**Defenders of Wildlife * The Humane Society of the United States * World Wildlife Fund**
**WildEarth Guardians * Rocky Mountain Wild**

USDA Forest Service Rocky Mountain Region
Attn: Objection Reviewing Officer
P.O. Box 18980
Golden, CO 80402

July 14, 2020

Subject: Objection for the Thunder Basin National Grassland 2020 Plan Amendment
Responsible Official: Russell Bacon, Forest Supervisor, Medicine Bow-Routt National Forest and Thunder Basin National Grassland, 2468 Jackson Street, Laramie, WY 82070
Submitted via: https://cara.ecosystem-management.org/Public//CommentInput?Project=55479

Dear Objection Reviewing Officer:

Pursuant to 36 CFR Part 219 Subpart B, Defenders of Wildlife, the Humane Society of the United States, the Humane Society Legislative Fund, World Wildlife Fund, and WildEarth Guardians are filing this administrative objection to the Thunder Basin National Grasslands proposed Amendment to its land and resource management plan, Final Environmental Impact Statement, and Draft Record of Decision.

Sincerely,


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**Summary of Objection Issues**

We are filing this administrative Objection with the United States Forest Service (Forest Service) regarding the proposed Amendment (the so-called "2020 Amendment") to the Thunder Basin National Grassland (Grassland *or* TBNG) Land and Resource Management Plan (2002 LRMP) because the proposed amendment process and substance fail to comply with a set of laws and their implementing regulations and associated policy. With the amendment and supporting analyses for this agency action, the Forest Service risks violating the National Forest Management Act (NFMA; 16 USC 1600 et seq.)—particularly its "diversity requirement" (16 USC 1604(g)(3)(B)), NFMA's regulations governing management planning—the 2012 Planning Rule (36 CFR 219 Subpart A), the National Environmental Policy Act (NEPA; 42 USC 4321 et seq.) and several implementing regulations under 40 CFR 1500-1508 the United States Endangered Species Act (ESA; 16 USC 1531 et seq.)—particularly Section 7(a)(1) of the Act (16 USC 1536(a)(1)), and the Constitution of the United States. The Responsible Official[1]—the Supervisor of the Medicine Bow-Routt National Forest and TBNG—put forth a plan amendment that significantly reduces protections for at-risk wildlife, removes direction intended to promote endangered black-footed ferret (ferret; *Mustela nigripes*) recovery, and fails to restore and maintain ecological integrity on the Grassland.

The objection points include the following:

- The Forest Service has failed to provide a legitimate rationale for changing the 2002 LRMP, which include Amendment #3 pertaining to black-tailed prairie dog (prairie dog *or* BTPD; *Cynomys ludovicianus*) and the Black-tailed Prairie Dog Conservation Assessment and Strategy of 2015 (2015 Strategy), violating the Planning Rule (36 CFR 219.13(b)(1)) and NEPA regulations (40 CFR 1502.13).

- The Forest Service has not used the best available scientific information to develop the Amendment and conduct the environmental analyses in the Final Environmental Impact Statement (FEIS), final Biological Evaluation (BE), and final Biological Assessment (BA), in violation of 36 CFR 219.3. Additionally, NEPA requires the use of high-quality information (40 CFR 1500.1(b)).

- The Forest Service acknowledges the proposed Amendment provides direction inconsistent with maintaining or restoring ecological integrity, in violation of 36 CFR 219.8(a) and 36 CFR 219.9(a).

- The proposed Amendment fails to provide the ecological conditions to contribute to the recovery of fails to provide a program to conserve the ferret, in violation of 36 CFR 219.9(a)&(b)(1) and ESA (Section 7(a)(1)), respectively.

- The proposed Amendment fails to provide the ecological conditions necessary to maintain the viability of several Regional Forester Sensitive Species (Sensitive Species) and potential Species

[1] The Responsible Official, the Forest Service's planning team, Region 2 staff involved in developing the proposed Amendment will generally be referred to as "the Forest Service" in this Objection.

of Conservation Concern (SCC), including the prairie dog, but also species associated with prairie dogs: the mountain plover (*Charadrius montanus*) and burrowing owl (*Athene cunicularia*), in violation of 36 CFR 219.9(a)&(b)(1) and Forest Service Manual (FSM) 2670. Additionally, the FEIS and BE do sufficiently assess the environmental consequences of the proposed Amendment as well as the other action alternatives (alternatives 2-4) developed for this process, which violates NEPA requirements at 40 CFR 1502.16.

- The proposed Amendment fails to sufficiently assess the environmental consequences of the use of fumigants on several SS and SCC that use prairie dog burrows such as the swift fox (*Vulpes velox*).

- The proposed Amendment violates Article IV, Section 3 of the United States Constitution by ceding federal authority over wildlife management to the State of Wyoming.

We explain the basis for each objection point below, beginning with point "1.".

**Introduction**

There are fewer and fewer places on America's prairie grasslands where we can conserve native wildlife and recover endangered species. Thunder Basin National Grassland in Wyoming is one of those places. The sheer expanse and diverse ecology of TBNG supports keystone species such as the prairie dog and all the species that depend on them—including, one day in the future, the endangered black-footed ferret. Saving wildlife at places like the TBNG has become even more important considering the growing wave of extinctions resulting from our failed efforts to take better care of our natural environment. The Forest Service, as the lead public lands agency of TBNG, has an ethical and legal responsibility to make management decisions that sustain and recover wildlife. Unfortunately, the agency's proposed management plan amendment for managing prairie dogs on TBNG does meet this standard. In fact, the amendment goes in the opposite direction by rolling back important wildlife protections needed for Thunder Basin to function with the integrity of a diverse and resilient grassland. The proposed amendment favors the agricultural enterprises that utilize Thunder Basin's public landscape, yet multiple uses can only be sustained if the land and wildlife are too.

But what about the public resource of wildlife? We know conserving habitat, including the habitat prairie dogs provide, is vital to maintaining and restoring wildlife populations and reversing the trend toward mass extinction. The plight of the black-footed ferret is emblematic of the dire consequences of poor land use decisions. Today only about 340 ferrets live in the wild, and TBNG is one of the few places where we can make a difference in their recovery. The return of ferrets to TBNG could reverse course for this species headed, again, toward extinct. Yet, the proposed Amendment brazenly ignores this opportunity and fails to meet the Forest Service's regulatory obligation to contribute to the recovery of ferrets. Conserving prairie dogs and the unique habitat they provide—for a wide array of wildlife—is the responsibility of government agencies. The Forest Service must consider the health of TBNG and its wildlife, today and tomorrow, for everyone.

The Forest Service plays a vital role in managing public lands for ecosystem health, which supports multiple use of our grasslands. We know prairie dog management has long been a social issue on TBNG and have been committed to finding solutions. Healthy grasslands with a diversity of species and habitats can support productive rangelands. Because the proposed amendment fails to strike this balance, the undersigned organizations are filing this objection to the prairie dog plan amendment and calling attention to the Forest Service's failure to meet their obligations to affirmatively contribute to the recovery of the endangered black-footed ferret. This amendment decision affects not only the TBNG but also the nation's hope for recovery of an iconic American species.

**Objectors' Previous Comments**

Each Objector previously submitted timely specific written comments regarding the Grassland's 2020 Amendment during designated opportunities for public comment, which occurred at Scoping and Draft Environmental Impact Statement. Each of the issues discussed in this Objection was raised in Objectors' prior comments, and Objectors hereby incorporate those comments by reference. These comments are referenced in the Objection as noted below.

- Defenders et al. 2019. Defenders of Wildlife, Prairie Dog Coalition of the Humane Society of the United States (now just the Humane Society of the United States), World Wildlife Fund. 2019. Scoping Comments on the Proposed Amendment to the Thunder Basin National Grassland Management Plan. May 20.

- Defenders et al. 2020. Defenders of Wildlife, Prairie Dog Coalition of the Humane Society of the United States (now just the Humane Society of the United States), World Wildlife Fund. 2020. Thunder Basin Plan Amendment Comment Letter (EIS No. 20190250). January 9.

- WildEarth Guardians 2020. WildEarth Guardians. 2020. Thunder Basin Plan Amendment Comments (EIS No. 20190250). January 8.

- Rocky Mountain Wild 2020. Rocky Mountain Wild. 2020. Thunder Basin Plan Amendment Comments (EIS No. 20190250). January 9.

**Statements of Objection Issues**

**1. The proposed Amendment does not comply with the National Forest Management Act.**

NFMA was enacted in 1976 in large part to elevate the value of ecosystems, habitat, and wildlife on our national forests and grasslands to the same level as timber harvest, livestock grazing, and other uses. In April 2012, the Forest Service finalized the 2012 Planning Rule, the implementing regulations to meet NFMA's requirement that national forests and grasslands develop management plans that provide for multiple uses. See 16 USC 1604; 36 CFR 219 et seq. A forest or grassland management plan is intended to be the vehicle that balances these purposes.

### 1.1. The Forest Service's basis for changing the management plan is arbitrary and flawed, in violation of 36 CFR 219.13.

The Forest Service has not sufficiently justified changing the Grassland's 2002 LRMP based on established criteria in NFMA. Although NFMA authorizes the Forest Supervisor to amend forest plans, this authorization is accompanied by crucial limitations to prevent arbitrary amendments. Pursuant to the 2012 Planning Rule, an amendment must be based on a "preliminary identification of the need to change the plan," which may be based on "a new assessment; a monitoring report; or other documentation of *new* information, changed conditions, or changed circumstances." 36 CFR 219.13(b)(1) (emphasis added). As the Forest Service recognizes, amendments are intended to keep plans "*current*, *effective*, and relevant." FSH 1909.12, ch. 20, sec. 21.3. Forest Service Directives further caution that "[a] well-supported and effective rationale determining a need to change the plan *must be based on a good source of information.*" FSH 1909.12, ch. 20, sec. 21.2. The Planning Rule states that "[t]he responsible official shall document how the best available scientific information ("BASI") was used to inform the amendment decision…" (36 CFR 219.3). Moreover, "[s]uch documentation must: Identify what information was determined to be the best available scientific information, explain the basis for that determination, and explain how the information was applied to the issues considered." 36 CFR 219.3. The planning Directives provide further support for and guidance to uphold these requirements. FSH 1909.12, ch. 20, sec. 21.2; FSH 1909.12, ch. 20, sec. 21.21. In light of these limitations, an amendment without a sufficient basis in science and that relies on irrelevant factors (such as outdated information or no-longer-extant conditions) would be arbitrary.[2]

Establishing a legitimate purpose and need for an agency action is a related NEPA requirement. 40 CFR 1502.13. We have detailed in Section 2.1 how the proposed Amendment fails to meet this requirement. The same arguments can be applied regarding the Planning Rule's requirements under 36 CFR 219.13, and we summarize these issues below.

We addressed this issue in scoping comments. Defenders et al. 2019. We also provide a detailed explanation of this argument in Defenders et al. 2020 at 11-17. WildEarth Guardians 2020 at 2-3 also addressed this point.

*a. The "management problem" is the failure of the Forest Service to fully apply direction available in the current management plan.*

In Defenders et al. (2019 at 4-7), we detailed how the 2002 LRMP, Amendment #3, and the 2015 Strategy provide the necessary management direction to meet the Forest Service's purposes for the new

[2] This requirement is consistent with general principles of administrative law requiring that, when an agency changes policy, it must provide a reasoned explanation, display awareness that it *is* changing position, and explain why it believes the new policy is better than its previous policy. *See FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009). As the Supreme Court has stated: "To explain a change requires more than setting forth reasons why the new policy is a good one. It also requires the agency to answer the question, 'Why did you change?' And a rational answer to this question typically requires a more complete explanation than would prove satisfactory were change itself not at issue." *Id.* at 549.

Amendment. The problem isn't the need for more management options but the Forest Service's failure to implement the available direction in the plan it has. In response to our comments, the Forest Service states,

> Because total prairie dog colony area on the grassland is variable from year to year, we have considered colony area volatility and extremes in both colony growth and decline as primary contributing factors to the need to change the plan; using solely current colony area in considering whether there is a need to change the plan would ignore information about how prairie dog colonies might be expected to behave in the future.

FEIS at C-11.

This response is arbitrary. Prairie dog colony area changes over time—naturally. To artificially cap colony area to 10,000 acres and 7,500 during drought represents over-management not based on the best available scientific information (also a violation of 36 CFR 219.3). Moreover, none of the action alternatives provide additional management tools that justify changing the management plan. To support these arguments, see Defenders et al. 2019, citing USFS, TBNG 2014; USFS, MBRNF & TBNG 2017; Ferebee 2017; Jaeger 2017; Andersen et al. 2017 and also Defenders et al. 2020 at 34-43.

*b. The Forest Service's argument for the need to change the plan is not based in science.*

The 2015 Strategy includes a provision calling for the Forest Service to review the strategy when prairie dog colony area exceeds 35,000 acres. The 2015 Strategy does not suggest the management plan or strategy be changed in response to this trigger. Prairie dog colony area expanded to an estimated 48,000 acres in 2017 across the Grassland. FEIS at 14. A widespread sylvatic plague epizootic that began in 2017 caused significant prairie dog mortality, reducing the area occupied by prairie dogs down to 625 acres by 2018, and the latest survey found 2,438 acres across the Grassland. FEIS at 6. The FEIS describes the expansion of prairie dog colony acres to 48,000 acres a "management situation," (FEIS at 14) despite this figure being consistent with prairie dog colony expansion predicted in the 2002 LRMP analyses and within the natural range of variation (NRV) for prairie dog occupancy. The Forest Service implies that social pressure influenced the need for change. FEIS at 14. The FEIS notes the Forest Service believes the current plan to be inflexible and contradictory to address the "management situation," but does not provide an explanation for these assertions. FEIS at 14.

The Forest Service's own science regarding prairie dog colony area for the Grassland does not support a need to change management direction, and this is also a violation of the Planning Rule requirement (36 CFR 219.3) regarding the need for using and documenting the use of the best available scientific information. The 2015 Strategy reported that 128,282 acres of potential prairie dog habitat exists on the Grassland (about 23% of the 553,000-acre TBNG); 48,000 acres is about 37% of the potential habitat and <9% of the total TBNG area. Again, the 2017 count of 48,000 acres of prairie dog colonies was accurately predicted by the Forest Service as natural expansion. United States Forest Service (USFS) 2000. Thus, it is perplexing why the Forest Service is describing 48,000 acres of prairie dog colonies on the Grassland a "management situation" or problem.

**1.2. The Forest Service has not used the best available scientific information to develop the proposed Amendment, in violation of 36 CFR 219.3.**

The Responsible Official is required to use the best available scientific information to inform a management plan amendment process. 36 CFR 219.3. The plan documents, including the FEIS, BE, and BA presented an array of scientific information in developing the Amendment and other action alternatives. However, the Forest Service failed to include some essential science that, if the agency had utilized, should have resulted in a different proposed decision. Additionally, the Forest Service mischaracterizes the results and management implications of some important scientific information. We indicate below where we have provided scientific information and accurate interpretations of that science.

- The Draft ROD, FEIS, and BE claim prairie dogs are resilient to plague, and this is not supported by the science. Draft ROD at 1. See Defenders et al. 2020 at 54-75.

- The BE claims that "rates to quickly recolonize available empty burrows (Knowles 1986, Uresk and Schenbeck 1987, Radcliffe 1992, Andelt 2006)," and this statement references some sources that are no longer the best available science and mischaracterizes the results of other sources. BE at E-164. See Defenders et al. 2020 at 72-73.

- Despite acknowledging that prairie dogs are keystone species and important to the Grassland's mixed- and short-grass grassland ecosystems in various narratives in the plan documents, but the essential role of prairie dog activity as a grassland disturbance process and key element of ecological integrity is not reflected in the Rangeland Vegetation and Livestock Grazing effects analysis and, more importantly, not reflected in the proposed Amendment. This demonstrates a failure to accurately interpret and document the best available scientific information. See Defenders et al. 2020 at 36-43.

- The plan documents do not consider the best available science on ferret reintroduction and recovery, and thus, it is not surprising that the proposed Amendment and other action alternatives to not provide plan components that would support ferret recovery. Defenders et al. 2020 at 47-53.

- The plan documents have not accurately interpreted the best available scientific information on prairie dog, mountain plover, and burrowing owl, which has resulted in plan components in the proposed Amendment and other action alternatives failing to provide the ecological conditions necessary to maintain the viability of these species on the grassland. See Defenders et al. 2020 at 54-75, 75-82, 82-83.

**1.3. The proposed Amendment does restore or maintain ecological integrity, and the Forest Service has specifically stated in the Draft Record of Decision it will not be managing the Grassland to maintain or restore ecological integrity, which violates 36 CFR 219.8(a) and 36 CFR 219.9(a).**

Section 219.8(a)(1) of the Planning Rule states "The plan must include plan components, including standards or guidelines, to maintain or restore the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area, including plan components to maintain or restore structure, function, composition, and connectivity …". The plan must take into account, among other elements of integrity, "System drivers, including dominant ecological processes, disturbance regimes" (219.8(a)(1)(iv)) in the development of plan components. We addressed this issue in previous comments. Defenders et al. 2020 at 34-43.

Ecological integrity is defined in the Planning Rule as:

> The quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence. 36 CFR 219.19.

The Draft ROD claims "the final environmental impact statement shows changes to the plan components maintain ecosystem sustainability … . The decision meets the substantive provisions described at 219.8." Draft ROD at 26-27. This is not true. The Draft ROD states,

> The interdisciplinary team considered the role of the natural range of variation in ecosystems affected by the plan amendment. Prairie dogs are native species on the northern Great Plains, and the disturbances they cause are part of the natural range of variation on the Thunder Basin National Grassland. My decision does not base the design of all plan components on those conditions common in the past relative to the natural range of variation. In many cases, those conditions are contrary to our objectives to balance the social, economic, cultural, and ecological needs in areas of the Thunder Basin National Grassland where prairie dogs are common. My decision is consistent with the purpose and need for this plan amendment and deviation from the natural range of variation is appropriate. The biological evaluation of animal species documents consideration of the conditions, trends, and stressors that affect the ability of the plan area to sustain native wildlife, and the rangeland vegetation and livestock grazing analysis (final environmental impact statement chapter 3) documents consideration of the ability of the plan area to sustain domestic livestock and minimize conflicts between prairie dog management and livestock grazing (Forest Service Handbook 1909.12 chapter 20 section 23.23). Draft ROD at 28.

Developing plan components based on the natural range of variation (NRV) of disturbances, including prairie dog foraging, vegetation clipping, and digging disturbance and fire disturbance, is a Planning Rule requirement.

a. *The proposed Amendment include plan components that authorize managing prairie dogs at artificially depressed levels by poisoning and shooting the animals, which is inconsistent with the NRV for prairie dogs.*

The Forest Service justifies its decision not to manage for an NRV for prairie dog disturbance based on direction in the Forest Service Handbook. However, this contradicts the Planning Rule. Guidance in the directives cannot override regulation. The Forest Service is proposing, in the Amendment, to cap prairie dog colony acreage at 10,000 acres, and 7,500 acres during drought, in the proposed MA 3.67; enable the reduction of prairie dog densities with poisoning, shooting, and relocation; not provide any protections for prairie dogs outside of the proposed MA 3.67; and kill prairie dogs in "boundary management zones" adjacent to private and state lands. However, Forest Service science predicted that prairie dog acres would naturally expand to 48,000 acres and found that 128,282 acres of suitable prairie dog habitat exists on the Grassland. USFS 2000; 2015 Strategy.

*b. The presence of ferrets must be considered as part of the NRV for the Grassland, and the Amendment must include plan components to support their recovery.*

Ferrets must be considered key compositional and functional characteristics of TBNG's prairie ecosystem. Not providing plan components to promote their recovery violates 36 CFR 219.8(a)(1) & 219.9(a)(1) as well as the ESA.

As we argue throughout this Objection, the proposed Amendment precludes ferret recovery on the Grassland. Black-footed ferrets belong in TBNG and historically occurred on the Grassland. Five black-footed ferret sightings were documented on TBNG between 1971 and 1977. USFS, MBNF & TBNG 1985. The last ferret was observed on the Grassland in 1981. USFS, MBNF & TBNG 1985. They are part of what makes up the biodiversity of the ecosystem, and their near extinction is a symbol of the global and national biodiversity crisis, as well as the deterioration of the integrity of grassland ecosystems. The Planning Directives include "species richness," "species diversity," and the "presence and abundance of species at risk" as compositional characteristics of ecosystems. FSH 1909.12, ch. 10, 12.13 – Exhibit 01. Ferrets also serve a functional role in the ecosystem as predators. FSH 1909.12, ch. 10, 12.13 – Exhibit 01. Their presence and persistence within a grassland ecosystem patch (i.e., a prairie dog complex) is an indicator of ecological integrity, including that there is a level of connectivity that allows for dispersal and promotes genetic diversity. Without ferrets, the Grassland is missing a key member of the ecological community.

### 1.4. The proposed Amendment fails to meet the requirements of 36 CFR 219.9 for several at-risk species.

NFMA requires the Forest Service to develop planning regulations that shall "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives" (i.e., the "diversity requirement") (16 USC 1604(g)(3)(B)). The preamble of the Planning Rule states,

> The rule contains a strong emphasis on protecting and enhancing water resources, restoring land and water ecosystems, and providing ecological conditions to support the diversity of plant and animal communities, while providing for ecosystem services and multiple uses. 77 Fed Reg. 21163.

Additionally, management plans must:

> Contribute to ecological, social, and economic sustainability by ensuring that all plans will be responsive and can adapt to issues such as the challenges of climate change; the need for forest restoration and conservation, watershed protection, and species conservation; and the sustainable use of public lands to support vibrant communities. (77 Fed. Reg. 21164)

These passages clearly demonstrate that the Planning Rule affirms that wildlife and habitat protection must be given the same priority as forest uses. The Rule requirements in 36 CFR 219.8 and 36 CFR 219.9 make this principle a mandate. The Rule requires forest plans to have plan components to maintain or restore the integrity of the terrestrial and aquatic ecosystems in the plan area (36 CFR 219.9(a)(1) & 219.8(a)) and the diversity of ecosystems and habitat types throughout the plan area (36 CFR 219.9(a)(2)). Essentially this requires forest plans to maintain or restore the variety of ecosystems and habitat types found on national forests and grasslands (e.g., conifer forests, wetlands, grasslands), as well as the condition of the ecosystems themselves.

In accordance with 36 CFR 219.9(b)(1), plan components must provide the "ecological conditions necessary to: contribute to the recovery of federally listed threatened and endangered species." This includes the endangered black-footed ferret.

The TBNG management plan must include plan components that maintain viable populations of Sensitive Species and/or potential SCC in the plan area. FSM 2670; 26 CFR 219(a) & (b)(1). In accordance with FSM 2670, the Forest Service must,

1. Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.
2. Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands
3. Develop and implement management objectives for populations and/or habitat of sensitive species.

FSM 2670.22. Sensitive Species policy defines a "viable population" as,

> A population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range (or range required to meet recovery for listed species) within the planning area. FSM 2670.5.

For potential SCC, the plan must maintain viable populations under 36 CFR 219.9(b)(1) by providing the necessary ecological conditions to do so in accordance with 36 CFR 219.9(a). The 2012 Planning Rule defines "viable population" as a "population of a species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments." 36 CFR 219.19.

We detailed how the action alternatives presented in the DEIS failed to comply with several Planning Rule requirements throughout previous comments. Defenders et al. 2020. The new Alternative 5 (the proposed Amendment) violates provisions in the Planning Rule as well. We explain these problems below.

### 1.4.1. The proposed Amendment fails to provide the ecological conditions necessary to contribute to black-footed ferret recovery, in violation of 36 CFR 219.9(a)(1) & (b)(1).

TBNG must provide the ecological conditions to support a ferret population with 100 breeding adult ferrets to contribute to the recovery of the species. Because so few sites exist with the capacity to support 100 breeding adult ferrets, the Grassland must serve as one of these crucial sites. Unfortunately, the proposed Amendment and other action alternatives will preclude the recovery of the species and do not provide plan components that are conducive to supporting a ferret population of any size—not even the minimum requirement of 30 breeding adult ferrets. We addressed this problem in Defenders et al. 2020 at 47-53; WildEarth Guardians 2020 at 4. To support 100 breeding adult ferrets on a BTPD complex that is periodically affected by plague epizootics, similarly to TBNG, the best available scientific information indicates the following conditions are necessary:

- Large areas of occupied prairie dog colony habitat: a minimum range of 20,495 to 47,931 acres (average of 33,323 acres) active prairie dog colony area distributed within a complex of multiple colonies. Livieri 2014, 2015, 2016, 2017, 2018, 2019.
- Prairie dogs distributed in large complexes: prairie dog colonies configured in large complexes, groups of prairie dog colonies that are within 4.4 mi (7.0 km), and subcomplexes of colonies that are within 0.9 mi (1.5 km) of each other. Forrest et al. 1985; Biggins et al. 1993; Biggins et al. 2006b; and Eads et al. 2012.
- High and naturally occurring densities of prairie dogs and prairie dog burrows: high densities of prairie dogs (which may range from 40 to 70 prairie dogs per hectare) and prairie dog burrows (which may range from 80 to 220 active burrows per hectare) that are allowed to fluctuate naturally. Biggins et al. 2006b; Eads et al. 2011; Livieri and Anderson 2012; Eads et al. 2012; USFWS 2013.
- Plague mitigation. Annual sylvatic plague mitigation for ferrets and prairie dogs. USFWS 2013; Poché et al. 2017; Tripp et al. 2017; Tripp et al. 2018; Eads et al. 2018; Eads et al. 2019.
- Protection from poisoning. Protection of potential ferret reintroduction areas from year-round prairie dog poisoning. USFWS 2013.
- Protection from year-round prairie dog shooting. Protection of potential ferret reintroduction areas from year-round prairie dog shooting. USFWS 2013.

The proposed Amendment or other action alternatives will not result in these conditions.

*a. The proposed Amendment and other action alternatives do not provide for large areas of occupied prairie dog colony habitat.*

Each action alternative, including the proposed Amendment, includes plan components that cap prairie dog colony area at specific acreages, which will not meet the minimum requirements to support a ferret

population of 100 breeding adult ferrets. Alternative 2 and the proposed Amendment cap prairie dog habitat at 7,500 to 10,000 acres within the proposed MA 3.67 and does not include any plan components that assure prairie dog colonies will be protected outside of the management area. Alternative 3 caps prairie dog colony area at 15,000 acres for the entire Grassland. Neither Alternative 2, Alternative 3, or the proposed Amendment would be able to support a self-sustaining population of ferrets—even a population with 30 breeding adults, which is the very minimum considered potentially viable. Alternative 4 caps colony area at 27,000, divided between Category 1, with a 18,000-acre ceiling, and Category 2, the sets a limit at 9,000. Not only are the acreages insufficient to establish a ferret population, the widespread allowance of lethal control further inhibits the ability to support a population with 100 breeding adults.

*b. The proposed Amendment and other action alternatives to not contain plan components that would ensure prairie dogs are distributed in large complexes.*

None of the action alternatives, including the proposed Amendment, include plan components that would manage prairie dog colonies to assure a sufficient complex configuration. Lethal and non-lethal prairie dog density control enabled by each action alternative could fragment and isolate colonies too far from each other to facilitate frequent and regular ferret movements.

*c. The proposed Amendment and other action alternatives are specifically designed to reduce prairie dog densities instead of maintaining or restoring high, naturally occurring densities of prairie dogs and prairie dog burrows.*

Each action alternative, including the proposed Amendment, includes plan components that enable prairie dog density reductions. So-called "density control" is not consistent with providing sufficient prairie dog densities to support a ferret population of any size.

*d. The proposed Amendment and other action alternatives do not provide sufficient plague mitigation.*

The proposed Amendment includes a plague mitigation standard, "An integrated approach to plague management (e.g., using tools such as deltamethrin and fipronil) will be implemented annually." Draft ROD at 67. The other action alternatives include the same guideline to allow plague mitigation. Without a sufficient standard that assures plague mitigation will occur on the Grassland, TBNG will likely never be able to sustain the prairie dog colony area, density levels, and distributions to support a ferret population with at least 100 breeding adults.

*e. The proposed Amendment and other action alternatives do not provide any areas that offer protection from prairie dog poisoning.*

The elimination of MA 3.63 in all action alternatives, including the proposed Amendment, and loss of prohibitions on poisoning in the Category 1 area in Alternative 4, mean that there will be no places on TBNG completely protected from prairie dog poisoning. Ferret habitat has to be protected from

poisoning to enable the size of colonies and densities of prairie dogs sufficient to support a viable ferret population.

*f. The proposed Amendment and other action alternatives to not provide protection from year-round prairie dog shooting.*

The elimination of MA 3.63 in all action alternatives and loss of prohibitions on poisoning in the Category 1 area in Alternative 4, mean that there will be no places on TBNG completely protected from prairie dog shooting. Ferret habitat has to be protected from prairie dog shooting to enable the size of colonies and densities of prairie dogs sufficient to support a viable ferret population.

### 1.4.2. The proposed Amendment fails to provide the ecological conditions necessary to maintain black-tailed prairie dog viability, in violation of Forest Service Manual 2670 and 36 CFR 219.9(a) & (b)(1).

The BTPD is a Sensitive Species and potential SCC for the Grassland. The FEIS made the following determination regarding the effects of the proposed Amendment on the BTPD:

> May adversely impact individuals but not likely to result in a loss of viability in the planning area, nor cause a trend toward Federal listing; No substantial adverse impacts or substantially lessened protections as a result of the plan amendment. FEIS at 127 Table 29.

This statement is inaccurate. **The purpose of the proposed Amendment is to substantially lessen protections for prairie dogs.** The content of Table E-21 in the Environmental Consequences section of the prairie dog section is described in this way:

> Plan components developed for black-tailed prairie dogs and other species will directly and indirectly reduce impacts (see Table E-21). In addition, the plan components listed below reduce the overall threats to the species by managing for preferred habitat. BE at E-175.

Implying the plan components are somehow more protective of prairie dogs and their habitat than the existing management plan is disingenuous. The elimination of the MA 3.63 protected area and the level of prairie dog poisoning and shooting enabled by the proposed Amendment, and other action alternatives, are intended to have population-level impacts: keeping the prairie dog population on the Grassland artificially low, constricting the species distribution across National Forest System (NFS) lands, and unnaturally reducing prairie dog densities. These factors combined with the inevitability of future plague epizootics and the lack of an annual plague mitigation plan in the proposed Amendment could lead to prairie dog extirpation across the Grassland.

We supplied substantial scientific support for this claim in Defenders et al. 2020 at 54-75 regarding action alternatives 2-4. And this issue was addressed in WildEarth Guardians 2020 at 5. Our claim holds for Alternative 5/preferred alternative as well. The proposed Amendment (Alternative 5) is a modification of Alternative 2 but provides no net benefits for prairie dogs relative to the other action

alternatives and may, on balance, be more harmful to prairie dogs than Alternative 2 (Proposed Action). The proposed Amendment puts prairie dog viability at risk on the Grassland.

*a. The proposed Amendment risks prairie dog viability by managing prairie dog colony area to be artificially low, especially during drought years.*

As Alternatives 2-4 did, the proposed Amendment prescribes ceilings on how large prairie dog colony areas can become during drought and non-drought periods. Keeping prairie dog populations at artificially depressed levels will not only reduce ecological integrity sustained by prairie dog colonies but will also put at risk the viability of prairie dogs. The proposed Amendment caps prairie dog colony acres in the MA 3.67 at 10,000 acres and 7,500 acres during drought years in the following objective and guidelines.

> GPA-MA3.67-FWRP-O-07. Manage toward 10,000 acres of prairie dog colonies in the management area each year during the life of the plan. In drought years, temporarily manage toward an objective of 7,500 acres of prairie dog colonies. Objective
>
> GPA-MA3.67-FWRP-GL-11. When prairie dog colony acreage is greater than 10,000 acres, use prairie dog control tools to maintain the 10,000 acre objective to minimize resource management conflicts. Guideline
>
> GPA-MA3.67-FWRP-GL-12 During drought, to mitigate prairie dog colony expansion, the total colony acreage in the management area may be managed toward a temporary alternate objective of 7,500 acres. Drought is defined as any year or sequence of years when annual precipitation amounts are less than 75 percent of normal, based on local climate data and in consultation with the United States Drought Monitor. Guideline

Prairie dogs have evolved with periodic drought conditions that have been part of the Great Plains climate for millennia. However, drought can affect the resiliency of colonies and populations when those populations are small. While the Forest Service acknowledges that prairie dog populations "are negatively impacted by long-term drought" (BE at E-122), the agency doesn't seem to understand that drought-induced prairie dog colony expansion does not correlate with population increases. The BE states, "Expanding colonies can grow in a few years, increasing population size on the order of 30 to 300 percent annually." BE at E-163. We thoroughly responded to this misunderstanding of prairie dog-drought dynamics and explained the potential negative impacts of drought, especially in small populations, to prairie dogs in Defenders et al. 2020 at 54-59, 71-75.

*b. The proposed Amendment risks prairie dog viability by capping allowable prairie dog colony area, providing no protections for prairie dogs in the proposed Management Area 3.67, and allowing the extermination of prairie dogs outside of the MA 3.67, resulting in a constricted prairie dog distribution.*

The proposed Amendment eliminates the satellite colony concept from Alternative 2, which offered some level of protection for prairie dog colonies outside of the proposed MA 3.67. Alternative 5 includes

no plan components that would provide any level of protection for prairie dog colonies outside of the MA 3.67. A standard authorizes prairie dog extermination outside of the MA 3.67,

> … On other site-specific colonies where control is requested, after consideration of impacts to nesting, breeding, and denning habitat for species associated with prairie dog colonies. FEIS at A-1-12.

Thus, anyone can request prairie dogs be exterminated. The standard is written to make the Forest Service beholden to fulfill such requests, and impacts to nesting, breeding, and denning habitat of prairie dog associated species need only be "considered"—which offers no meaningful direction. The 2015 Strategy reported TBNG has 128,282 acres of potential prairie dog habitat (2015 Strategy at 19, Table 2). Under the proposed Amendment, prairie dog colony acreage will be kept below 8% of the suitable habitat available on the Grassland during non-drought years when total prairie dog colony area is allowed to reach 10,000 acres and can go below 6% of available suitable habitat during drought years when colony area is managed toward 7,500 acres. During times when prairie dog colony area reaches 7,500 or 10,000, this leaves 120,782 to 118,282 acres of potential habitat that could technically be completely unprotected from poisoning and shooting; this area could become permanently unsuitable for prairie dogs.

Moreover, due to the Boundary Management Zones (BMZs) where prairie dogs will be poisoned, prairie dog distribution is further constricted in the proposed MA 3.67. The current MA 3.63, where prairie dogs are protected from poisoning and shooting, is 51,000 acres. FEIS at 56. The proposed MA 3.67 is 42,335 acres, but the following guideline shrinks the area where prairie dogs will be tolerated on the Grassland to at least 35,059 acres (See FEIS at 44) with an allowance for more:

> GPA-MA3.67-FWRP-GL-14. A temporary (i.e., 1 to 3 year) ¾-mile boundary management zone that includes the standard ¼-mile boundary management zone may be used at specific locations within Management Area 3.67 to address imminent or persistent prairie dog encroachment if (a) the Forest Service determines that prairie dogs on Federal land are moving toward the boundary management zone and are a potential boundary problem or (b) control efforts within ¼-mile of private or State property using appropriate tools for 3 consecutive years have not been successful. Before expanding a boundary management zone, the responsible official should consider the total area of prairie dog colonies relative to the 10,000 acre objective for prairie dog colonies, impacts to species associated with prairie dog colonies, compliance with other plan components, site-specific information, and concurrent treatment by the adjacent landowner. Guideline

Though it may be an unlikely scenario, it is possible that the ¾ "temporary" BMZ allowance can further shrink the area that can be occupied by prairie dogs to 20,507 acres, which is only 48.4% of the proposed MA 3.67 area.

The problem is that condensing the area where prairie dogs are distributed across the Grassland and not protecting colonies outside the proposed MA 3.67 makes the prairie dog population within the proposed MA 3.67 more vulnerable to extirpation from plague epizootics. While the Forest Service

makes the assumption that private lands will contribute to prairie dog viability on the TBNG, stating, "Adjacent private lands are expected to provide support and resiliency to plover populations that occur on NFS lands, especially considering the pattern of mixed ownership across TBNG" (BE at E-152), this is not assured. The overriding purpose of the proposed Amendment is to address social conflict regarding prairie dogs that the Forest Service has noted are continuing despite changes in the plan over the years made to address these conflicts. In this context, where there is low tolerance for prairie dogs among ranchers who graze their cattle as TBNG allotment lessees and/or surrounding private lands, the Forest Service cannot make the assumption above. In the event of a plague epizootic with 100% prairie dog mortality, recovering the population would require rescue from prairie dogs migrating back into the Grassland. If prairie dog colonies are not sufficiently connected because they do not exist near enough for in-migration, prairie dog viability on the TBNG is at risk.

*c. The proposed Amendment risks prairie dog viability by enabling prairie dog density reductions, including when total prairie dog colony acres are below the 7,500-acre drought year cap.*

The proposed Amendment includes prairie dog density reduction plan components, as did action alternatives 2 and 3, with some modifications. The proposed Amendment even allows "density control" when prairie dog colony area in the propose MA 3.67 fall below 7,500 acres, as authorized by the following standards:

> GPA-MA3.67-FWRP-ST-10. Do not authorize use of control tools when prairie dog colony acreage is less than 7,500 acres, except in boundary management zones or if approved for density control based on best available scientific information. Standard
>
> GPA-MA3.67-FWRP- ST-15. Do not authorize prairie dog density control activities when total colony acreage is less than 7,500 acres, unless best available scientific information indicates that density control activities will achieve site-specific objectives and maintain habitat requirements for species associated with prairie dog colonies. Colonies treated for density control will continue to count toward the 10,000 acre objective for prairie dog colonies. Standard

It is not clear how the "best available scientific information" would guide the application of these guidelines because it is unclear what the science should be informing. Of course, science should be used in decision making. But in the case of these guidelines, it is unclear what the purpose of the science would be. The management approaches do not make this clearer. The following excerpts are from the management approaches section of the FEIS: Appendix B.

> Density control could occur in different spatial patterns and at different intensities. The objectives of density control would be site-specific and could include influencing colony growth and dispersal, preventing undesirable vegetation state changes, and promoting forage availability. FEIS at B-6.
>
> The preferred alternative would not allow density control if total colony acreage is less than 7,500 acres in management area 3.67 until scientific information becomes available to indicate

> that density control can meet site-specific objectives and maintain habitat for species associated with prairie dog colonies. FEIS at B-6.

The first excerpt, discussing some potential objectives of density control, doesn't help explain what questions the science is supposed to answer. The second excerpt seems to be an attempt to confer constraints on the guideline that are not actually a part of the guideline, which is misleading.

Reducing prairie dog densities using poisoning and shooting, or even non-lethal methods, is not supported by the best available science as a mechanism that will sustain viable populations of species associated with prairie dogs. Biggins and Eads (2019) found that shooting and poisoning of prairie dogs, and the resulting prairie dog moralities encourage fleas to "flock" or search for new hosts. This phenomenon may allow for increased flea parasitism on prairie dogs and, perhaps, increased plague transmission. The fragmentation of prairie dog colonies due to plague, shooting, and poisoning leads to small, isolated colonies that are subject to potential extirpation due to inbreeding, population fluctuations, and other issues that not only affect their long term population viability but also the viability of wildlife species that depend on them for survival (Reading et al. 1989; Miller et al 1994). Mountain plovers, burrowing owls, and ferrets all require habitat with high densities of prairie dogs. Density control could permanently eliminate suitable habitat.

*d. The new plague mitigation standard in the proposed Amendment is necessary to maintain a viable population of prairie dogs on the Grassland, however, it is not sufficient given the lack of a fully protected area for the species and multiple compound threats enabled by the plan components.*

We appreciate that the proposed Amendment (Alternative 5) includes a plague standard, which we had requested in DEIS comments, and also includes an objective for plague management. Alternative 5 changed a guideline providing direction for plague mitigation in the proposed MA 3.67 to a standard, that reads,

> An integrated approach to plague management (e.g., using tools such as deltamethrin and fipronil) will be implemented annually. FEIS at 68.

The proposed Amendment also includes the following objective:

> Develop a plague management plan within 3 years of 2020 plan amendment approval. FEIS at 65.

However, the standard is too vague to provide sufficient direction to assure that plague epizootics do not lead to the extirpation of prairie dogs on the Grassland—especially given that prairie dog poisoning and shooting will occur in the proposed MA 3.67 and prairie dog colony area and populations will be managed at artificially depressed levels. And the objective does not guarantee that the plague management plan will be implemented. At a minimum, the plague standard should include where and how often mitigation will occur annually and should only take one year to develop and implement a plague management plan. Biologically, protecting 999-3,000 acres is a great start to help prairie dogs

recover from the recent plague outbreak. As prairie dog colony acres expand, however, and to achieve 10,000 acres of prairie dogs, the number of acres of plague abatement will need to increase accordingly, which could cost up to $275,000 annually.

Of considerable concern is the financial and time investment in plague mitigation when those same prairie dog acres can be poisoned or shot. Biggins and Eads (2019) found that poisoning and recreational shooting of prairie dogs causes high localized mortality, which increases flea abundance and infection in surviving individuals, and in turn can trigger a plague event. Prairie dogs that survive recreational shooting events have compromised immune systems, increased vigilance rates, and reduced foraging times; this is hypothesized to increase flea parasitism and trigger additional plague events. Therefore, if poisoning and recreational shooting of prairie dogs increases in flea abundance and infection, and this subsequently predicts or causes epizootic plague, a plague standard that protects prairie dogs from the disease in areas where they are not lethally controlled should be considered to maximize prairie dog viability and cost efficacy of limited resources. Given the available science, the proposed integrated plague mitigation approach alone is no substitute for an area that protects prairie dogs from poisoning, shooting, and plague with associated plan components that enable the expansion of prairie dog colonies into colony complexes and allow prairie dogs to occur at their natural densities.

### 1.4.3. The proposed Amendment fails to provide the ecological conditions necessary to maintain mountain plover viability, in violation of Forest Service Manual 2670 and 36 CFR 219.9(a)(1) & (b)(1).

The mountain plover is a Forest Service Regional 2 sensitive species, and the Forest Service has identified it as a potential SCC for the Grassland. In the Great Plains, mountain plovers are strongly associated with prairie dog colonies. Mountain plovers depend on the sparsely vegetated and bare ground conditions that prairie dogs can create. Reducing forb cover and bare ground conflicts with mountain plover habitat requirements. Knopf and Miller 1994. Research by Duchardt et. al (2020) found that higher mountain plover densities are correlated with bare ground and forb cover and that areas with greater forb cover are preferred nest sites. The action alternatives, including the proposed Amendment, are designed to provide increased forage for livestock and manage against these conditions, particularly through the application of “density control” and artificially depressing prairie dog colony acreage. If prairie dogs no longer play their keystone role because of persistent lethal control, mountain plover viability is compromised. Furthermore, there are no monitoring efforts outlined in any of the alternatives to assess the impact of density control on mountain plover populations. We addressed this issue in Defenders et al. 2020 at 75-77; WildEarth Guardians 2020 at 5.

### 1.4.4. The proposed Amendment fails to provide the ecological conditions necessary to maintain burrowing owl viability, in violation of Forest Service Manual 2670 and 36 CFR 219.9(a)(1) & (b)(1).

The burrowing owl is a Forest Service Regional 2 sensitive species, and the Forest Service has identified it as a potential SCC for the Grassland. In the Great Plains, burrowing owls are strongly associated with prairie dog colonies. They nest and shelter in prairie dog burrows and are rarely found off prairie dog colonies in the Great Plains. The proposed Amendment puts burrowing owl viability at risk on the

Grassland. Prairie dog shooting restrictions apply only until August 15, and only in the proposed MA 3.67, and the owls may remain in Wyoming through mid-October before migrating. WGFD 2018 (https://wgfd.wyo.gov/News/Transmitters-following-Wyoming%E2%80%99s-burrowing-owls-ov). Burrowing owls may look like prairie dogs and are in danger of being shot when prairie dog shooting is allowed. Eliminating the MA 3.63, where prairie dogs are protecting from poisoning and shooting; reducing prairie dog colony area down to 10,000 acres and 7,500 acres during drought; practicing prairie dog density control as prescribed in the propose Amendment risk extirpation of the species to TBNG. We addressed this issue in Defenders et al. 2020 at 82-83; WildEarth Guardians 2020 at 5.

## 2. The Final Environmental Impact Statement and associated analyses for the proposed Amendment do not comply with the National Environmental Policy Act.

NEPA has two objectives: (1) it requires an agency "to consider every significant aspect of the environmental impact of a proposed action"; and (2) "it ensures that the agency will inform the public that it has indeed considered environmental concerns in its decision making process." *United States v. Coal. for Buzzards Bay*, 644 F.3d 26, 31 (1st Cir. 2011) (internal citations omitted). Stated another way, NEPA requires federal agencies to take a hard look at the environmental consequences of their actions before they act. See 42 USC 4321, 4332(2)(C); 40 CFR 1501.2, 1502.25.

An incomplete analysis of environmental effects, or the efficacy of measures to reduce the severity of those effects, "undermine[s] the 'action-forcing' function of NEPA," because "neither the agency nor other interested groups and individuals can properly evaluate the severity of the adverse effects." *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 352 (1989) (citations omitted). A flawed analysis of the effects spills into the consideration of alternatives because, in the absence of understanding site-level impacts, the agency also cannot evaluate the comparative merits and tradeoffs of the alternatives it considers. Consideration of alternatives is the "heart" of the NEPA process because it defines the issues and provides a clear basis for choices by the decision maker and the public. 40 CFR 1502.14.

The FEIS fails to comply with the NEPA because it does not provide a legitimate purpose and need for the amendment and does not provide a range of reasonable alternatives. The FEIS, BE, and BA do not take a sufficiently hard look at direct, indirect, and cumulative effects of the action alternatives on at-risk species, including the ferret, prairie dog, and mountain plover. We addressed these issues in Defenders et al. 2020 at 83-95.

### 2.1. The Final Environmental Impact Statement and Draft Record of Decision fail to establish a legitimate purpose and need for the Amendment in violation of 40 CFR 1502.13.

With respect to NEPA regulations, a purpose and need statement should be brief and specific (40 CFR 1502.13). However, the purpose and need for the amendment must be reasonable in light of the information the Forest Service has before it. The purpose and need cannot be defined as to make the Forest Service's preferred result "a foreordained formality." *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991). Instead, "an agency should always consider the views of Congress, expressed, to the extent that the agency can determine them, in the agency's statutory authorization to

act, as well as in other congressional directives." *Id*. Congress's views, of course, are reflected in statutes such as NFMA—and the ESA, which has made conservation and recovery of listed species an integral part of the Forest Service's mission.

In the case of the proposed Amendment, stated purpose and need in the FEIS is unreasonably (and unlawfully) narrow. The Forest Service has not established that the Grassland's 2002 LRMP needed to change. We addressed this problem in previous comments by Defenders et al. 2019, for example on pages 4-7, 8-15 and Defenders et al. 2020, for example on pages 8-17.

Below, we summarize how the Amendment decision process violates NEPA's regulations regarding requirements for an acceptable purpose and need for agency action. We note how the Forest Service responded to our DEIS comments. The Forest Service made no changes in its purpose and need statements in the FEIS, and therefore, the same problems apply to the FEIS and Draft ROD.

*a. The current plan components and other provisions are sufficient to meet the purposes itemized in the FEIS (at 17), and there is no need to change the management plan.*

As articulated above in Section 1.1, the problem isn't the need for more management options but the Forest Service's failure to implement the available direction in the 2002 Plan, Amendment #3, and the 2015 Strategy. The Forest Service did not provide an adequate argument as to why these management tools are insufficient when implemented and appropriately applied.

*b. The Forest Service's basis for changing the management plan is arbitrary and based on outdated information.*

Defenders et al. (2020 at 9-11) argued that the expansion of prairie dog colony acres to 48,000 acres across the Grassland in 2017 should not have triggered the need to change the plan because this expansion had been predicted by the Forest Service in previous analyses and is consistent with the natural range of variation for prairie dog occupancy. The Grassland lost all but 625 acres of prairie dogs to plague by 2018, and this change should have negated any need to change the plan. If any change is necessary, it should be facilitating ferret recovery on the Grassland. The Forest Service used no science to make its determination that the plan needs to change, which also violated 36 CFR 219.3. To support this argument, Defenders et al. 2020 cited USFS 2000; 2015 Strategy, citing Jachowski et al. 2011, Proctor et al. 2006; DEIS. The FEIS states, "Providing a wider array of management options to respond to changing conditions and stabilize colony area could allow more flexible and consistent management." FEIS at 14. We argue, in response, 1) the Forest Service has not supported the claim that the current plan cannot stabilize colony area or that the Amendment can do this; 2) prairie dog colony sizes naturally fluctuate, as stated above, even in the absence of plague; and 3) as used here, "stability" is a euphemism for artificially depressing prairie dog populations size and distribution though poisoning and shooting. The Forest Service fails to address this problem; if it had, the agency would likely have decided not to go forward with developing the Amendment.

*c. The purpose to "provide a wider array of management options to respond to changing conditions" is vague, ambiguous, arbitrary, and not supported by the FEIS.*

We argued that the meaning of "changing conditions" in this statement is unclear. Defenders et al. 2020 at 12. The Forest Service seems to be responding with the statement in the FEIS, "Providing a wider array of management options to respond to changing conditions and stabilize colony area could allow more flexible and consistent management." FEIS at 14. As we stated above, we response: 1) the Forest Service has not supported the claim that the current plan cannot stabilize colony area or that the Amendment can do this; 2) prairie dog colony sizes naturally fluctuate, even in the absence of plague; and 3) as used here, "stability" seems a euphemism for artificially depressing prairie dog populations size and distribution though poisoning and shooting.

*d. The purpose to "minimize prairie dog encroachment onto non-Federal lands" is sufficiently met in the current plan.*

We argued existing direction in the 2015 Strategy meets this purpose and cited 2015 Strategy at 12. The Forest Service does not address this issue in the FEIS.

*e. The purpose to "reduce resource conflicts related to prairie dog occupancy and livestock grazing" is already met in the current plan.*

As we argued in Defenders et al. 2019 and Defenders et al. (2020 at 12-13), the problem the Forest Service should be addressing is its failure to fully and properly implement the current plan. The FEIS claims,

> The initial use of nonlethal prairie dog control methods in management area 3.63, as directed in the strategy, proved inefficient and costly, and implementation of the strategy was unsuccessful in addressing encroachment onto private and State lands. Use of some key prairie dog management tools such as translocation and prescribed burning has been halted over the past decade because of local social resistance to them. FEIS at 14.

It is incorrect to state the initial use of nonlethal prairie dog control methods in MA 3.63 "proved inefficient and costly" and "was unsuccessful in addressing encroachment onto private and State lands." First, non-governmental organizations paid for most of the translocation efforts in 2010 and 2011. Second, the translocation efforts and the buffer fences worked as pledged (that they would reduce the amount of lethal control needed adjacent to private lands and repopulate plagued out prairie dog colonies in the MA 3.63) until the Forest Service discontinued use of translocation as a tool and removed one of the two buffer fences due to social resistance.

*f. The purpose to "ensure continued conservation of at-risk species" is not construed in a way that complies with 2012 Planning Rule requirements.*

We argued that this purpose does not comply with 36 CFR 219.9(b)(1) & (c). Defenders et al. 2020 at 13-14. The FEIS has not modified this purpose, and this problem remains.

*g. The need to "revise management direction in Management Area 3.63 – Black-Footed Ferret Reintroduction Habitat" is arbitrary.*

We argued in comments on the DEIS, "Protecting potential ferret habitat by prohibiting prairie dog poisoning and shooting year-round, as direction for MA 3.63 does, is necessary for ferret recovery." Defenders et al. 2020 at 14. The Forest Service has not changed this need statement and has not changed direction: the plan allows prairie dog poisoning and shooting in all areas of the Grassland.

*h. The need to "adjust the boundaries of Management Area 3.63 to be more conducive to prairie dog management" is vague and arbitrary.*

Defenders et al. (2020 at 14-15) raised this problem. Eliminating the MA 3.63 area (not merely adjusting the boundary) from the Grassland has resulted in the Amendment providing zero areas where prairie dogs are protected from shooting and poisoning, which threatens the viability of potential SCC associated with prairie dogs as well as the viability of prairie dogs. The proposed MA 3.67 being exchanged for the MA 3.63, is slated to be 35,000 acres, while the MA 3.63 is 51,000 acres. The FEIS provides no information or justification as to why this shrinkage is "more conducive to prairie dog management."

*i. The need to "increase the availability of lethal prairie dog control tools to improve responsiveness to a variety of management situations, including those that arise due to encroachment of prairie dogs on neighboring lands, natural and human-caused disturbances, and disease" is overly broad, vague, and arbitrary.*

We detailed in our scoping comments that the key problem regarding prairie dog management on the TBNG is not that the Forest Service has insufficient management tools but that the agency has not adequately used the management tools in the current plan nor dedicated funds and personnel to these efforts. Defenders et al. 2019 at 4-7. Moreover, this statement remains unchanged and unclear in the FEIS.

*j. The stated purpose and need for the proposed amendment is impermissibly narrow.*

The purpose and need for the proposed Amendment fail to adequately address the Forest Service's statutory and regulatory obligations to wildlife (including endangered and at-risk species) and the grassland's ecological integrity, thus resulting in a one-sided and exceedingly narrow proposal that emphasizes poisoning and shooting of prairie dogs. Defenders et al. 2020 at 15.

*k. The purpose to "support ecological conditions that do not preclude reintroduction of the black-footed ferret" is arbitrary, unlawfully narrow, and falls short of the Forest Service's obligations under the Planning Rule requirements and the Endangered Species Act.*

The Forest Service has an obligation to help *recover* black-footed ferrets, and the purpose and need abandons this obligation. Defenders et al. 2020 at 16.

*l. There is a need for the plan to manage for ecological integrity, and this requires protecting prairie dogs to enable them to fulfill their ecological role as engineers of the TBNG grassland ecosystem.*

The management plan must maintain and restore the ecological integrity of the shortgrass prairie ecosystem as required by 36 CFR 219.8 and thus must include managing for prairie dogs in naturally occurring abundance, densities, and distribution. Defenders et al. 2020 at 16 made this claim, citing Miller et al. 1994; Mulhern and Knowles 1996; Kotliar et al. 1999; Bangert and Slobodchikoff 2006; Hanson et al. 2007; Santos-Barrera et al. 2008; Coppock and Detling 1986; Uresk et al. 1996; Truett et al. 2001; Wang et al. 2019.

## 2.2. The Final Environmental Impact Statement does not provide a range of reasonable alternatives, in violation of 40 CFR 1502.14.

NEPA requires an EIS to offer a range of reasonable alternatives. 40 CFR 1502.14. Reasonable alternatives are those that are viable, feasible, and accomplish the purpose and need of the amendment. In the case of the TBNG's "2020 Amendment," each alternative must meet NFMA's "diversity requirement" by complying with the 2012 Planning Rule's requirements to "provide the ecological conditions necessary to" 1) "contribute to the recovery of federally listed threatened and endangered species" or 2) "maintain a viable population of each [potential] species of conservation concern within the plan area" (36 CFR 219.9(b)). The Amendment's action alternatives must also comply with 36 CFR 219.8 & 219.9(a). The alternatives must also comply with Section 7(a)(1) of the ESA.

The DEIS did not offer a range of reasonable action alternatives. We addressed this issue in comments on the draft Amendment and DEIS. Defenders et al. 2020 at 17-26; WildEarth Guardians 2020 at 3-4.

The Forest Service slightly modified the DEIS's Alternative 2 to develop Alternative 5 as the preferred alternative. To meet this requirement, each amendment alternative must comply with applicable law. None of the action alternatives, including Alternative 5 (preferred alternative) comply with the requirements of 36 CFR 219.8 & 219.9 or Section 7(a)(1) of the ESA regarding ferrets.

*a. The following problems render all action alternatives non-compliant with the Planning Rule and ESA, and thus, NEPA.*

The elimination of the MA 3.63 designation on the Grassland and the associated loss of prairie dog shooting and poisoning prohibitions, setting caps on prairie dog colony area, prairie dog density control, and the failure to manage for sufficiently large and optimally configured prairie dog complexes are most concerning to us. These elements of the action alternative plan components demonstrate the failure to present a range of reasonable alternatives for public consideration. We made detailed arguments regarding these points in Defenders et al. 2020 at 18-23, citing Wilcox and Murphy 1985; Wilcove et al. 1998; Crooks and Sanjayan 2006; O'Brien et al. 1996; Saccheri et al. 1998; Westemeier et al. 1998; Pannell and Charlesworth 2000; Hanski and Gaggiotti 2004; Whitlock 2004; Magle et al. 2010; Frankham 2006; Lomolino et al. 2003; Antolin et al. 2006; Roach et al. 2001; Twidwell et al. 2014; Reading et al. 1989; Miller et al 1994.

*b. Alternative 2 (proposed action), Alternative 3, and Alternative 5 (preferred alternative) lack standards that provide for plague mitigation in prairie dogs.*

Sylvatic plague is the most pernicious threat to prairie dogs, and plague mitigation must be a requirement if the Grassland hopes to maintain the viability of black-tailed prairie dogs and associated species of conservation concern. A guideline for plague mitigation, which is included in these three alternatives, is not sufficient. See Defenders et al. 2020 at 22-23, citing Cully et al. 2010; Seery et al. 2003; Biggins et al. 2010; Matchett et al. 2010.

*c. The drought plans in Alternatives 2 and 5 (preferred alternative) could lead to the loss of prairie dog viability and the persistence of prairie dog associated species.*

Alternative 2 and 5 fail to be reasonable alternatives for reasons beyond those described above. The alternatives include standards to limit prairie dog colony area down to 7,500 acres (versus 10,000 acres) during drought. In Alternative 2, "drought" is not defined, though it is in Alternative 5. While the size of prairie dog colonies tends to expand in terms of acreage during drought conditions, actual prairie dog numbers tend to go down due to food scarcity. In other words, prairie dog density decreases despite the appearance of enlarged colonies. The effect of the "drought plan" would be killing prairie dogs in colonies that are already depressed and stressed, which could negatively impact the health of the prairie dogs and lead to the collapse of the colony prairie dog population.

*d. The following problems are unique to Alternative 3.*

Similar to alternatives 2 and 5, Alternative 3 has specific drought direction; "drought" has not been defined. A standard dictates that "During drought conditions, to mitigate prairie dog colony expansion, manage toward the lower end of the range (10,000 acres) of prairie dog colonies across the Grassland." Alternative 3 permits the use of fumigants and anticoagulant poisons to kill prairie dogs. The other alternatives permit only the rodenticide zinc phosphide, transmitted via grain bait. Fumigants are non-targeted and can kill all wildlife in a treated burrow. Anticoagulants are particularly hazardous to predators that scavenge on poisoned prairie dogs, and non-target poisoning is a significant problem. Poisoning with the anticoagulant Rozol® at current and future ferret reintroduction sites, however, is prohibited by the EPA label that governs use of Rozol. See Defenders at 24-26, citing USFWS 2013a; Sheffield 1997; Desmond et al. 1995; Desmond et al. 2000; Desmond and Savidge 1999; Cook et al. 2003; USGS 2017; TBNG 2017.

*e. The following problems are unique to Alternative 4.*

Alternative 4 jettisons the Category 3 area designation, which has a target of maintaining 6,000 prairie dog acres and encompasses 94,033 acres of potential habitat. This essentially means that there will be no prairie dog colonies outside of the Category 1 and 2 areas—a loss of up to 6,000 and possibly more acres of prairie dog habitat. This alternative also prohibits lethal control in Category 1 and 2 areas unless their 18,000-acre and 9,000-acre respective prairie dog acreage targets are reached, but non-lethal methods to reduce prairie dog densities are permissible. Lethal density control can occur after acreage

targets are achieved. Even if the proposed acreage targets could support a viable ferret population, the allowance of lethal and non-lethal control methods to reduce prairie dog density undermines protections needed to maintain ample numbers of the ferret's main prey: prairie dogs.

*f. Alternative 5 (preferred alternative) allows for the use of fumigants to kill prairie dogs, which not only kills prairie dogs but also other species associated with prairie dogs.*

Alternative 5 permits the use of fumigants to kill prairie dogs. Fumigants are non-targeted and can kill all wildlife in a treated burrow. See Defenders at 24-26, citing USFWS 2013a; Sheffield 1997; Desmond et al. 1995; Desmond et al. 2000; Desmond and Savidge 1999; Cook et al. 2003; USGS 2017; TBNG 2017.

### 2.3. The Final Environmental Impact Statement fails to take a hard look at the environmental consequences of the proposed Amendment in violation of 40 CFR 1502.16.

NEPA requires evaluate the direct, indirect, and cumulative impacts—also referred to as effects—of several alternatives, including the proposed action and preferred alternative, to determine whether an alternative with more conservation potential is available (See CFR 1502.16(a)-(b), 1502.25(c), 1508.7, 1508.8, 1508.16, 1508.27(b)(7)). We addressed these issues in Defenders et al. 2020 at 88-95.

#### 2.3.1. The Final Environmental Impact Statement fails to take a hard look at the environmental consequences of the proposed Amendment on the ecological integrity of the short- and mix-grass prairie ecosystems of Thunder Basin National Grassland, in violation of 40 CFR 1502.16.

As we discussed above in Section 1.3, the Forest Service has acknowledged that the proposed Amendment is shifting to a management regime that does not seek to restore or maintain ecological integrity in a way that complies with the Planning Rule at 36 CFR 219.8(a). The definition of ecology integrity in the Planning Rule is worth repeating here:

> The quality or condition of an ecosystem when its dominant ecological characteristics (for example, composition, structure, function, connectivity, and species composition and diversity) occur within the natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human influence. 36 CFR 219.19.

And the FEIS has failed to assess the direct, indirect, and cumulative effects of the proposed Amendment, and other action alternatives, on the short- and mixed-grass prairie ecosystems of TBNG. The FEIS has substituted an analysis of forage production for livestock grazing instead of a true and necessary assessment of how the Amendment's plan components will affect ecological integrity, based on the NRV for key ecological characteristics, including natural disturbance processes such as prairie dog activities and fire. We addressed this extensively in previous comments. Defenders et al. 2020 at 34-43.

The state-and-transition modeling the FEIS uses to assess the impacts of prairie dogs on rangeland vegetation and livestock grazing is an inappropriate analytical tool for a natural ecosystem that is meant to be managed for plant and animal community diversity—at least in large part. 36 CFR 219.8(a) and 219.9. Though the FEIS notes in various places in the FEIS and BE that prairie dogs are native keystone

species, this fact is not represented in the modeling results. The ecological site descriptions and modeling do not incorporate prairie dog activity as a characteristic of the NRV ignoring the importance of prairie dogs, as ecosystem engineers, to the natural communities of the grasslands and omitting the best available scientific information.

We have additional concerns about the rangeland vegetation and livestock grazing analysis. This important analysis should not have been based on incomplete information—the National Resources Conservation Service EDMs, which were not made available to the public until July 9, 2020. It doesn't make sense to base the analysis on the maximum prairie dog colony acreage in 2016-2017, given that the proposed Amendment and other action alternatives have plan components that cap acreage well below 2016-2017 prairie dog occupancy. The FEIS states,

> In addition to affecting cattle weight gains, a change in forage availability has the potential to impact authorized AUMs for any given year or could lead to voluntary reductions in stocking. This analysis calculated the impacts to available AUMs for livestock grazing based on predicted differences in available forage because of differences in productivity and forage consumption across projected future extent of prairie dog colonies. It is assumed plant community states resulting from prairie dog occupancy have a representative species composition component that is available for livestock forage, and livestock grazing will continue on all ecological sites regardless of species composition. FEIS at 81.

This analysis assumes prairie dog herbivory is the only variable affecting cattle weight gains and stocking rates; which are also affected by droughts, wildfires, hail, grasshoppers, and other factors are not accounted for in the model. The FEIS notes that recent research has emphasized the importance of grassland heterogeneity, yet the ESDs are not modified to address "grazing overuse." The rationales for using the ESDs align with range-related concerns, but do not address wildlife concerns by evaluating the ecological conditions necessary for wildlife diversity and viability. A big gap in the analysis is its lack of evaluation of the effects of livestock on plant communities and wildlife habitat.

### 2.3.2. The Final Environmental Impact Statement and Biological Evaluation fail to take a hard look at the environmental consequences of the proposed Amendment on the black-footed ferret and the species' recovery, in violation of 40 CFR 1502.16.

The Forest Service's determination that the four action alternatives will have "no effect" on the ferret is arbitrary and capricious. FEIS at 133; BE at E-42. The Forest Service contends in the FEIS that, "Best available data indicate the reintroduction of black-footed ferrets to the Thunder Basin National Grassland is biologically feasible and would promote conservation and recovery of the species." FEIS at 133. Setting aside that merely maintaining the feasibility of ferret "reintroduction" does not meet the requirements of the ESA (16 USC 1536(a)(1)) or the Planning Rule (36 CFR 219.9(b)(1)), alternatives 2-5 are not conducive to supporting a ferret population of any size and, moreover, the Amendment completely undermines ferret conservation and recovery and is potentially sabotaging TBNG as a site for future ferret reintroduction and recovery. Nonetheless, the statement acknowledges that the Grassland does indeed have a responsibility to promote the recovery of the species. But because each action alternative represents a U-turn by the Grassland from managing to restore and maintain ferret habitat

and preparing the site for ferret toward managing to degrade and destroy ferret habitat and abandoning plans to recover ferrets, the agency action will result in significant adverse effects, including the failure to recover the species. There are myriad problems with the effects analysis for the ferret that we discuss below. We raised this problem in Defenders et al. 2020 at 85-87.

*a. The effects analysis uses the wrong metric for assessing impacts to ferrets and ferret recovery and fails to assess the adverse effects of reintroducing ferrets into a site that likely won't support a viable population.*

A stated purpose of the Amendment is to, "support ecological conditions that do not preclude reintroduction of the black-footed ferret." FEIS at 17. "Reintroduction" is not a justifiable purpose for the Amendment or metric upon which to assess effects. The appropriate benchmark is ferret "recovery," and the analysis must assess how well the action alternatives meet the criterion for supporting a population with 100 breeding adult ferrets and contribute to objectives in the Recovery Plan. Reintroduction—a much lower bar than recovery—fails to meet the requirements in the ESA (16 USC 1536(a)(1)) or the Planning Rule (36 CFR 219.9(b)(1)) regarding threatened and endangered species management.

The FEIS, BA, and BE fail to look at the impacts of maintaining an artificially low prairie dog population with poisoning and shooting and prairie dog "density control" on future ferret reintroductions. As stated above, the Forest Service claims the Amendment will promote ferret conservation and recovery. In the BA, the Forest Service states 1,500 acres of prairie dogs is sufficient for ferret reintroduction, citing the Wyoming ESA 10(j) Rule (80 FR 66824) and cites the Recovery Plan (USFWS 2013) to claim that 15,000 acres of prairie dogs is sufficient to support a ferret population with 100 breeding adults. Moreover, the Amendment is designed to prohibit a prairie dog complex from expanding to 15,000 acres. While 1,500 acres of black-tailed prairie dogs is the minimum acreage requirement for requesting a ferret allocation from the United States Fish and Wildlife Service (USFWS), it is not capable of hosting even the minimum criteria of 30 breeding adults. The USFWS suggests a minimum of 4,500 acres to host 30 breeding adult ferrets and at least 15,000 acres to support 100 breeding adults. USFWS 2019. It is clear from the reintroduction site analysis conducted in the SSA (USFWS 2019), however, that far larger acreages are needed to host ≥30 or 100 adults.

> At the population level, black-footed ferret populations need at least 30 breeding adults, which requires at least 1,800 ha of black-tailed prairie dog habitat or 3,000 ha of Gunnison's or white-tailed prairie dog habitat (USFWS 2013a). Populations also need some level of connectivity, a sufficient rate of juvenile survival, and larger, less fragmented prairie dog colonies to maintain resiliency to stochastic events.

USFWS 2019 at 11.

> An analysis of comprehensive survey data from the only five reintroduction sites to ever meet the minimum 30 breeding adult criterion (Aubrey Valley, Arizona; Butte Creek Ranches, Kansas; Cheyenne River Reservation, South Dakota; Conata Basin-Badlands, South Dakota; and Shirley

> Basin, Wyoming) showed that the amount of habitat needed by each breeding female exceeded parameters established in the 2013 Black-footed Ferret Recovery Plan (USFWS 2013a).

USFWS 2019 at ii.

The ferret effects analysis does not assess the risks of reintroducing ferrets to a landscape where a viable population cannot be supported due to the Amendment's management direction. The consequences could be creating a ferret population sink where meeting the minimum 30 breeding adult criteria is impossible. Providing only enough habitat to reintroduce ferrets rather than provide the ecological conditions to host a population of 100 breeding adult ferrets not only fails to contribute to federal delisting criteria, but it also skirts the Forest Service's obligations under the ESA. A lack of large, connected prairie dog complexes protected from plague, poisoning, and recreational shooting is the primary reason why reintroduction sites fail to meet the criteria of ≥30 or 100 breeding adult ferrets.

*b. The scale of analysis is arbitrary and capricious.*

As with the DEIS and draft BA and BE, the scale of analysis for assessing effects of the agency action on ferrets and ferret recovery is unclear, and moreover, should include the entire species' range. The Amendment will have species-level, i.e., rangewide, effects. The Forest Service's scale of analysis is arbitrary and capricious even considering the Forest Service's unlawfully narrow purpose and need. The Forest Service fails to sufficiently analyze how the alternatives—and their specific, respective plan components—directly, indirectly, and cumulatively impact whether TBNG plan would support ecological conditions "that do not preclude reintroduction of the black-footed ferret." Common sense dictates that there must be an implied "success" element to purpose statement—i.e., that the plan would support ecological conditions "that do not preclude [successful] reintroduction of the black-footed ferret." In other words, simply providing conditions that might permit the short-term survival of a few ferrets released on the Grassland would not suffice. The proposed amendment and plan components' impacts must be evaluated in light of how they would affect whether the Grassland could support a reintroduction that meaningfully contributes to the long-term conservation and recovery of black-footed ferrets. Accordingly, the appropriate frame of reference for the Forest Service's analysis of the direct, indirect, and cumulative impacts to black-footed ferrets must be the impacts on the species' ability to be recovered under the ESA—not the impacts in light of Wyoming's ferret reintroduction matrix, and especially not the "impacts" to an extirpated ferret population. See FEIS at 134-136; BE at E-42; BA at 8.

*c. The effects analysis does not assess the direct and indirect impacts of the agency action.*

These "analyses" are not true analyses but rather conclusory statements that there will be "no effect" on the ferret because there are currently no ferrets on TBNG. There was no attempt to assess and compare the impacts of the alternatives' plan components on the recovery of the species—to which TBNG's capacity to support 100 breeding adult ferrets is critical according to the best available science. The FEIS uses the Wyoming Ferret Plan prioritization matrix criteria as the basis for the ferret effects analysis—not the Amendment plan components.

*d. The FEIS, BA, and BE lack an assessment of cumulative effects.*

The cumulative effects of past human actions, particularly repeated prairie dog poisoning since the early 1900s, are the reasons ferrets were extirpated in TBNG as well as throughout the TBNG region, the black-tailed prairie dog range in Wyoming, and the entire range in the 1980s. Since that time, plague has become an additional human impact that has incrementally affected ferret habitat by reducing the number of sites with the capacity to host self-sustaining populations of ferrets, including those with 100 breeding adults. The proposed amendment is an action that adds to these cumulative impacts by increasing the allowable extent of prairie dog poisoning on the Grassland and not having plague mitigation, which will, ultimately, sabotage TBNG as a ferret recovery site.

### 2.3.3. The Final Environmental Impact Statement and Biological Evaluation fail to take a hard look at the environmental consequences of the proposed Amendment on the black-tailed prairie dog, in violation of 40 CFR 1502.16.

The FEIS makes an arbitrary determination regarding the effects of the proposed amendment on prairie dog viability in the plan area that the actional alternatives "may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing." FEIS at 147. However, BE has misinterpreted the science on threats, especially plague, to prairie dogs and inaccurately characterizes prairie dogs as resilient to plague, poisoning, and shooting. BE at E-162. Prairie dogs are not necessarily resilient to these threats. Below, we assess additional implications of the action alternatives and find the impacts of the plan components more severe than the FEIS portrays them to be. The FEIS and BE analyses made no attempt to conduct a viability analysis that quantifies the effects of the proposed plan components in the alternatives. We addressed this problem in Defenders et al. 2020 at 98-91.

*a. The scale of analysis is arbitrary.*

The proposed MA 3.67 and the NFS lands of the Grassland are both too constrained for a sufficient analysis. More appropriate scales of analysis would be the broader landscape that includes the economic analysis area for the "analysis of socioeconomic resources" (FEIS at 93) and the black-tailed prairie dog range in Wyoming. The BE indicates that adjacent private lands will impact prairie dogs on the Grassland and has included the following assumption in the additional rationale supporting the effects determination: "Adjacent private and State lands are expected to continue to have numerous prairie dog colonies. These colonies provide support and resiliency to those that occur on NFS lands, especially considering the pattern of mixed ownership across TBNG." BE at 181. Using this broader landscape scale is supported by the Planning Rule (36 CFR 219.8(b)). The analysis must take into account regional trends in gains and losses in prairie dog habitat to be able to consider how to manage adaptively in response to these trends. Some key trends include the loss of occupied black-tailed prairie dog colony area throughout Wyoming that was surveyed at 330,000 acres between 1997 and 1998 and then at 225,000 acres in 2015 (BE at 163), and the uptick in rodenticide use to kill prairie dogs in the region referenced in the FEIS.

*b. The analysis of direct, indirect, and cumulative effects is inadequate.*

The effects analysis fails to quantify impacts of management prescriptions, such as density control, on prairie dog viability. The BE fails to look at the effects of proposed changes in management outside of the proposed MA 3.67. It is clear from the proposed plan components that decisions about when to conduct density control can be made arbitrarily. The DEIS or BE fails to reference any science regarding how density reductions affect prairie dogs. The planning documents present no methodology or protocol for how density control is to be conducted. Additionally, though the action alternatives prescribe target prairie dog colony acreages, plan components do not require maintaining the same colonies over time. As long as the target area is met, the management system would allow for the manipulation of colonies so they "move" around the landscape. The Forest Service must assess the impacts of artificial colony manipulation of the structure, configuration, and distribution of prairie dog colonies on prairie dog viability. The Forest Service must also analyze the effects of not including mandatory plague mitigation in a standard. What would be the impact on prairie dogs if no mitigation occurs and plague keeps prairie dog colony area at below target levels? This high probability scenario must be assessed.

### 2.3.4. The Final Environmental Impact Statement and Biological Evaluation fail to take a hard look at the environmental consequences of the proposed Amendment on the mountain plover, in violation of 40 CFR 1502.16.

The Forest Service makes an arbitrary determination regarding the effects of the proposed amendment on mountain plover viability in the plan area, stating the action,

> May adversely impact individuals but not likely to result in a loss of viability in the planning area, nor cause a trend toward Federal listing; No substantial adverse impacts or substantially lessened protections as a result of the plan amendment. FEIS at 126.

However, the impacts of the plan components are likely more severe than the FEIS portrays them to be and the plan documents do not sufficiently assess these. We raised this problem in Defenders et al. 2020 at 91-95.

*a. The scale of analysis is arbitrary.*

We are not completely clear regarding the exact land area the assessment has carved out as its unit of analysis: the proposed MA 3.67 or the entire Grassland. The proposed MA 3.67 and the NFS lands of the Grassland are both too constrained. More appropriate scales of analysis would be the broader landscape that includes the economic analysis area for the "analysis of socioeconomic resources" (FEIS at 101) and the black-tailed prairie dog range in Wyoming. The BE indicates that adjacent private lands will impact mountain plovers on the Grassland and has included the following assumption in the additional rational supporting the effects determination: "Adjacent private lands are expected to provide support and resiliency to plover populations that occur on NFS lands, especially considering the pattern of mixed ownership across TBNG" (BE at 153). Using this broader landscape scale is supported by the Planning Rule (36 CFR 219.8(b)). The analysis must take into account regional trends in gains and

losses in prairie dog habitat to be able to consider how to manage adaptively in response to these trends. Some key trends include the loss of occupied black-tailed prairie dog colony area throughout Wyoming that was surveyed at 330,000 acres between 1997 and 1998 and then at 225,000 acres in 2015 (BE at 163) and the uptick in rodenticide use to kill prairie dogs in the region referenced in the FEIS.

*b. The analysis of direct, indirect, and cumulative effects is inadequate.*

The effects analysis fails to analyze impacts of management prescription, such as density control, on occupied prairie dog colonies. The analysis in the BE focuses primarily on effects from limiting the area occupied by prairie dog colonies. The BE fails to look at the effects of proposed changes in management outside of the proposed MA 3.67.

The Forest Service's proposed change in management regimes from one that enabled native disturbance processes, like fire and prairie dog activity, to play their natural, ecosystemic roles to a regime that focuses more on a non-native livestock-dominated system, will have direct and indirect impacts. The FEIS and BE fail to assess the impacts on mountain plovers of striking prescribed fire plan components and fire suppression activities, which could result in eliminating natural and necessary fire disturbance from the landscape.

The FEIS states,

> All alternatives include changes to geographic area direction (appendix A, chapter 2) that would replace objectives and guidelines to manage for specific percentages of seral and structural stages within each management area and geographic area with desired conditions and guidelines to manage rangeland vegetation based on ecological site descriptions published by the Natural Resources Conservation Service. FEIS at 89.

The plan documents have not analyzed the effects of this change to mountain plovers and plover habitat.

The FEIS states,

> The best available scientific information, much of which was collected on the grassland, shows 10,000 acres of colonies approximates the lower limit likely to adequately provide for the persistence of the mountain plover in the plan area. FEIS at 70.

The plan documents fail to analyze the effects of managing prairie dog colonies at the 7,500-acre cap (25% below the lower limit for persistence) if drought conditions persist over multiple years, which could happen as climate warming increases.

The BE states,

> In addition to lethal density control, collapsing burrows and levelling mounds may be used to limit prairie dog colony expansion or to restore areas with inactive burrows, and could result in destruction of nest sites or decrease in habitat quality for mountain plover. BE at 147.

This is the sum total discussion about density control impacts to mountain plover habitat and is not an analysis of the effects of prairie dog density reductions to mountain plovers. It is clear from the proposed plan components that decisions about when to conduct density control can be made arbitrarily; there are no objectives or metrics that provide for an amount of bare ground required by mountain plovers. The presence of prairie dogs at their target levels is apparently the proxy for mountain plover habitat suitability, regardless of prairie dog densities. The DEIS or BE reference no science regarding how prairie dog density reductions affect mountain plovers. The planning documents present no methodology or protocol for how density control is to be conducted. Moreover, reductions in prairie dog densities are allowed to occur when prairie dog colony acreage is less than 7,500 acres during drought conditions.

Additionally, though the action alternatives prescribe target prairie dog colony acreages, plan components do not require maintaining the same colonies over time. As long as the target area is met, the management system would allow for the manipulation of colonies so they "move" around the landscape. The result could also be a skewed ratio of more "new" colonies, that tend to have less bare ground than older colonies. The FEIS and BE do not analyze the effects of this management scenario.

### 2.3.5. The Final Environmental Impact Statement and Biological Evaluation fail to take a hard look at the environmental consequences of the proposed Amendment on the burrowing owl, in violation of 40 CFR 1502.16.

The analysis of direct, indirect, and cumulative effects in the FEIS and BE are inadequate and contrary to NEPA regulations. The analysis merely provides a narrative description of potential effects but fails to quantify the amount of burrowing owl habitat loss by applying the proposed Amendment prescription or those of the other action alternatives. The BE states,

> In addition to lethal density control, collapsing burrows and levelling mounds may be used to limit prairie dog colony expansion or to restore areas with inactive burrows, and could result in mortality of burrowing owls or decrease in habitat quality. However, plan components do not allow these activities if burrowing owls are present. Information would be gathered during annual prairie dog inventory and mapping efforts and density control activities. BE at 66-67.

However, the effects analysis does not look at the impacts of removing burrows from burrowing owl habitat, which could permanently destroy the species' habitat on the Grassland. We addressed this problem in Defenders et al. 2020 at 82-83; WildEarth Guardians 2020 at 5.

### 3. The proposed Amendment violates Section 7(a)(1) of the Endangered Species Act by failing to provide a program for conserving the black-footed ferret.

The proposed Amendment prevents ferret reintroduction on the Grassland and accordingly precludes recovery of the species as a whole. Providing the management framework and ecological conditions necessary to reintroduce ferrets to the Grassland and sustain a population of 100 breeding adults is essential for the species' recovery (as outlined in USFWS 2013). This requires protecting large complexes of prairie dog colonies, upon which ferrets depend, from the threats of poisoning, shooting, and plague. Because too few sites sufficient to support 100 breeding adult ferrets exist across the ferret's range without TBNG serving as one of these sites, the Amendment decision will preclude the species' recovery. With the right management approach, TBNG has the ecological capacity to support 100 breeding adults. Instead of providing a program to conserve ferrets, as required by the ESA, TBNG is undermining ferret recovery through the Amendment.

We addressed this problem in the following comments: Defenders et al. 2019: 26-34; Defenders et al. 2020: 95-97; WildEarth Guardians 2020 at 4.

*a. The Amendment does not meet the following legal requirements.*

Congress enacted the ESA to provide "a program for the conservation of . . . endangered species and threatened species" (16 USC 1531(b)). Section 2(c) of the ESA establishes that it is "the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act" (16 USC 1531(c)(1)). Section 7(a)(1) of the Act mandates that federal agencies "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species" (16 USC 1536(a)(1)). The ESA defines "conservation" to mean "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this [Act] are no longer necessary" (16 USC 1532(3)). Thus, Section 7's use of "conservation" implies a higher duty than merely carrying out programs that allow a listed species to continue to survive; instead, the Forest Service must use its authority to *improve* the prospects of a listed species with an eye toward the species no longer needing the Act's protection. *Cf. Sierra Club v. U.S. Fish & Wildlife Serv.*, 245 F.3d 434, 441-42 (5th Cir. 2001) ("'Conservation' is a much broader concept than mere survival. The ESA's definition of 'conservation' speaks to the recovery of a threatened or endangered species."). Moreover, "habitat acquisition and maintenance" are among the non-exclusive list of "methods and procedures" an agency could be expected to use in carrying out its obligation to conserve listed species (16 USC 1532(3)).

Section 7(a)(1) requires agencies to affirmatively carry out programs for the conservation of listed species—including the black-footed ferret on TBNG. Though the Forest Service retains discretion in carrying out its Section 7(a)(1) obligations, simply "taking insignificant measures" will not satisfy that duty. *Center for Biological Diversity v. Vilsack*, 276 F.Supp.3d 1015, 1031 (D. Nev. 2018); *see also Pyramid Lake Paiute Tribe of Indians v. U.S. Dept. of Navy*, 898 F.2d 1410 (9th Cir. 1990). Most relevant here, the Forest Service's past disregard of management policies (such as plague mitigation efforts) and its abandonment of protective management direction through the Amendment go beyond the scope of

its discretion in carrying out a black-footed ferret recovery program. *Cf. Red Wolf Coal. v. U.S. Fish & Wildlife Serv.*, 346 F.Supp.3d 802 (E.D.N.C. 2018). By amending the plan to manage TBNG in a manner that likely precludes reintroduction of black-footed ferrets—and consequently, recovery of the species as a whole—the Forest Service violates the ESA.

*b. The proposed Amendment does not provide management plan direction that enables Thunder Basin National Grassland to become a black-footed ferret recovery site that supports a population of 100 breeding adult ferrets, which is necessary for the species to recover.*

The Amendment does not include plan components to provide the ecological conditions (i.e., adequate prairie dog habitat) to support a ferret population with 100 breeding adults. However, it does include plan components that preclude ferret recovery on the Grassland and increase stressors to the species' habitat. Below are the ecological conditions necessary to support 100 breeding adult ferrets, according to the best available science.

- Minimum range of 20,495 to 47,931 acres (average of 33,323 acres) active prairie dog colony area distributed within a complex of multiple colonies. Livieri 2014, 2015, 2016, 2017, 2018, 2019.
- Prairie dog colonies configured in large complexes, groups of prairie dog colonies that are within 4.4 mi (7.0 km), and subcomplexes of colonies that are within 0.9 mi (1.5 km) of each other. Forrest et al. 1985; Biggins et al. 1993; Biggins et al. 2006b; and Eads et al. 2012.
- High densities of prairie dogs (which may range from 40 to 70 prairie dogs per hectare) and prairie dog burrows (which may range from 80 to 220 active burrows per hectare) that are allowed to fluctuate naturally. Biggins et al. 2006b; Livieri and Anderson 2012; Eads et al. 2012; USFWS 2013.
- Annual sylvatic plague mitigation. USFWS 2013; Poché et al. 2017; Tripp et al. 2017; Tripp et al. 2018; Eads et al. 2018; Eads et al. 2019.
- Protection of potential ferret reintroduction areas from year-round prairie dog poisoning. USFWS 2013.
- Protection of potential ferret reintroduction areas from year-round prairie dog shooting. USFWS 2013.

The Amendment caps prairie dog colony acres at 10,000 (and 7,500 during drought periods) in a management area where current management direction protects prairie dogs from poisoning and shooting. The Amendment eliminates plan components that provide management direction to encourage prairie dog distribution in colony complexes. While the Amendment (the preferred alternative, Alternative 5) includes a plague mitigation standard, which is important to protect prairie dog populations from plague, the standard is vague and, because of the prairie dog acreage caps and other plan components (i.e., lethal control of prairie dogs), it is not sufficient to promote ferret recovery.

*c. New information supports the case that TBNG is essential for ferret recovery and the proposed Amendment's provisions will make the Grassland unsuitable for ferret recovery because it will not support a viable population of the species.*

The United States designated the black-footed ferret an endangered species in 1966 (32 Fed. Reg. 4001, 4001 (Mar. 11, 1967)), and the species remains endangered under the U.S. Endangered Species Act of 1973 (50 CFR 17.11(h)). After the ferret was believed to be extinct, a small population was found in Meeteetse, Wyoming in 1981, and government scientists trapped them for a captive breeding program to try to resurrect the species in the wild.

The captive population receives full protection as endangered under the ESA, while all ferrets in the wild are designated as "nonessential experimental" under Section 10(j) of the ESA. A state-wide 10(j) rule applies throughout Wyoming (80 Fed. Reg. 66821). Thus, any ferrets that would be reintroduced to TBNG would not receive the full protection of their endangered listing but would rather be treated under the law as a species proposed for listing. Section 10(j) rules are intended, in part, to protect landowners from ESA take penalties.

Federal delisting criteria for ferrets are to:

> Establish ≥3,000 free-ranging breeding adult black-footed ferrets in 30 or more populations, with at least one population in each of at least 9 of 12 States within the historical range of the species, with no fewer than 30 breeding adults in any population, and at least 10 populations with 100 or more breeding adults. USFWS 2013 at 6.

Today, there are zero reintroduction sites with 100 breeding adults. New information about ferrets, demonstrates the species' is trending away from recovery. The USFWS's Species Status Assessment (SSA) was made publicly available on the day public comments were due on the Grassland's Draft Amendment and DEIS—January 9, 2020 (USFWS 2019; and see Hughes 2020). The USFWS issued its Five-year Review for the Black-footed Ferret (*Mustela nigripes*) on January 21, 2020 (USFWS 2020).

The SSA found the following:

There are 29 sites where ferrets were reintroduced; of these sites only 14 are currently active. Of the active reintroduction sites, two are in high condition (high resiliency), eight are in moderate condition (moderate resiliency), and four are in low condition (low resiliency). Fifteen are extirpated, mainly because of sylvatic plague. According to the USFWS 2019, ferret populations in the wild will decline in viability unless conservation efforts are increased from current levels. The USFWS defines viability as "the ability of the black-footed ferret to sustain populations in the wild into the future in a biologically meaningful timeframe." USFWS 2019 at i.

> An analysis of comprehensive survey data from the only five reintroduction sites to ever meet the minimum 30 breeding adult criterion (Aubrey Valley, Arizona; Butte Creek Ranches, Kansas; Cheyenne River Reservation, South Dakota; Conata Basin-Badlands, South Dakota; and Shirley Basin, Wyoming) showed that the amount of habitat needed by each breeding female exceeded

> parameters established in the 2013 Black-footed Ferret Recovery Plan (USFWS 2013a). USFWS 2019 at 51.
>
> Overall, we predict that the effects of sylvatic plague and the lack of suitable habitat will continue to limit the viability of the black-footed ferret, and management inputs will continue to be required in order to maintain current levels of viability. Moreover, management inputs will need to be expanded and improved in effectiveness in order to increase viability for the species. USFWS 2019 at ii.

Currently, the species exhibits moderate to low levels of resiliency, redundancy, and representation.

> Overall resiliency for this population is low, given the need to augment existing reintroduction sites regularly with excess animals from the captive population, and most importantly the need for continuous management inputs such as plague management and black-footed ferret vaccination to keep individual sites from succumbing to sylvatic plague epizootics. The redundancy of this population has been compromised in recent years, with only 14 of 29 reintroduction sites being classified as active. USFWS 2019 at 65.

To achieve recovery, there needs to be enough ferrets in enough places with suitable habitat and sufficient management interventions at each reintroduction site.

> The black-footed ferret needs multiple, resilient populations distributed across its range in a variety of ecological settings to persist into the future and to avoid extinction. USFWS 2019 at i.
>
> The size of reintroduction sites, along with the density of prairie dog prey, level of conservation efforts, sylvatic plague, drought, and other abiotic factors, plays a significant role in their ability to support black-footed ferret populations. USFWS 2019 at 50.
>
> Self-sustaining black-footed ferret reintroduction sites have been established successfully in recent years, provided plague management and sufficient amounts of suitable habitat are available (Grenier et al. 2007, Jachowski et al. 2011a, USFWS 2018b). These instances suggest that availability of suitable habitat and implementation of appropriate management practices [are important]. USFWS 2019 at 51.
>
> As obligate predators of prairie dogs, black-footed ferrets typically need large, contiguous (≤ 7 km apart; Biggins et al. 1993) prairie dog colonies to meet their individual needs. USFWS 2019 at 8.
>
> Populations [] need some level of connectivity, a sufficient rate of juvenile survival, and larger, less fragmented prairie dog colonies to maintain resiliency to stochastic events. At the species level, the black-footed ferret needs multiple (≥20), resilient populations (i.e., redundancy) that display a breadth of ecological and genetic diversity (i.e., representation) across its historic range, including black-tailed, Gunnison's, and white-tailed prairie dog habitats. USFWS 2019 at 10.

To achieve recovery, additional, suitably-sized reintroduction sites are needed. Large prairie dog colony complexes can support larger ferret populations, which translates into higher resiliency outcomes.

> Given the species' obligate association with prairie dogs, it is likely that individual black-footed ferret populations associated with larger, less fragmented prairie dog colonies exhibit greater resiliency and are less likely to be extirpated by stochastic events than those associated with smaller, fragmented colonies (Miller et al. 1994, Jachowski et al. 2011a). USFWS 2019 at 10.

> In general, larger populations exhibit higher resiliency and are better able to withstand stochastic events. Sylvatic plague remains an important disruptor of prairie ecosystems (Eads and Biggins 2015, Biggins and Eads 2019). USFWS 2019 at 17.

This resilience is even more important in the face of stressors such as sylvatic plague, drought, poisoning, and recreational prairie dog shooting. Furthermore, the effects of plague can be exacerbated by drought and recreational shooting, both of which have negative impacts on ferret habitat suitability. Prairie dog poisoning fragments colonies and reduces overall abundance, which causes increased susceptibility to stochastic events and low levels of population resiliency. Therefore, purposeful prairie dog plague mitigation, shooting closures, and prairie dog colonies that are protected from poison are important tools in achieving ferret recovery goals.

> As an obligate predator of prairie dogs, the effects of stressors such as drought have cascading effects on the black-footed ferret. Prairie dog populations affected by drought exhibit lower abundance, reproduction, and survival. This makes both prairie dog and black-footed ferret populations less resilient and more vulnerable to other stochastic events. If drought decreases the density of individual prairie dog colonies and reduces the availability of suitable dispersal corridors, black-footed ferrets are forced to range farther during foraging activities, which negatively affects their survival and overall population resiliency. Such populations will also exhibit decreased resiliency through the limitation of immigration and gene flow. This combination of factors can lead to the loss of populations across the range and decrease the redundancy of the species, making it more susceptible to wide scale, catastrophic events. The effects of drought may be amplified if it occurs in concert with other stressors, such as a plague epizootic (Seglund et al. 2006, Lupis et al. 2007, Eads et al. 2016). USFWS 2019 at 25.

> Recreational shooting of prairie dogs likely limits the carrying capacity for ferrets at reintroduction sites, and may appreciably reduce survival and reproduction. As such, recreational shooting may decrease black-footed ferret population resiliency in localized situations, particularly at reintroduction sites located in black-tailed prairie dog habitat. If individual prairie dog colonies are extirpated due to the additive effects of high shooting pressure and other stressors such as sylvatic plague and drought, black-footed ferret population redundancy may be reduced if this occurs over a large portion of the species' range. Since the effects of recreational shooting are most pronounced in black-tailed prairie dog colonies, the representation of black-footed ferret populations may be reduced if populations occurring within this habitat type experience reduced resiliency. USFWS 2019 at 28.

> Since prairie dog mortality by unregulated recreational shooting can greatly exceed predation by black-footed ferrets, implementation of shooting closures is thought to increase prey availability for black-footed ferrets, particularly in instances where sylvatic plague also affects prairie dog populations (Reeve and Vosburgh 2006, Biggins and Eads 2019). USFWS 2019 at 29.
>
> Long-term poisoning of prairie dogs can create increase colony fragmentation and reduce overall abundance, causing increased susceptibility to stochastic events and low levels of population resiliency. As an obligate predator of prairie dogs, black-footed ferrets cannot readily adapt to such situations by switching prey resources, and their populations exhibit low abundance, juvenile survival, and resiliency as a result. Extirpation or increased fragmentation of prairie dog colonies reduces black-footed ferret redundancy, as individual ferret populations are extirpated due to reduced prey availability and connectivity between populations. If poisoning is widespread, this can lead to the extirpation of black-footed ferret populations across a variety of ecological settings, reducing genetic variability and resulting in a reduction of the species' representation. USFWS 2019 at 31.

TBNG has the biological potential to advance ferret recovery by hosting 100 breeding adults. Unfortunately, the FEIS falls short of even providing habitat for 30 breeding adults as no prairie dog colonies are protected from poisoning or recreational shooting. The SSA demonstrates that ferret populations are declining and that by expanding the scale of sylvatic plague mitigation efforts, establishing new reintroductions sites of suitable size, and protecting prairie dogs from recreational shooting and poisoning, viability of the species can be increased. Ferret recovery could even be achieved. But this requires action and the FEIS fails to contribute to advancing recovery of this endangered species.

The Five-year Review (USFWS 2020) concluded the following:

> The projected future condition of each population [the wild/reintroduced and captive] varied by scenario, but we predicted that both populations would decline in viability under every scenario except for scenarios where conservation efforts increased relative to current levels. Overall, we project that the effects of sylvatic plague, declining genetic fitness, and the lack of suitable habitat will continue to limit the viability of the black-footed ferret, and management inputs will continue to be required in order to maintain current levels of viability. Moreover, management inputs [e.g., "plague management and population augmentation for the wild population] will need to be expanded and improved in effectiveness in order to increase viability for the species. USFWS 2020 at 4.
>
> Additional current and potential future rangewide threats to the black-footed ferret identified in the most recent recovery plan (Service 2013) and 5-year review (79 FR 25883) included lack of prairie dog management sufficient for ferrets. USFWS 2020 at 4.
>
> Lack of purposeful management of prairie dog populations to provide sufficient habitat for black-footed ferrets identified as an imminent threat of high magnitude (Service 2013); SSA

> report notes the need for ongoing management of prairie dog populations to maintain and increase black-footed ferret resiliency redundancy, and representation. USFWS 2020 at 4.

These recent findings represent the best available science and provide further support that without TBNG becoming a site that can sustain 100 breeding adult ferrets, the species cannot recover.

In our comments we documented that government scientists and administrators have considered TBNG a key site for ferret reintroduction and recovery for decades. c.f. Luce 2008. Five black-footed ferret sightings were documented on TBNG between 1971 and 1977 (USFS, MBNF & TBNG 1985). The last ferret was observed on the Grassland in 1981 (USFS, MBNF & TBNG 1985). Since at least 1985—and until the Forest Service proposed the "2020 Amendment"—the Forest Service has developed and implemented management prescriptions, administered projects, and undertaken other actions to provide the conditions necessary for black-footed ferret reintroduction on TBNG, and by extension, the conservation and recovery of the species as a whole. This included the 2015 Strategy, which was based on stakeholder consensus. We documented this in scoping comments Defenders et al. 2019, citing USFS, MBNF & TBNG 1985; USFS 2000; MBNF 1998; USFS, TBNG 2002; Matthews et al. 2001; Buseck et al. 2005; USFS, TBNG 2009; USFS, TBNG 2014; TBNG 2015. TBNG's current Land and Resource Management Plan (2002 LRMP), for which the Final ROD was signed in 2002, designated the 3.63 Management Area (MA 3.63) for "Black-footed Ferret Reintroduction Habitat," and prioritized that, "[b]lack-tailed prairie dog colony complexes are actively and intensively managed as reintroduction habitat for black-footed ferrets." USFS, TBNG 2002: 3-16. The MA 3.63 designation protected prairie dogs from poisoning and shooting. In previous comments, we provided evidence that the Forest Service historically understood its duty to conduct a program for the conservation of black-footed ferrets on TBNG. Defenders et al. 2020, citing Cables 2007[3].

The USFWS has also emphasized the importance of the national grasslands and, specifically, TBNG as recovery sites for ferrets. USFWS 2007; USFWS 2017. The USFWS affirmed the importance of TBNG for the ferret recovery effort in 2017, stating,

> TBNG is one of the few large grassland properties with extensive black-tailed prairie dog populations and accordingly is of particular interest as a site that has extremely high potential to contribute to the recovery of the endangered black-footed ferret (ferret). In fact, TBNG may well be the best existing potential site across the species' range in 12 western states, Mexico, and Canada that could significantly contribute to ferret recovery at the present time. USFWS 2017.

However, beginning in about 2014, the Forest Service began taking actions that were antagonistic to prairie dogs as well as future ferret reintroduction and recovery. For example, the agency failed to utilize provisions in the 2002 LRMP, Amendment #3, and the plan-mandated Prairie Dog Conservation Assessment and Strategy (2009, updated 2015). USFS, TBNG 2014; USFS, MBRNF & TBNG 2017; Ferebee 2017.

[3] Mr. Rick D. Cables is a former Regional Forester for the Rocky Mountain Region (Region 2) of the Forest Service,

The Amendment signifies an additional radical policy shift by the Forest Service away from decades of commitment to a planning framework emphasizing ferret reintroduction and recovery on the Grassland and demonstrates the Forest Service's abandonment of its obligations under Section 7(a)(1) of the ESA for the Grassland. Despite the Forest Service's claim in Amendment documents that "the ecological conditions needed for reintroduction have been and will continue to be provided in management area 3.67," the Amendment's changes are antithetical to management conducive to ferret recovery. This is evident by eliminating the MA 3.63 and providing no places on the Grassland that protect prairie dogs from poisoning and shooting, by placing caps on prairie dog acreage that are too low to support a ferret population with 100 breeding adults, by instituting mechanisms the allow reducing prairie dog densities anywhere on the Grassland, and by including other plan components that undermine ferret recovery.

*d. Management approaches in the proposed Amendment further hinder ferret recovery.*

A few management approaches, which are optional plan content (36 CFR 219.7(f)(2)), appear to enable management decision making that may undermine ferret recovery. Some of these decisions likely should be made at the project-level and be governed by a NEPA process. This is true for the following management approaches in the Amendment described in the Draft ROD and Appendix B of the FEIS.

*Collaborative stakeholder group*. The Forest Service has not provided sufficient information about and strictures regarding stakeholder group decision making to assure that such a group is not making management decision that should be the domain of the Forest Service. The Draft ROD states,

> Forest Service personnel will work actively with and accept input on prairie dog management and monitoring from a third-party collaborative stakeholder group. The district ranger will share relevant information with the group and be responsive to information presented by the group. Draft ROD at 77.

We discussed in comments our concerns about a collaborative stakeholder group making decisions about the management of the Grassland.

> The Forest Service provides no clear direction on the makeup and ground rules for the proposed collaborative stakeholder group. … Any collaborative group recommendations must be consistent with the Forest Service's statutory, regulatory, and plan obligations (see NGO scoping comments, May 29, 2019). Moreover, the collaborative group must be established and must operate in conformance with all applicable laws, including the Federal Advisory Committee Act. Defenders et al. 2020 at 23.

The Forest Service did not provide any additional information in the Draft ROD or other plan documents about the stakeholder group to satisfy our concerns.

*Priorities for prairie dog control*. Decisions about where, when, and how poisoning prairie dogs occurs should be project-level decisions that offer opportunities for public input and otherwise abide by NEPA. Poisoning black-tailed prairie dogs, a Regional Forester Sensitive Species for the Grassland, and destroying habitat for other imperiled species such as the mountain plover, burrowing owl, swift fox,

and ferruginous hawk, is an action with significant impacts. Moreover, reducing prairie dog colonies by poisoning them reduces potential ferret habitat and risks rendering this habitat unsuitable for ferrets permanently.

*Prairie Dog density control*. Decisions about reducing the densities of prairie dogs within their colonies should be project-level decisions that offer opportunities for public input and otherwise abide by NEPA. Reducing the densities of black-tailed prairie dogs, a Regional Forester Sensitive Species for the Grassland, and degrading habitat for other imperiled species such as the mountain plover, burrowing owl, swift fox, and ferruginous hawk is an action with significant impacts and not backed by science. Moreover, reducing prairie dog colony densities degrades potential ferret habitat and risks rendering this habitat unsuitable for ferrets permanently.

*e. Relinquishing federal authority over ferret recovery by the Forest Service to the State of Wyoming and utilizing elements of the Wyoming Game & Fish Black Footed Ferret Recovery Plan as de facto plan direction will prevent ferret recovery.*

Ceding authority to the State of Wyoming may prevent the Forest Service from meeting its ESA Section 7(a)(1) obligations on the Grasslands. Moreover, this likely violates the Article IV, Section 3 of the U.S. Constitution. We addressed this issue in previous comments. Defenders et al. 2019 at 13-15; Defenders et al. 2020 at 27-31. The FEIS identifies Wyoming Game and Fish Department (WGFD) "As the lead agency for reintroduction efforts in Wyoming." FEIS at 9. And the USFWS concurs. 80 Fed. Reg. 66822. To the extent the USFWS has ceded decision making authority to Wyoming, this arrangement is unlawful. We discuss this in more detail below in Section 4.

The Draft ROD indicates the Forest Service agrees the WGFD has decision authority over ferret reintroduction on the Grassland, stating, " … USFWS staff and the Wyoming Game and Fish Department staff do not currently have plans to reintroduce ferrets on the Thunder Basin National Grassland … ." Draft ROD at 6. To the extent the Forest Service gives the State of Wyoming the authority to determine when and where black-footed ferrets are reintroduced to the Grassland, or the ability to veto a decision by the federal agencies to reintroduce ferrets, it is unlawful. Moreover, it would prevent any possibility of reintroduction of ferrets to the Grassland, and likely preclude the recovery of the species as a whole for the foreseeable future due to the Wyoming Black-footed Ferret Management Plan's prohibitive bar for making decisions about potential reintroduction sites, including the criteria for landowner support.

We remain concerned the Forest Service is incorporating elements of the Wyoming Game & Fish Black-Footed Ferret Management Plan (Wyoming Ferret Plan) as *de facto* plan direction, using the Wyoming Ferret Plan's "Black-footed Ferret Reintroduction Site Prioritization Matrix" as a decision document. If this is the case, following the Wyoming Ferret Plan's direction will certainly preclude the reintroduction and recovery of ferrets on the Grassland. Direction from the matrix has not been explicitly incorporated into Amendment plan components and the effects of this direction have not been assessed in the EIS. The Forest Service implies plans like the Wyoming Ferret Plan do not provide the force of regulation, stating,

> In regard to species recovery, recovery plans are not regulatory documents, but are instead intended to provide guidance to the U.S. Fish and Wildlife Service, other Federal agencies, States, tribes and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. The recovery of a species may be achieved without all criteria being fully met. BE at E-41.

Yet, in other places across plan documents, the Forest Service indeed indicates the Wyoming Ferret Plan will be used for decision making. For example, the Draft ROD states,

> Other changes to plan direction, such as designation of boundary management zones and allowance for control outside of management area 3.67 are intended to meet minimum requirements for reintroduction in Wyoming as described in the WGFD black-footed ferret site prioritization matrix. Draft ROD at 6.

The Draft ROD references the Wyoming Ferret Plan in a footnote and includes the following link to the plan: https://wgfd.wyo.gov/WGFD/media/content/PDF/Wildlife/Nongame/Wyoming-BFF-Management-Plan_11-14-2018.pdf. It is important to note that the Wyoming Ferret Plan did not receive public review or comment.

This aspect of the Amendment planning process is particularly vexing: the EIS uses the Wyoming Ferret plan prioritization matrix criteria as the basis for the ferret effects analysis—not the Amendment plan components. Again, these criteria have not explicitly been included as plan components; yes, as we demonstrate here, the Forest Service is indicating its intend to use these criteria to make management decision. The following statement in the FEIS further indicates the Forest Service intends to use the Wyoming Ferret Plan as a basis for management decision making:

> This analysis compares each alternative's responsiveness to the requirements for reintroduction established by the Wyoming Black-Footed Ferret Working Group. The proposed action, prairie dog emphasis alternative, and preferred alternative include management components that would not preclude reintroduction. The no-action alternative does not meet the requirement for having resources in place to conduct boundary control efforts. The grassland-wide alternative includes the use of anticoagulant rodenticides in the boundary management zone, which may make the site a low priority for allocation of ferrets and may need to cease before officially designating the area as a reintroduction site. FEIS at 134.

Not assessing the impacts of the action, i.e., the Amendment plan components, on ferret recovery is also a violation of the Planning Rule (36 CFR 219.14(b) & (c)(2)) and NEPA regulations (40 CFR 1502.16).

The FEIS seems to be using an outdated version of the prioritization matrix from February 5, 2018, which is provided as a link (https://www.fs.usda.gov/nfs/11558/www/nepa/110862_FSPLT3_5013106.pdf) in the Forest Service's plan documents for the Amendment provided on the Amendment website (https://www.fs.usda.gov/project/?project=55479). The version of the Wyoming Ferret Plan referenced in the Draft ROD is dated November 14, 2018. This later version has five (5) prioritization criteria, while the February 5, 2018 version used for the EIS effects analysis has six (6) criteria. Thus, even if it was

appropriate and lawful for the Wyoming Ferret Plan ferret reintroduction site prioritization matrix criteria to serve as the indices for assessing impacts, the fact that the analysis uses an outdated version of the criteria would negate the validity of this analysis.

The prioritization criteria (from February 5, 2018) utilized for the EIS effects analysis include: "minimum prairie dog acreage," "capacity to fulfill allocation of ferrets," "support of landowners within reintroduction site," "resources in place to conduct boundary control efforts," "community support," and "compatible land management practices". FEIS at 135. The prioritization criteria from the November 14, 2018 version of the Wyoming Ferret Plan include:

1. Minimum requirements for allocating ferrets (e.g., minimum prairie dog acreage, landowner or land management agency support, capacity to fulfill ferret allocations, etc.);
2. Habitat suitability, stability, and management, including the funding and capacity to provide prairie dog boundary control where needed and desired;
3. Disease monitoring and management, with a particular emphasis on sylvatic plague;
4. Ability to address statewide objectives, including the ability to assess and monitor the status of ferret and prairie dog populations; and
5. Stakeholder support of reintroduction activities, with particular emphasis on local communities and landowners, including adjacent landowners and permittees / leasees.

WGFD 2018 at 14.

Both sets of criteria would make reintroducing ferrets prohibitive on the Grassland, given the requirement to have stakeholder support. We provided a detailed discussion of this problem in previous comments. Defenders et al. 2020 at 27-31.

Other statements within the plan documents further support the notion that the Forest Service will be taking Wyoming's lead on ferret reintroduction and recovery and using the Wyoming Ferret Plan as a basis for management decisions. The FEIS and BE both state,

> As the lead agency for reintroduction efforts in Wyoming, the Wyoming Game and Fish Department leads the Black-Footed Ferret Working Group, which has developed the black-footed ferret reintroduction site prioritization matrix (Wyoming Game and Fish Department 2018) to prioritize new areas for reintroduction. This prioritization matrix will allow members to evaluate different criteria related to the biological and social context for reintroduction at sites recommended as reintroduction sites. Only sites that meet the 6 requirements for reintroduction would be evaluated further for prioritization based on 10 ranking criteria. Ranking criteria would then be used to select the highest priority site for reintroduction activities. Not all ranking criteria need to be met for a site to be considered for reintroduction. FEIS at 9-19, 134; BE at E-41.

In the Response to Comments from the draft Amendment and DEIS, found in Appendix C of the FEIS, the Forest Service makes the following statements:

It is also appropriate that any future consideration of a reintroduction of the Black-footed Ferret must follow the Wyoming Game and Fish Department management plan, which requires stakeholder support and guides conservation and management of the species in the state. FEIS at C-73.

Wyoming Game & Fish Black Footed Ferret Recovery Plan requires a need for, "Stakeholder support of reintroduction activities, with particular emphasis on local communities and landowners, including adjacent landowners and permittees / lessees." We believe that unless, and until, you can demonstrate such support, the whole BFF Recovery area idea should be put on hold, or done away with completely. FEIS at C-73.

The biological evaluation and biological assessment analyze effects to black-footed ferrets and the final environmental impact statement compares the responsiveness of each alternative to the requirements for black-footed ferret reintroduction established by the Wyoming Game and Fish Department. The preferred alternative, proposed action, and prairie dog emphasis alternatives do not include any management components that would preclude reintroduction. FEIS at C-74, C-96.

Other changes to plan direction, such as designation of boundary management zones and allowance for control outside of management area 3.67 are intended to meet minimum requirements for reintroduction in Wyoming as described in the Wyoming Game and Fish Department black-footed ferret site prioritization matrix. FEIS at C-75, C-88, C-96.

Ironically, despite the Forest Service apparently and illegitimately tying its management decisions to the Wyoming Ferret Plan, the Amendment undermines Wyoming Ferret Plan objectives. Objective 1 of the Wyoming Ferret Plan calls for maintaining "a minimum of 341 breeding adults distributed among 5 or more populations statewide," and Wyoming currently contains only two ferret populations. Objective 2: "[m]aintain a minimum of 30 breeding adults in each population, with at least 2 populations containing a minimum of 100 breeding adults," is far from being achieved as only 1 site exists with this potential. Objective 3 aims to "[e]stablish at least 2 populations within white-tailed prairie dog colonies and at least 1 population within black-tailed prairie dog (*C. ludovicianus*) colonies," yet no ferret populations are known to occur on black-tailed prairie dog colonies in Wyoming, and no potential black-tailed prairie dog recovery sites have been identified in the State, with the exception of TBNG.

**4. The proposed Amendment violates the United States Constitution by ceding federal authority over wildlife management to the State of Wyoming.**

The Forest Service is under no obligation to align any part of its management plan with Wyoming's Black-footed Ferret Management Plan or any state government wildlife management direction (36 CFR 219.4(b)(3)). Given that there is no statutory or regulatory basis for wholly subjecting federal management of federal public lands to the priorities of a state game agency, Wyoming's plan fails to provide a basis justifying the need to change TBNG's existing management plan, including the 2009 Amendment #3 of TBNG's land management plan. Despite the 2012 Planning Rule's instruction to coordinate with other government entities under 36 CFR 219.4(b)(1), the Forest Service cannot abdicate

its statutory responsibilities to manage the federal public lands in line with Congress's direction. We raised this issue in Defenders et al. 2019 at 13-15; Defenders et al. at 27-31.

Notwithstanding any state-federal cooperative agreements or memoranda of understanding, federal agencies have final responsibility for ensuring compliance with federal law. The ESA and NFMA require the USFWS and the Forest Service to use their authorities to recover listed species and any purported veto power by the State of Wyoming (whether express or implied) is unlawful.

It is a common misconception that states represented by their wildlife agencies have ultimate management authority over wildlife on federal lands. In fact, the courts have consistently upheld that the federal government has supremacy over its lands under the Property Clause of the United States Constitution (United States Constitution, Article IV, Section 3, Clause 2), which grants Congress the "Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States," and under the Supremacy Clause (United States Constitution, Article IV, Clause 2). In *Kleppe v. New Mexico*, 426 U.S. 529, 541 (1976), the Court stated, "the 'complete power' that Congress has over public lands necessarily includes the power to regulate and protect the wildlife living there." *Kleppe* further described the limit of a state's ability to dictate policy on federal lands: "those powers exist only in so far as [their] exercise may be not incompatible with, or restrained by, the rights conveyed to the Federal government by the Constitution." Id. at 545 (internal quotes omitted).

We described in previous comments (Defenders et al. 2019 at 13-15; Defenders et al. 2020 at 27-31) our concerns that the Forest Service was intending to cede its lawful authority over wildlife management to the State of Wyoming regarding ferret reintroduction and recovery on the Grassland. We recommended that, "The proposed amendment should be modified to clarify that final authority concerning [ferret] reintroductions resides with the Forest Service and Fish and Wildlife Service." Defenders et al. 2020 at 27. The Draft ROD and FEIS contain no such clarifying statement. Instead, the FEIS identifies Wyoming Game and Fish Department (WGFD) "As the lead agency for reintroduction efforts in Wyoming." FEIS at 9. The Forest Service's position is similar to that of the USFWS, which appears to have relinquished its own authority to Wyoming over ferret recovery in the Wyoming 10(j) rule: Establishment of a Nonessential Experimental Population of Black-footed Ferrets in Wyoming (80 Fed. Reg. 66822) (Wyoming 10(j) Rule). The Forest Service states,

> As part of the final 10(j) rule, the U.S. Fish and Wildlife Service also formally passed leadership of ferret reintroduction to the Wyoming Game and Fish Department, which has played a lead role in reintroduction efforts in the State since ferrets were rediscovered outside of Meeteetse in 1981. BE at 41.

The Wyoming 10(j) Rule states,

> The WGFD will serve as the lead agency in the reintroduction and subsequent management of black-footed ferret in Wyoming; however, WGFD will continue to coordinate closely with the Service on these restoration efforts. 80 Fed. Reg. 66822.

To the extent the USFWS has ceded decision-making authority to Wyoming, this arrangement is unlawful. It is well-established that a federal agency may not align its regulation of wildlife on federal land with state management where such an action would be in violation of the federal agency's statutory mandates.[4] It is equally well-established that federal agencies may not subdelegate their statutory authorities to outside entities—including state agencies—absent an affirmative showing of congressional authorization. *U.S. Telecom Ass'n v. FCC*, 359 F.3d 554, 565–66 (D.C. Cir. 2004).

The Draft ROD indicates the Forest Service agrees the WGFD has decision authority over ferret reintroduction on the Grassland, stating, " … USFWS staff and the Wyoming Game and Fish Department staff do not currently have plans to reintroduce ferrets on the Thunder Basin National Grassland … ." Draft ROD at 6. To the extent the Forest Service gives the State of Wyoming the authority to determine when and where black-footed ferrets are reintroduced to the Grassland, or the ability to veto a decision by the federal agencies to reintroduce ferrets, it is unlawful and in violation of Article IV, Section 3 of the U.S. Constitution.

**Suggestions for Improvement**

This Objection has demonstrated that the Forest Service risks violating several laws, regulations, and policies with the 2020 Amendment process and intended outcome, which is now the proposed Amendment (Alternative 5/preferred alternative). We have already provided recommendations for the Forest Service regarding the amendment. We note these below and include some additional suggestions.

1. The Forest Service must have a land management plan that contributes to ferret recovery to comply with NFMA and the ESA. We recommended developing a plan that provides the ecological conditions necessary to support a ferret population with 100 breeding adult ferrets, which is required for the species recovery. See Defenders et al. 2020 at 47-53. We offered a path forward to help address social conflicts. See Defenders et al. 2020 at Appendix.

2. The Forest Service must have a land management plan that maintains the viability of Sensitive Species and potential Species of Conservation Concern, including prairie dogs, mountain plovers, burrowing owls, and others. A management plan that can provide the conditions necessary to support 100 breeding adult ferrets can help provide for the conditions necessary for these species—in sum: large, dense, and widely-distributed prairie dog colonies and colony complexes.

3. The Forest Service must revise its EIS or conduct a supplemental EIS in order to comply with relevant laws, regulations, and policies that are articulated above.

[4] *See, e.g.*, *Wyoming v. United States*, 279 F.3d 1214, 1226-27 (10th Cir. 2002) (the Constitution gives the federal government the plenary power to manage federal lands, including wildlife living on such lands); *Audubon Soc'y v. Davis*, 307 F.3d 835, 851 (9th Cir. 2002) ("The Supremacy Clause of the Constitution, Art. VI, cl. 2, invalidates state laws that 'interfere with, or are contrary to,' federal law").

**Literature Cited**

*The sources referenced in this section include documents cited in Defenders et al. 2019, Defenders et al. 2020, and this Objection. We have submitted these documents to be incorporated into the public record.*


Agnew, W., D.W. Uresk, and R.M. Hansen. 1986. Flora and fauna associated with prairie dog colonies and adjacent ungrazed mixed-grass prairie in western South Dakota. Journal of Range Management. 39: 135-139.

Agnew, W., D.W. Uresk, and R.M. Hansen. 1988. Arthropod consumption by small mammals on prairie dog colonies and adjacent ungrazed mixed grass prairie in western South Dakota. USDA Forest Service General Technical Report RM-154: 8-87.

American Society of Mammalogists. 1998. Resolution on the decline of prairie dogs and the grassland ecosystem in North America.

Andelt, W.F. 2006. Methods and economics of managing prairie dogs. Conservation of the Black-tailed Prairie Dog: Saving North America's Western Grasslands. J.L. Hoogland (ed). Island Press. pp. 129-138.

Anderson, E., S.C. Forrest, T.W. Clark, and L. Richardson. 1987. Paleobiology, biogeography, and systematics of the black-footed ferret, *Mustela nigripes* (Audubon and Bachman), 1851. Great Basin Naturalist Memoirs. 8: 11-62.

Antolin, M., P. Gober, B. Luce, D. Biggins, W. Van Pelt, D. Seery, M. Lockhart and M. Ball. 2002. The influence of sylvatic plague on North American wildlife at the landscape level, with special emphasis on black-footed ferret and prairie dog conservation. Transactions of the North American Wildlife and Natural Resources Conference. 67: 105-127.

Antolin, M.F., L.T. Savage, and R.J. Eisen. 2006. Landscape features influence genetic structure of black-tailed prairie dogs (*Cynomys ludovicianus*). Landscape Ecology. 21: 867-875.

Archuleta, F.D. 2014. Black-tailed prairie dog (*Cynomys ludovicianus*) response to seasonality and frequency of fire. Master's Thesis. New Mexico Highlands University. Las Vegas, NM.

Arrowood, P.C., C.A. Finley, and B.C. Thompson. 2001. Analyses of burrowing owl populations in New Mexico. Journal of Raptor Research. 35: 362-370.

Augustine, D., A. Davidson, K. Dickinson, and B. Van Pelt. *In press*. Thinking like a grassland: challenges and opportunities for biodiversity conservation in the Great Plains of North America. Rangeland Ecology and Management.

Augustine, D.J. 2011. Habitat selection by Mountain Plovers in shortgrass steppe. Journal of Management. 75(2): 297-304.

Augustine, D.J., and B.W. Baker. 2013. Associations of grassland bird communities with black-tailed prairie dogs in the North American Great Plains. Conservation Biology. 27(2): 324-334.

Augustine, D.J. and J.D. Derner. 2012. Disturbance regimes and mountain plover habitat in shortgrass steppe: large herbivore grazing does not substitute for prairie dog grazing or fire. Journal of Wildlife Manage. 76(4): 721-728.

Augustine, D.J., M.R. Matchett, T.P. Toombs, J.F. Cully Jr., T.L. Johnson, and J.G. Sidle. 2008. Spatiotemporal dynamics of black-tailed prairie dog colonies affected by plague. Landscape Ecology. 23(3): 255-267.

Bak, J.M., K.G. Boykin, B.C. Thompson, and D.L. Daniel. 2001. Distribution of wintering ferruginous hawks (*Buteo regalis*) in relation to black-tailed prairie dog (*Cyomys ludovicianus*) colonies in southern New Mexico and northern Chihuahua. Journal of Raptor Research. 35: 142-129.

Baker, B.W., D.J. Augustine, J.A. Sedgwick, and B.C. Lubow. 2013. Ecosystem engineering varies spatially: a test of the vegetation modification paradigm for prairie dogs. Ecography. 36: 230-239.

Bangert, R.K., and C.N. Slobodchikoff. 2004. Prairie dog engineering indirectly affects beetle movement behavior. Journal of Arid Environments. 56(1): 83-94.

Bangert, R.K., and C.N. Slobodchikoff. 2006. Conservation of prairie dog ecosystem engineering may support arthropod beta and gamma diversity. Journal of Arid Environments. 67(1): 100-115.

Barko, V.A. 1996. Effect of the black-tailed prairie dog on avifaunal composition in southern shortgrass prairie. MS thesis. Oklahoma State University. Stillwater, OK.

Barnes, A. 1993. A review of plague and its relevance to prairie dog populations and the black-footed ferret. Management of Prairie Dog Complexes for the Reintroduction of the Black-footed Ferret. J. Oldemeyer, D.E. Biggins, B.J. Miller, and R. Crete (eds). USFWS Biological Report 13. pp. 28-37.

Biggins, D.E. 2006. The symposium in context. Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J.E. Roelle, B.J. Miller, J.L. Godbey, and D.E. Biggins (eds). U.S. Geological Survey Scientific Investigations Report 2005-5293. pp. 3-5.

Biggins, D.E. 2012. Information on black-footed ferret biology collected within the framework of ferret conservation. Western North American Naturalist. 72(2): 129-133.

Biggins, D.E., and D.A. Eads. 2019. Prairie dogs, persistent plague, flocking fleas, and pernicious positive feedback. Frontiers in Veterinary Science. 6: 75.

Biggins, D.E., J. L. Godbey, K.L. Gage, L.G. Carter, and J.A. Montenieri. 2010. Vector control improves survival of three species of prairie dogs (*Cynomys*) in areas considered enzootic for plague. Vector-Borne and Zoonotic Diseases. 10(1): 17-26.

Biggins, D.E., J.L. Godbey, T.M. Livieri, M.R. Matchett, and B.D. Bibles. 2006a. Post-release movements and survival of adult and young black-footed ferrets. Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J.E. Roelle, B.J. Miller, J.L. Godbey, and D.E. Biggins (eds). U.S. Geological Survey Scientific Investigations Report 2005-5293. pp. 189-198.

Biggins, D.E., J.M. Lockhart, and J.L. Godbey. 2006b. Evaluating habitat for black-footed ferrets: revision of an existing model. Recovery of the Black-footed Ferret - Progress and Continuing Challenges. E. Roelle, B.J. Miller, J.L. Godbey, and D.E. Biggins (eds). U.S. Geological Survey Scientific Investigations Report 2005-5293. pp. 143-150.

Biggins, D.E., B.J. Miller, L.R. Hanebury, B. Oakleaf, A.H. Farmer, R. Crete, and A. Dood. 1993. A technique for evaluating black-footed ferret habitat. Management of prairie dog complexes for the reintroduction of the black-footed ferret. US Fish and Wildlife Service Biological Report, 13. pp.73-88.

Biggins, D.E., S. Ramakrishnan, A.R. Goldberg, and D.A. Eads. 2012. Black-footed ferrets and recreational shooting influence the attributes of black-tailed prairie dog burrows. Western North American Naturalist. 72(2): 158-172.

Bonham, C.D., and A. Lerwick. 1976. Vegetation changes induced by prairie dogs on shortgrass range. Journal of Range Management. 29: 221-225.

Bruskotter, J.T., J.A. Vucetich, K.M. Slagle, R. Berardo, A.S. Singh, and R.S. Wilson. 2018. Support for the US Endangered Species Act over time and space: Controversial species do not weaken public support for protective legislation. Conservation Letters. 11(6): e12595.

Bryan, R.D. and M.B. Wunder. 2014. Western Burrowing Owls (*Athene cunicularia hypugaea*) eavesdrop on alarm calls of black-tailed prairie dogs (*Cynomys ludovicianus*). Ethology. 120: 180-188.

Buseck, R.S., Keinath, D.A., Everett, E., 2005. Species assessment for black-tailed prairie dog in Wyoming. US Department of Interior, Bureau of Land Management, Wyoming State Office, Cheyenne, WY.

Campbell, T.M. and T.W. Clark. 1981. Colony characteristics and vertebrate associates of white-tailed and black-tailed prairie dogs in Wyoming. American Midland Naturalist. 105: 269-76.

Cartron, J.-L.E., P.J. Polechla, Jr., and R.R. Cook. 2004. Prey of nesting ferruginous hawks in New Mexico. Southwestern Naturalist. 49(2): 270-276.

Ceballos G., A. Davidson, R. List, J. Pacheco, P. Manzano-Fischer, G. Santos-Barrera, J. Cruzado1. 2010. Rapid decline of a grassland system and its ecological and conservation implications. PLoSONE. 5(1): e8562.

Ceballos, G. and J. Pacheco. 1997. The relationship of prairie dogs and regional biodiversity in Mexico. Seventh International Theriological Congress, Acapulco, Mexico (Abs).

Ceballos, G., J. Pacheco, and R. List. 1999. Influence of prairie dogs (*Cynomys ludovicianus*) on habitat heterogeneity and mammalian diversity in Mexico. Journal of Arid Environments. 41: 161-172.

Cincotta, R.P., D.W. Uresk, and R.M. Hansen. 1987. A statistical model of expansion in a colony of black-tailed prairie dogs. Proceedings of the Great Plains Wildlife Damage Control Workshop Internet Center for Wildlife Damage Management. 54: 30-33.

Clark, T.W., D. Hinckley, and T. Rich (eds). 1989. The prairie dog ecosystem: Managing for biological diversity. Montana BLM Wildlife Technical Bulletin No. 2.

Clark, T.W., T.M. Campbell, D.G. Socha, and D.E. Casey. 1982. Prairie dog colony attributes and associated vertebrate species. Great Basin Naturalist. 42: 572-82.

Collinge, S.K., W.C. Johnson, C. Ray, R. Matchett, J. Grensten, J.F. Cully, Jr., K.L. Gage, M.Y. Kosoy, J.E. Loye, and A.P. Martin. 2005a. Testing the generality of a trophic-cascade model for plague. EcoHealth. 2: 102-112.

Collinge, S.K., W.C. Johnson, C. Ray, R. Matchett, J. Grensten, J.F. Cully, Jr., K.L. Gage, M.Y. Kosoy, J.E. Loye, and A.P. Martin. 2005b. Landscape structure and plague occurrence in black-tailed prairie dogs on grasslands of the western USA. Landscape Ecology. 20: 941-955.

Collins, A.R., J.P. Workman, and D.W. Uresk. 1984. An economic analysis of black-tailed prairie dog (*Cynomys ludovicianus*) control. Journal of Range Management. 37(4): 358-361.

Conant, R.T., D. Kluck, M. Anderson, A. Badger, B.M. Boustead, J. Derner, L. Farris, M. Hayes, B. Livneh, S. McNeeley, D. Peck, M. Shulski, and V. Small. 2018. Northern Great Plains. Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II. D.R. Reidmiller, C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds). U.S. Global Change Research Program. Washington, DC. pp. 941-986.

Connell, L.C., L.M. Porensky, and J.D. Scasta. 2019. Prairie dog (*Cynomys ludovicianus*) influence on forage quantity and quality in a grazed grassland-shrubland ecotone. Rangeland Ecology and Management. 72: 360-373.

Cook, R.R., J.E. Carton, and P.J. Polechla, Jr. 2003. The importance of prairie dogs to nesting ferruginous hawks in grassland ecosystems. Wildlife Society Bulletin. 31: 1073-1082.

Coppock, D.L., and J.K. Detling. 1986. Alteration of bison and black-tailed prairie dog grazing interaction by prescribed burning. The Journal of Wildlife Management. 452-455.

Coppock, D.L., J.K. Detling, J.E. Ellis, and M.I. Dyer. 1983a. Plant-herbivore interactions in a North American mixed-grass prairie. I. Effects of black-tailed prairie dogs on intraseasonal aboveground plant biomass and nutrient dynamics and plant species diversity. Oecologia. 56: 1-9.

Coppock, D. L., J. K. Detling, J. E. Ellis, and M. I. Dyer. 1983b. Plant-herbivore interactions in a North American mixed-grass prairie: II. responses of bison to modification of vegetation by prairie dogs. Oecologia. 56: 10-15.

Correll, M.D., E.H. Strasser, A.W. Green, and A.O. Panjabi. 2019. Quantifying specialist avifaunal decline in grassland birds of the Northern Great Plains. Ecosphere. 10(1): e02523.

Cook, R.R., Jean-Luc, E.C., and Paul, J.P. 2003. The importance of prairie dogs to nesting ferruginous hawks in grassland ecosystems. Wildlife Society Bulletin. 31(4): 1073-082.

Crooks, K.R. and M. Sanjayan (eds). 2006. Connectivity conservation. Cambridge University Press.

Cully, J.F., D.E. Biggins, and D.B. Seery. 2006. Conservation of prairie dogs in areas with plague. Conservation of the Black-Tailed Prairie Dog. J.L. Hoogland (ed). Island Press. pp. 157-168.

Cully, J.F., Jr., T.L. Johnson, S.K. Collinge, and C. Ray. 2010. Disease limits populations: plague and black-tailed prairie dogs. Vector-Borne and Zoonotic Diseases. 10(1): 7-15.

Cully, Jr, J.F., S.K. Collinge, R.E. Vannimwegen, C. Ray, W.C. Johnson, B. Thiagarajan, D.B. Conlin and B. Holmes. 2010. Spatial variation in keystone effects: small mammal diversity associated with black-tailed prairie dog colonies. Ecography 33: 1-11.

Dano, L. 1952. Cottontail rabbit (*Sylvilagus audubonii baileyi*) populations in relation to prairie dog (*Cynomys ludovicianus ludovicianus*) towns. M. S. thesis. Colorado State University, Fort Collins, CO.

Davidson, A.D., J.K. Detling, J.H. and Brown. 2012. Ecological roles and conservation challenges of social, burrowing, herbivorous mammals in the world's grasslands. Frontiers in Ecology and the Environment. 10: 477e486.

Davidson, A.D., R.R. Parmenter, and J.R. Gosz. 1999. Responses of small mammals and vegetation to a reintroduction of Gunnison's prairie dogs. Journal of Mammalogy. 80: 1311-1324.

Davis, J.R. and T.C. Theimer. 2003. Increased lesser earless lizard (*Holbrookia maculata*) abundance on Gunnison's prairie dog colonies and short term responses to artificial prairie dog burrows. American Midland Naturalist. 150: 282-290.

Derner, J.D., J.K. Detling, and M.F. Antolin. 2006. Are livestock weight gains affected by black-tailed prairie dogs? Frontiers in Ecology and the Environment. 4(9): 459-464.

Desmond, M. 2004. Effects of grazing practices and fossorial rodents on a winter avian community in Chihuahua. Mexico. Biological Conservation. 116: 235-242.

Desmond, M.J., J.A. Savidge, and K.M. Eskridge. 2000. Correlations between burrowing owl and black-tailed prairie dog declines: a 7-year analysis. Journal of Wildlife Management. 64: 1067-1075.

Desmond, M.J., J.A. Savidge, and T.F. Seibert. 1995. Spatial patterns of burrowing owls (*Speotyto cunicularia*) nests within black-tailed prairie dog (*Cynomys ludovicianus*) towns. Canadian Journal of Zoology. 73: 1375-1379.

Desmond, M.J., and Savidge, J.A. 1999. Satellite burrow use by burrowing owl chicks and its influence on nest fate. Ecology and conservation of grassland birds of the western hemisphere. Studies in Avian Biology. 19: 128-130.

Detling, J.K. 1998. Mammalian herbivores: Ecosystem-level effects in two grassland national parks. Wildlife Society Bulleting. 26: 438-448.

Detling, J.K. and A.D. Whicker. 1987. A control of ecosystem processes by prairie dogs and other grassland herbivores. Proceedings of the Eighth Great Plains Wildlife Damage Control Workshop. Rapid City SD. U. S. Forest Service. pp. 23-29.

Dinsmore, S.J. 2013. Mountain Plover responses to deltamethrin treatments on prairie dog colonies in Montana. Ecotoxicology. 22(2): 415-424.

Dinsmore, S.J., and M.D. Smith. 2010. Mountain Plover responses to plague in Montana. Vector-Borne and Zoonotic Diseases. 10(1): 37-45.

Dinsmore, S.J., G.C. White, and F.L. Knopf. 2005. Mountain Plover population responses to black-tailed prairie dogs in Montana. Journal of Wildlife Management. 69: 1546-1553.

Duchardt, C.J., D.J. Augustine, and J.L. Beck. 2019. Threshold responses of grassland and sagebrush birds to patterns of disturbance created by an ecosystem engineer. Landscape Ecology. 34: 895-909.

Duchardt, C.J., J.L. Beck, and D.J. Augustine. 2020. Mountain Plover habitat selection and nest survival in relation to weather variability and spatial attributes of black-tailed prairie dog disturbance. The Condor 122: 1-15.

Duchardt, C.J., L.M. Prensky, D.J. Augustine, and J.L. Beck. 2018. Disturbance shapes avian communities on a grassland–sagebrush ecotone. Ecosphere. 9(10): e02483.

Duchardt, C.J., and J.D. Scasta. 2017. Welcome to Thunder Basin. University of Wyoming Thunder Basin Fact Sheet #1. University of Wyoming. B-1288.1. January.

Eads, D.A. 2009. Evaluation and development of black-footed ferret resource selection models. MS thesis. University of Missouri. Columbia, MO.

Eads, D.A., D.E. Biggins, T.M. Livieri and J.J. Millspaugh. 2014. Space use, resource selection and territoriality of black-footed ferrets: implications for reserve design. Wildlife Biology. 20: 27-36.

Eads, D.A., and D.E. Biggins. 2017. Paltry past-precipitation: predisposing prairie dogs to plague? The Journal of Wildlife Management. 81(6): 990-998.

Eads, D.A., and J.L. Hoogland. 2016. Factors that affect parasitism of black-tailed prairie dogs by fleas. Ecosphere. 7(7): e01372.

Eads, D.A., and J.L. Hoogland. 2017. Precipitation, climate change, and parasitism of prairie dogs by fleas that transmit plague. Journal of Parasitology. 103(4): 309-319.

Eads, D.A., D.E. Biggins, D.H. Long, K.L. Gage, and M.F. Antolin. 2016. Droughts may increase susceptibility of prairie dogs to fleas: incongruity with hypothesized mechanisms of plague cycles in rodents. Journal of Mammalogy. 97(4): 1044-1053.

Eads, D.A., D.E. Biggins, J. Bowser, J.C. McAllister, R.L. Griebel. E. Childers, T.M. Livieri, L. Sterling Krank, and K. Bly. 2018. Resistance to deltamethrin in prairie dog (*Cynomys ludovicianus*) fleas in the field and in the laboratory. Journal of Wildlife Diseases. 54(4): 745-754.

Eads, D.A., D.E. Biggins, J. Bowser, K. Broerman, T.M. Livieri, E. Childers, P. Dobesh, and R.L. Griebel. 2019. Evaluation of five pulicides to suppress fleas on black-tailed prairie dogs: encouraging long-term results with systemic 0.005% fipronil. Vector-Borne and Zoonotic. Diseases. 19(6): 400-406.

Eads, D.A., D.S. Jachowski, D.E. Biggins, T.M. Livieri, M.R. Matchett and J.J. Millspaugh. 2012. Resource selection models are useful in predicting fine-scale distributions of black-footed ferrets in prairie dog colonies. Western North American Naturalist. 72(2): 206-216.

Ecke, D.H., and C.W. Johnson. 1952. Plague in Colorado and Texas. Public Health Monograph. No. 6 (Part I). Federal Security Agency: Public Health Service. U.S. Government Printing Office. Washington, DC.

Ellison Manning, A. E. and C. M. White. 2001. Nest site selection by mountain plovers (*Charadrius montanus*) in a shrub-steppe habitat. Western North American Naturalist. 61: 229-235.

Enscore, R., B. Biggerstaff, T. Brown, R. Fulgham, P. Reynolds, D. Engelthaler, C., R. Parmenter, J. Montenieri, J. Cheek, R. Grinnell, P. Ettestad and, K. Gage. 2002. Modeling relationships between climate and the frequency of human plague cases in the southwestern United States, 1960 - 1997. The American Journal of Tropical Medicine and Hygiene. 66(2): 186-196.

EPA (Environmental Protection Agency). 2004. Potential Risks of Nine Rodenticides to Birds and Nontarget Mammals: A Comparative Approach. Office of Pesticides Programs, Environmental Fate and Effects Division, Environmental Protection Agency. July.

Facka, A.N., Roemer G.W., Mathis, V.L. Kam, M. Geffen, E. 2010. Drought leads to collapse of black-tailed prairie dog populations reintroduced to the Chihuahuan Desert. Journal of Wildlife Management. 74: 1752-1762.

Ferebee, B. (Regional Forester of the Rocky Mountain Region) to the Wyoming County Commissioners Association. Letter May 19, 2017.

Frankham, R. 2006. Genetics and landscape connectivity. Connectivity Conservation. K.R. Crooks and M. Sanjayan (eds). Cambridge University Press. pp. 72-96.

Frankham, R., J.D. Ballou, and D.A. Briscoe. 2002. Introduction to conservation genetics. Cambridge University Press.

Fritz, M. 2001. Michael I. Fritz, Nebraska Game and Parks Commission, Letter to Pete Gober, U.S. Fish and Wildlife Service. December 20.

Forrest, S.C., T.W. Clark, L. Richardson, and T.M. Campbell III. 1985. Black-footed ferret habitat: some management and reintroduction considerations. Wyoming BLM Wildlife Technical Bulletin No. 2. 49 pp.

Fuhlendorf, S.D., B.W. Allred and R.G. Hamilton. 2010. Bison as keystone herbivores on the Great Plains. Can cattle serve as proxy for evolutionary grazing patterns? American Bison Society Working Paper No. 4, November 2010.

Fuhlendorf, S.D., D.M. Engle, R.D. Elmore, R.F. Limb, and T.G. Bidwell. 2012. Conservation of pattern and process: developing an alternative paradigm of rangeland management. Rangeland Ecology & Management. 65(6): 579-589.

Gaines, E. 1996. Creating a reserve within the Thunder Basin National Grasslands. Thesis. University of Montana.

Garrett, M.G., and W.L. Franklin. 1981. Prairie dog dispersal in Wind Cave Park: possibilities for control. Proceedings Fifth Great Plains Wildlife Damage Control Workshop. R.M. Timm and R.J. Johnson (eds). Institute of Agriculture and Natural Resources. University of Nebraska at Lincoln. pp. 185-98.

Garrett, M.G., and W.L. Franklin. 1988. Behavioral ecology of dispersal in the black-tailed prairie dog. Journal of Mammalogy. 69(2): 236-250.

Garrett, M.G., Hoogland, J.L. and Franklin, W.L., 1982. Demographic differences between an old and a new colony of black-tailed prairie dogs (*Cynomys ludovicianus*). American Midland Naturalist. 51-59.

Geaumont, B.A, T.J. Hovick, R.F. Limb, W.M. Mack, A.R. Lipinski, and K.K. Sedivec. 2019. Plant and bird community dynamics in mixed-grass prairie grazed by native and domestic herbivores. Rangeland Ecol. Manage. 72(2): 374-384.

Gervin, C.A., H.H. Bruun, T. Seipel, and N.D. Burgess. 2019. Presence of both active and inactive colonies of prairie dogs contributes to higher vegetation heterogeneity at the landscape scale. American Midland Naturalist. 181: 183-194.

Gilpin, M.E., and M.E. Soulé. 1986. Minimum viable populations: processes of species extinctions. Conservation Biology: Science of Scarcity and Diversity. M.E. Soulé (ed). Sinauer Associates, Inc., Publishers. pp. 19-34.

Goguen, C.B. 2012. Comparison of bird and mammal communities on black-tailed prairie dog (*Cynomys ludovicianus*) colonies and uncolonized shortgrass prairie in New Mexico. Journal of Arid Ecology. 80: 27-34.

Goodrich, J.M. and S.W. Buskirk. 1998. Spacing and ecology of North American badgers (*Taxidae taxus*) in a prairie-dog (*Cynomys leucurus*) complex. Journal of Mammalogy. 79: 171-179.

Goodrich, J.M., and S.W. Buskirk. 1995. Control of abundant native for conservation of endangered species. Conservation Biology. 9(6): 1357-1364.

Goodwin, H.T. 1995. Pliocene-Pleistocene biogeographic history of prairie dogs, genus Cynomys (Sciuridae). Journal of Mammalogy. 76(1): 100-122.

Grassel, S.M., J.L. Rachlow and C.J. Williams. 2016. Reproduction by black-tailed prairie dogs and black-footed ferrets: effects of weather and food availability. Western North American Naturalist. 76(4): 405-416.

Griebel, R.L. 2009. Wall ranger district 2009 plague management report. Nebraska National Forest, Buffalo Gap National Grassland, Wall Ranger District. Wall, South Dakota, 13 pp.

Hansen, R.M. and I.K. Gold. 1977. Black-tailed prairie dogs, desert cottontails and cattle trophic relations on shortgrass range. Journal of Range Management. 30: 210-14.

Hanski, I., and O.E. Gaggiotti (eds). 2004. Ecology, genetics, and evolution of metapopulations. Elsevier Academic Press.

Hanson, D.A., H.B. Britten, M. Restani, and L.R. Washburn. 2007. High prevalence of Yersinia pestis in black-tailed prairie dog colonies during an apparent enzootic phase of sylvatic plague. Conservation Genetics. 8(4): 789-795.

Hartley, L.M., J.K. Detling, and L.T. Savage. 2009. Introduced plague lessens the effects of an herbivorous rodent on grassland vegetation. Journal of Applied Ecology. 46(4): 861-869.

Hillman, C.N. 1968. Field observations of black-footed ferrets in South Dakota. Thirty-third North American Wildlife Conference. pp. 433-443.

Holycross, A.T. and J.D. Fawcett. 2002. Observations on neonatal aggregations and associated behaviors in the prairie rattlesnake, *Crotalus viridis viridis*. American Midland Naturalist. 148: 181-184.

Hoogland, J.L. 1995. The black-tailed prairie dog: social life of a burrowing mammal. University of Chicago Press. selected pages.

Jaeger, D. Forest Supervisor (Medicine Bow-Routt National Forests, Thunder Basin National Grassland) to Wyoming County Commissioners Association, Email Subject: Short-term and long-term actions for Thunder Basin National Grassland. May 19, 2017.

Johnson, W., and S. Collinge. 2004. Landscape effects on black-tailed prairie dog colonies. Biological Conservation. 115(3): 487-497.

Hoogland, J.L. 2001. Black-tailed, Gunnison's, and Utah prairie dogs reproduce slowly. Journal of Mammalogy. 82(4): 917-927.

Houston, B.R., T.W. Clark and S.C. Minta. 1986. Habitat suitability index model for the black-footed ferret: a method to locate transplant sites. Great Basin Naturalist Memoirs. 99-114.

Ingham, R.E. and J.K. Detling. 1984. Plant-herbivore interactions in a North American mixed-grass prairie III. Soil nematode populations and root biomass on *Cynomys ludovicianus* colonies and adjacent uncolonized areas. Oecologia. 63: 307-313.

Jachowski, D.S. 2007. Resource selection by black-footed ferrets in relation to the spatial distribution of prairie dogs. Doctoral Dissertation. University of Missouri-Columbia.

Jachowski, D. S., R. A. Gitzen, M. B. Grenier, B. Holmes, and J. J. Millspaugh. 2011a. The importance of thinking big: Large-scale prey conservation drives black-footed ferret reintroduction success. Biological Conservation. 144: 1560–1566.

Jachowski, D.S., J.J. Millspaugh, D.E. Biggins, T.M. Livieri, M.R. Matchett, and C.D. Rittenhouse. 2011b. Resource selection by black-footed ferrets in South Dakota and Montana. Natural Areas Journal. 31: 218-225.

Jachowski, D.S., R.A. Gitzen, M.B. Grenier, B. Holmes, and J.J. Millspaugh. 2011a. The importance of thinking big: Large-scale prey conservation drives black-footed ferret reintroduction success. Biological Conservation. 144: 1560-1566.

Johnson, W.C., and S.K. Collinge. 2004. Landscape effects on black-tailed prairie dog colonies. Biological Conservation. 115: 487-497.

Jones, P.H., D.E. Biggins, D.A. Eads, S.L. Eads, and H.B. Britten. 2012. Deltamethrin flea-control preserves genetic variability of black-tailed prairie dogs during a plague outbreak. Conservation Genetics. 13(1): 183-195.

Keffer, K., K. Gordon, and S. Anderson. 2000. Effects of recreational shooting on behavior of black-tailed prairie dogs. 2000 progress report. Wyoming Cooperative Fish and Wildlife Research Unit. University of Wyoming, Laramie. 15 pp.

Kenney, J.J., J. Detling, and R.P. Reading. 2016. Influence of black-tailed prairie dogs (*Cynomys ludovicianus*) on short-horned grasshoppers (Orthoptera: Acrididae) on the shortgrass steppe of Colorado. Journal of Arid Environments. 127: 93-99.

King, J.A., 1955. Social behavior, social organization, and population dynamics in a black-tailed prairie dog town in the Black Hills of South Dakota. University of Michigan.

Klatt, L.E. and D. Hein. 1978. Vegetative differences among active and abandoned towns of black-tailed prairie dogs (*Cynomys Ludovicianus*). Journal of Range Management. 31: 315-17.

Knopf, F. L. 1996. Prairie legacies—Birds. Pages 135–148 in F.B. Samson, and F.L. Knopf (eds), Prairie Conservation: Preserving North America's Most Endangered Ecosystem. Washington, D.C.: Island Press.

Knopf, F.L. and B.J. Miller. 1994. Charadrius montanus: Montane, grassland, or bare-ground plover? Oxford Journals (111): 504-506.

Knowles, C.J. 1985. Observations on Prairie Dog Dispersal in Montana. Prairie Naturalist. 17(1): 33-40.

Knowles, C.J. 1986. Population recovery of black-tailed prairie dogs following control with zinc phosphide. Journal of Range Management. 39(3): 249-251.

Knowles, C.J. 1988. An evaluation of shooting and habitat alteration for control of black-tailed prairie dogs. Eighth Great Plains wildlife damage control workshop proceedings. 28-30 April 1987. D.W. Uresk, G.L. Schenbeck, and R. Cefkin (eds). USDA, Forest Service General Technical Report RM-154. pp. 53-56.

Knowles, C.J. 2002. Status of white-tailed and Gunnison's prairie dogs. National Wildlife Federation. Missoula, MT; Environmental Defense. Washington, DC. 30 pp.

Knowles, C.J. and P.R. Knowles. 2019. Mountain Plover Population Trends in Central and Northeastern Montana. FaunaWest Wildlife Consultants. Report. July 17.

Knowles, Craig J. 1985. Observations on Prairie Dog Dispersal in Montana. Prairie Naturalist. 17(1): 33-40.

Knowles, C.J. and P.R. Knowles. 1994. A Review of Black-tailed Prairie Dog Literature in Relation to Rangelands Administered by the Custer National Forest. USDA, Forest Service. 61 pp.

Koford, C.B., 1961. The prairie dog of the North American plains, and its relations with plants, soil, and land use. La Terre et La Vie. 327-341.

Kohl, M.T., Krausman, P.R., Kyran K., Williams, D.M. 2013. Bison versus cattle: are they ecologically synonymous? Rangeland Ecology and Management. Society for Range Management. 66(6):721-731.

Kotliar, N. B. 2000. Application of the new keystone-species concept to prairie dogs: How well does it work? Conservation. Biology. 15: 1715-1721.

Kotliar, N.B., B.W. Baker, A.D. Whicker, and G. Plumb. 1999. A critical review of assumptions about the prairie dog as a keystone species. Environmental Management. 24: 177-192.

Kretzer, J.E. and J. F. Cully, Jr. 2001. Effects of black-tailed prairie dogs on reptiles and amphibians in Kansas shortgrass prairie. Southwestern Naturalist. 46: 171-177.

Krueger, K. 1986. Feeding relationships among bison, pronghorn, and prairie dogs: an experimental analysis. Ecology. 67(3): 760-770.

Lacher, T.E., Jr., A.D. Davidson, T.H. Fleming, E.P. Gomez-Ruiz, G.F. McCracken, N. Owen-Smith, C.A. Peres, and S.B. Vander Wall. 2019. The functional roles of mammals in ecosystems. Journal of Mammalogy. 100(3): 942-964.

Lantz, S.J. and C.J. Conway. 2009. Factors affecting daily nest survival of burrowing owls within black-tailed prairie fog colonies. Journal of Wildlife Management. 73(2): 232-241.

Lantz, S.J., H. Smith, and D.A. Keinath. 2004, Species assessment for western burrowing owl (*Athene cunicularia hypugaea*) in Wyoming. Wyoming Cooperative Fish and Wildlife Research Unit and Wyoming Natural Diversity Database, University of Wyoming. 70 p.

Lehmkuhl, J.F. 1984. Determining size and dispersion of minimum viable populations for land management planning and species conservation. Environmental Management. 8(2): 167-176.

Lindner, R.L., R.B. Dahlgren, and C.N. Hillman. 1972. Black-footed ferret—prairie dog interrelationships. Pages 22-37 in Symposium on Rare and Endangered Wildlife of Southwestern United States, New Mexico Department of Game and Fish, Sante Fe.

List, R. and D.W. MacDonald. 2003. Home range and habitat use of the kit fox (*Vulpes macrotis*) in a prairie dog (*Cynomys ludovicianus*) complex. Journal of Zoology (London). 259: 1-5.

Livieri, T.M. 1999. Harvest strategies for sustaining fluctuating black-tailed prairie dog (*Cynomys ludovicianus*) populations. University of Wisconsin, Stevens Point. Manuscript. 6 pp.

Livieri, T.M. 2007. Black-footed ferret spatial use of prairie dog colonies in South Dakota. MS Thesis. University of Wisconsin-Stevens Point, Stevens Point, WI. 72p.

Livieri, T.M. 2014. Conata Basin black-footed ferret monitoring report summer/fall 2013. Prairie Wildlife Research, Wellington, CO. 11p.

Livieri, T.M. 2015. Conata Basin/Badlands National Park black-footed ferret monitoring report summer/fall 2014. Prairie Wildlife Research, Wellington, CO. 12p.

Livieri, T.M. 2016. Conata Basin/Badlands National Park black-footed ferret monitoring report summer/fall 2015. Prairie Wildlife Research, Wellington, CO. 15p.

Livieri, T.M. 2017. Conata Basin/Badlands National Park black-footed ferret monitoring report summer/fall 2016. Prairie Wildlife Research, Wellington, CO. 16p.

Livieri, T.M. 2018. Conata Basin/Badlands National Park black-footed ferret monitoring report summer/fall 2017. 17p.

Livieri, T.M. 2019. Conata Basin/Badlands National Park black-footed ferret monitoring report summer/fall 2018. 16p.

Livieri, T.M., and E.M. Anderson. 2012. Black-footed ferret home ranges in Conata Basin, South Dakota. Western North American Naturalist 72: 196-205.

Lockhart, J.M., E.T. Thorne, and D.R. Gober. 2006. A Historical Perspective on Recovery of the Black-footed Ferret and the Biological and Political Challenges Affecting Its Future. Recovery of the black-footed ferret—progress and continuing challenges: U.S. Geological Survey Scientific Investigations Report 2005–5293. J.E. Roelle, B.J. Miller, J.L. Godbey and D.E. Biggins (eds). 288 p.

Lomolino, M.V., and G.A. Smith. 2003a. Prairie dog towns as islands: Applications of island biogeography and landscape ecology for conserving nonvolant terrestrial vertebrates. Global Ecology and Biogeography. 12: 275-286.

Lomolino, M.V., and G.A. Smith. 2003b. Terrestrial vertebrate communities at black-tailed prairie dog (*Cynomys ludovicianus*) towns. Biological Conservation. 115: 89-100.

Lomolino, M.V., and G.A. Smith. 2001. Dynamic biogeography of prairie dog (*Cynomys ludovicianus*) towns near the edge of their range. Journal of Mammalogy. 82(4): 937-945.

Lomolino, M.V., G.A. Smith, and V. Vidal. 2003. Long-term persistence of prairie dog towns: insights for designing networks of prairie reserves. Biological Conservation. 112: 111-120.

Luce, R.J. 2006. Areas where habitat characteristics could be evaluated to identify potential black-footed ferret reintroduction sites and develop conservation partnerships. Recovery of the black-footed ferret—progress and continuing challenges: U.S. Geological Survey Scientific Investigations Report 2005–5293. J.E. Roelle, B.J. Miller, J.L. Godbey and D.E. Biggins (eds). 288 p.

Luce, R.J. 2008. Potential black-footed ferret reintroduction sites, 2008. Report to the U.S. Fish and Wildlife Service, Pierre, SD. 51pp.

Lynch, M., and R. Lande. 1998. The critical effective size for a genetically secure population. Animal Conservation. 1(1): 70-72.

Maestas, L.P., and H.B. Britten. 2019. Effects of deltamethrin treatment on small mammal and ectoparasite population dynamics and plague prevalence in a North American mixed-grass prairie system. Vector-Borne and Zoonotic Diseases. 19(4): 274-283.

Magle, S.B., E.W. Ruell, M.F. Antolin, and K.R. Crooks. 2010. Population genetic structure of black-tailed prairie dogs, a highly interactive species, in a fragmented urban habitat. Journal of Mammalogy. 91(2): 326-335.

Magle, S.B., K.A. Salamack, K.R. Crooks, and R.P. Reading. 2012. Effects of habitat fragmentation and black-tailed prairie dogs on urban avian diversity. Biodiversity and Conservation. 21: 2803-2821.

Manzano-Fischer, P., R. List, and G. Ceballos. 1999. Grassland birds in prairie dog towns in northwestern Chihuahua, Mexico. Studies in Avian Biology. 19: 263-271.

Marsh, R.E. 1984. Ground squirrels, prairie dogs, and marmots as pests on rangeland. Proceedings of the Conference for Organization and Practice of Vertebrate Pest Control, 30 August-3 September 1982. ICI Plant Protection Division, Fernherst, UK. pp. 195-208,

Martínez-Estévez L., P. Balvanera, J. Pacheco, and G. Ceballos. 2013 Prairie dog Decline reduces the supply of ecosystem services and leads to desertification of semiarid grasslands. PLoSONE 8(10): e75229.

Matchett, R.M., D.E. Biggins, V. Carlson, B. Powell, and T. Rocke. 2010. Enzootic plague reduces black-footed ferret (*Mustela nigripes*) survival in Montana. Vector-Borne and Zoonotic Diseases. 10(1): 27-35.

Matthews, M. 2001. Varmint hunters sidelined in Wyoming. High Country News. July 2.

Miles, V.I., M.J. Wilcomb, Jr., and J.V. Irons. 1952. Rodent plague in the Texas South Plains 1947-49, with ecological considerations. Public Health Monograph. No. 6 (Part II). Federal Security Agency: Public Health Service. U. S. Government Printing Office.

McDonald, L., J. Mitchell, S. Howlin, and C. Goodman. 2015. Range-wide monitoring of black- tailed prairie dogs in the United States: pilot study. Western Ecosystems Technology Inc., Laramie, Wyoming.

Miller, B., D.E. Biggins, and R. Crete. 1993. Workshop summary. Proceedings of the Symposium on the Management of Prairie Dog Complexes for the Reintroduction of the Black-footed Ferret. J.L. Oldemeyer, D.E. Biggins, and B.J. Miller (eds). United States Fish and Wildlife Service. Washington, DC.

Miller, B. and G. Ceballos. 1994. Managing conflict and biotic diversity in the prairie dog ecosystem. Endangered Species Update. 11(6 &7): 1-6.

Miller, B., G. Ceballos and R.P. Reading. 1994. The prairie dog and biotic diversity. Conservation Biology. 8: 677-681.

Miller, B. and R.P. Reading. 2012. Challenges to black-footed ferret recovery: protecting prairie dogs. Western North American Naturalist. 72(2): 228-240.

Miller, B.J., R.P. Reading, D.E. Biggins, J.K. Detling, S.C. Forrest, J.L. Hoogland, J. Javersak, S.D. Miller, J. Proctor, J. Truett, and D.W. Uresk. 2007. Prairie dogs: An ecological review and current biopolitics. Journal of Wildlife Management. 71(8): 2801-2810.

Miller, B, R.P. Reading, and S. Forrest. 1996. Prairie night: Recovery of the black-footed ferret and other endangered species. Smithsonian Institution Press.

Miller, B., R. Reading, J. Hoogland, T. Clark, G. Ceballos, R. List, S. Forrest, L. Hanebury, P. Manzano, J. Pacheco, and D. Uresk. 2000. The role of prairie dogs as keystone species: Response to Stapp. Conservation Biology. 14: 318-321.

Miller, B., R. Reading, J. Strittholt, C. Carroll, R. Noss, M Soulé, O. Sánchez, J. Terborgh, D. Brightsmith, T. Cheeseman, and D. Foreman. 1998/99. Focal species in design of reserve networks. Wild Earth. 8(4): 81-92.

Miller, B., C. Wemmer, D. Biggins, and R. Reading. 1990. A proposal to conserve black-footed ferrets and the prairie dog ecosystem. Environmental Management. 14: 763-769.

Mills, L.S., M.E. Soulé, and D.F. Doak. 1993. The history and current status of the keystone species concept. BioScience. 43: 219-224.

Mize, E.L., and H.B Britten. 2016. Detections of Yersinia pestis East of the Known Distribution of Active Plague in the United States. Vector Borne Zoonotic Diseases. 16(2): 88-95.

Mulhern, D.W., and C.J. Knowles. 1997. Black-tailed prairie dog status and future conservation planning. Conserving Biodiversity on Native Rangelands: symposium proceedings: August 17, 1995. D.W. Uresk, G.G. Schenbeck, and J.T. O'Rourke (tech coordinators). Fort Robinson State Park, Nebraska. General Technical Report RM-GTR-298. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 298: 19-29.

Mulhern, D.W., and K.L. Powell. 1993. The prairie dog ecosystems and endangered species. Great Plains Wildlife Damage Control Workshop Proceedings. p. 349.

Munn, L.C. 1993. Effects of prairie dogs on physical and chemical properties of soils. Management of prairie dog complexes for the reintroduction of the black-footed ferret. Proceedings of the Symposium on the Management of Prairie Dog Complexes for the Reintroduction of the Black-footed Ferret. J.L. Oldemeyer, D.E. Biggins, and B.J. Miller (eds). United States Fish and Wildlife Service. pp. 11-17.

O'Brien, S.J., J.S. Martenson, S. Miththapala, et al. 1996. Conservation genetics of Felidae. Conservation Genetics: Case Histories from Nature. Chapman and Hall. pp. 50-74.

O'Meilia, M.E., F.L. Knopf, and J.C. Lewis. 1982. Some consequences of competition between prairie dogs and beef cattle. Journal of Range Management. 35: 580-585.

Outwater, A. 1996. Water: A Natural History. Basic Books.

Oyler-McCance, S.J., J. St. John, R.F. Kysela, and F.L. Knopf. 2008. Population structure of Mountain Plover as determined using nuclear microsatellites. The Condor. 110(3): 493-499.

Paine, R.T. 1980. Food webs: Linkage, interaction strength and community infrastructure. Journal of Animal Ecology. 49: 667-685.

Pannell, J.R., and B. Charlesworth. 2000. Effects of metapopulation processes on measures of genetic diversity. Philosophical Transactions of the Royal Society of London, B. Biological Sciences 355: 1851-1864.

Parmenter, R., E. Yadav, C. Parmenter, P. Ettestad and K. Gage. 1999. Incidence of plague associated with increased winter-spring precipitation in New Mexico. American Journal of Tropical Medicine and Hygiene. 61(5): 814-821.

Pauli, J.N. 2005. Ecological Studies of the Black-tailed Prairie Dog (*Cynomys ludovicianus*): Implications for Biology and Conservation. M.S. Thesis. Department of Zoology and Physiology. University of Wyoming. May.

Pauli, J.N., and S.W. Buskirk. 2007. recreational shooting of prairie dogs: a portal for lead entering wildlife food chains. Journal of Wildlife Management. 71(1): 103-108.

Plumpton, D.L. and D.E. Andersen. 1997. Habitat use and time budgeting by wintering ferruginous hawks. The Condor. 99: 888-893.

Plumpton, D. L. and D. E. Andersen. 1998. Anthropogenic effects on winter behavior of ferruginous hawks. Journal of Wildlife Management. 62: 340-346.

Poché, D., D. Hartman, L. Polyakova, and R.M. Poché. 2017. Efficacy of a fipronil bait in reducing the number of fleas (*Oropsylla* spp.) infesting wild black-tailed prairie dogs. Journal of Vector Ecology. 42(1): 171-177.

Power, M.E., D. Tilman, J.A. Estes, B.A. Menge, W.J. bond, L.S. Mills, G. Daily, J.C. Castilla, J. Lubchenco, and R.T. Paine. 1996. Challenges in the quest for keystones. BioScience. 466: 9-20.

Price, E.R. 2002. Observation of rock wrens using white-tailed prairie dog burrows. Prairie Naturalist. 34: 149-150.

Proctor, J., B. Haskins, and S. C. Forrest. 2006. Focal areas for conservation of prairie dogs and the grassland ecosystem. Pages 232–247 in J. L. Hoogland, editor. Conservation of the black-tailed prairie dog. Island Press, Washington, D.C., USA.

Radcliffe, M.C. 1992. Repopulation of black-tailed prairie dog (Cynomys ludovicianus) colonies after artificial reduction. Master's Thesis. Frostburg State University. Frostburg, MD.

Rattner, B.A., K.E. Horak, R.S. Lazarus, S.L. Schultz, S. Knowles, B.G. Abbo, and S.F. Volker. 2015. Toxicity reference values for chlorophacinone and their application for assessing anticoagulant rodenticide risk to raptors. Ecotoxicology. 24(4): 720-734.

Ray, J.D., N.E. McIntyre, M.C. Wallace, A.P. Teaschner, and M.G. Schoenhals. 2016. Factors Influencing Burrowing Owl Abundance in Prairie Dog Colonies on the Southern High Plains of Texas. Journal of Raptor Research. 50: 185-193.

Reading, R.P. 2009. Vertebrate species associated with prairie dogs. Prairie dogs: Communication and community in an animal society. C. Slobodchikoff, B.S. Perla, and J.L. Verdolin. Harvard University Press, Cambridge, MA. pp. 139-146.

Reading, R.P. and S.R. Kellert. 1993. Attitudes toward a proposed black-footed ferret (*Mustela nigripes*) reintroduction. Conservation Biology. 7: 569-580.

Reading, R.P., B. J. Miller, and S.R. Kellert. 1999. Values and attitudes toward prairie dogs. Anthrozoös. 12: 43-52.

Reading, R.P., S.R. Beissinger, J.J. Grensten, and T.W. Clark. 1989. Attributes of black-tailed prairie dog colonies in northcentral Montana, with management recommendation for conservation of biodiversity. Montana BLM Wildlife Technical Bulletin. 2: 13-27.

Reading, R.P., T.W. Clark, A. Vargas, L.R. Hanebury, B.J. Miller, and D. Biggins. 1996. Recent directions in black-footed ferret (*Mustela nigripes*) recovery. Endangered Species Update. 13(10-11): 1-6.

Reading, R.P., T.W. Clark, A. Vargas, L.R. Hanebury, B.J. Miller, D. Biggins, and P. Marinari. 1997. Black-footed ferret (*Mustela nigripes*) conservation update. Small Carnivore Conservation. 17: 1-6.

Reading, R.P., T.W. Clark, L.A. McCain, and B.J. Miller. 2002. Black-tailed prairie dog conservation: A new approach for a 21st century challenge. Endangered Species Update. 19: 162-170.

Reading, R.P., S.R. Beissinger, J.J. Grensten, and T.W. Clark. 1989. Attributes of black-tailed prairie dog colonies in northcentral Montana, with management recommendations for conservation of biodiversity. The Prairie Dog Ecosystem: Managing for Biological Diversity. T.W. Clark, D. Hinckley, and T. Rich (eds). Wildlife Technical Bulletin No. 2. BLM-MT-PT-89-004-4352. Billings, MT, USA: Montana Bureau of Land Management. pp. 13-27.

Reeve, A.F., and T.C. Vosburgh. 2003. Effects of Recreational Shooting on Prairie Dogs as Black-footed Ferret Habitat. Manuscript.

Reeve, A.F., and Vosburgh, T.C. 2006. Recreational shooting of prairie dogs. Conservation of the Black-tailed Prairie Dog; Saving North America's Western Grasslands. J.L. Hoodland (ed). pp. 139-156.

Reeve, A.F., and Vosburgh, T.C. 2006. Shooting prairie dogs. Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J.E. Roelle, B.J. Miller, J.L. Godbey, and D.E. Biggins (eds). United States Geological Survey Scientific Investigations Report, 5293. p.119.

Restani, M., L.R. Rau, and D.L. Flath. 2001. Nesting ecology of burrowing owls occupying black-tailed prairie dog towns in southeastern Montana. Journal of Raptor Research. 35: 296-303.

Richardson, L., T.W. Clark, S.C. Forrest, and T.M. Campbell, III. 1987. Winter ecology of black-footed ferrets (*Mustela nigripes*) at Meeteetse, Wyoming. American Midland Naturalist. 117: 225-239.

Roach, J.L., B. Van Horne, P. Stapp, and M.F. Antolin. 2001. Genetic structure of a black-tailed prairie dog metapopulation. Journal of Mammalogy. 82: 946-959.

Rocke, T.E., P. Nol, P. Marinari, J. Kreeger, S. Smith, G.P. Andrews, and A.M. Friedlander. 2006. Vaccination as a potential means to prevent plague in black-footed ferrets. Recovery of the Black-footed Ferret: Progress and Continuing Challenges. J.E. Roelle, B.J. Miller, J.L. Godbey, and D.E. Biggins (eds). United States Geological Survey Scientific Investigations Report. 5293: 243-247.

Rocke, T.E., D.W. Tripp, F. Lorenzsonn, E. Falendysz, S. Smith, J. Williamson, and R. Abbott. 2015. Age at vaccination may influence response to sylvatic plague vaccine (SPV) in Gunnison's prairie dogs (*Cynomys gunnisoni*). EcoHealth. 2(2): 278-287.

Rocke, T.E., D.W. Tripp, R.E. Russell, R.C. Abbott, K. Richgels, M.R. Matchett, D.E. Biggins, R. Griebel, G. Schroeder, S.M. Grassel, D.R. Pipkin, J. Cordova, A. Kavalunas, B. Maxfield, J.T. Boulerice, and M.W. Miller. 2017. Sylvatic plague vaccine partially protects prairie dogs (*Cynomys* spp.) in field trials. EcoHealth. 14(4): 438-450.

Roemer, D.M., and S.C. Forrest. 1996. Prairie dog poisoning in northern Great Plains: an analysis of programs and policies. Environmental Management. 20(3): 349-359.

Roth, J.D. 2019. Sylvatic plague management and prairie dogs - a meta-analysis. Journal of Vector Ecology. 44(1): 1-10.

Russell, R.E., R.C. Abbott, D.W. Tripp, and T.E. Rocke. 2018. Local factors associated with on-host flea distributions on prairie dog colonies. Ecology and Evolution. 8(17): 8951-8972.

Saccheri, I., M. Kuussaari, M. Kankare, P. Vikman, W. Fortelius, and I. Hanski. 1998. Inbreeding and extinction in a butterfly metapopulation. Nature. 392: 491-494.

*Samson, F. and F. Knopf. 1994.* Prairie Conservation in North America*. BioScience. 44: 418–421.*

Santos-Barrera, G., J. Pacheco, and G. Ceballos. 2008. Amphibians and reptiles associated with the prairie dog grasslands ecosystem and surrounding areas at the Janos Casas Grandes complex, northwestern Chihuahua, Mexico. Acta Zoológica Mexicana. 24(3): 125-136.

Sauer, J.R., D.K. Niven, J.E. Hines, D.J. Ziolkowski, Jr, K.L. Pardieck, J.E. Fallon, and W.A. Link. 2017. The North American Breeding Bird Survey, Results and Analysis 1966 - 2015. Version 2.07.2017. USGS Patuxent Wildlife Research Center.

Savage, L.T., R.M. Reich, L.M. Hartley, P. Stapp, and M.F. Antolin. 2011. Climate, soils, and connectivity predict plague epizootics in black-tailed prairie dogs (*Cynomys ludovicianus*). Ecological Applications. 21(8): 2933-2943.

Schenbeck, G.L. 1981. Management of black-tailed prairie dogs on the national grasslands. Great Plains Wildlife Damage Control Workshop Proceedings. 143.

Schultz, C.A., Sisk, T.D., Noon, B.R., and M.A. Nie. 2012. Wildlife conservation planning under the United States Forest Service's 2012 planning rule. The Journal of Wildlife Management. 77: 428-444.

Seery, D.B., and D.J. Matiatos. 2000. Response of wintering buteos to plague epizootics in prairie dogs. Western North American Naturalist. 60(4): 8.

Seery, D.B., D.E. Biggins, J.A. Montenieri, R.E. Enscore, D.T. Tanda, and K.L. Gage. 2003.Treatment of black-tailed prairie dog burrows with deltamethrin to control fleas (Insecta: Siphonaptera) and plague. Journal of Medical Entomology. 40: 718-722.

Select Federal Natural Resource Management Committee of the Wyoming Legislature. 2018. Letter from Senator Michael Von Flatern and Representative Tyler Lindholm to Mr. Scott Talbott (Director, WGFD), Ms. Noreen Walsh (Regional Supervisor, Mountain-Prairie Region, USFWS), and Mr. Brian Ferebee (Regional Forester, Rocky Mountain Region, Forest Service), re: Black-footed Ferret/Reintroduction in the Thunder Basin National Grassland. December 3.

Shaffer, J.A., L.D. Igl, D.H. Johnson, M.L. Sondreal, C.M. Goldade, M.P. Nenneman, T.L. Wooten, and B.R. Euliss. 2019. The effects of management practices on grassland birds—Mountain Plover (*Charadrius montanus*). The Effects of Management Practices on Grassland Birds. D.H. Johnson, L.D. Igl, J.A. Shaffer, and J.P. DeLong (eds). U.S. Geological Survey Professional Paper 1842. pp. 1-10.

Sharps, J.C. and D.W. Uresk. 1990. Ecological review of black-tailed prairie dogs and associated species in western South Dakota. Great Basin Naturalist. 50: 339-345.

Sheffield, S.R. 1997. Current status, distribution, and conservation of the burrowing owl (*Speotytocu-nicularia*) in midwestern and western North America, *in* J. R. Duncan, D. H. Johnson, and T. H. Nicholls, editors, Biology and conservation of owls of the northern hemisphere: Second international symposium. U. S. Forest Service General Technical Report NC-190: 399-407.

Sheffield, S.R. and M. Howery. 2001. Current status, distribution, and conservation of the burrowing owl in Oklahoma. Journal of Raptor Research. 35: 351-356.

Shipley, B. and R.P. Reading. 2006. Comparative abundance of herpetofauna and small mammals between prairie dog colonies and non-colonized grassland. Journal of Arid Environments. 66(1): 27-41.

Shipley, B., R.P. Reading, and B. Miller. 2008. Comparing capture rates of reptiles and amphibians in black-tailed (*Cynomys ludovicianus*) prairie dog colonies and uncolonized prairie in Colorado, USA. Western North American Naturalist. 62(2): 245-248.

Shipley, B.K., D. Chiszar, K.T. Fitzgerald, and A.J. Saviola. 2013. Spatial ecology of prairie rattlesnakes (*Crotalus viridis*) associated with black-tailed prairie dog (*Cynomys ludovicianus*) colonies in Colorado. Herpetological Conservation and Biology. 8(1): 240-250.

Shoemaker, K.T. R.C. Lacy, M.L. Verant, B.W. Brook, T.M. Livieri, P.S. Miller, D.A. Fordham, and H.R. Akçakaya. 2014. Effects of prey metapopulation structure on the viability of black-footed ferrets in plague-impacted landscapes: a metamodelling approach. Journal of Applied Ecology. 51(3): 735-745.

Sidle, J.G., Schenbeck, G.L., Lawton, E.A., Licht, D.S. 2006. Role of federal lands in the conservation of prairie dogs. In J.L. Hoogland (ed). Conservation of the Black-Tailed Prairie Dog: Saving North America's Western Grassland. Island Press. pp. 218-231.

Sidle, J.G., M. Ball, T. Byer, J.J. Chynoweth, G. Foli, R. Hodorff, G. Moravek, R. Peterson, and D.J. Svingen. 2001. Occurrence of burrowing owls in black-tailed prairie dog colonies on Great Plains National Grasslands. Journal of Raptor Research. 35: 316-321.

Sierra-Corona, R, A. Davidson, E.L. Fredrickson, H. Luna-Soria, H. Suzan-Azpiri, E. Ponce-Guevara, and G. Ceballos. 2015. Black-tailed prairie dogs, cattle, and the conservation of North America's arid grasslands. PLoS ONE. 10(3): e0118602.

Smith, G.A., and M.V. Lomolino. 2004. Black-tailed prairie dogs and the structure of avian communities on the shortgrass prairie. Oecologia. 138: 592-602.

Soulé, M. and R. Noss. 1998. Rewilding and biodiversity: complementary goals for conservation. Wild Earth. 8: 19-28.

South Dakota. South Dakota Dept. of Game, Fish and Parks Technical Bulletin No. 4. 37 pp.

Stapp, P. 1998. A reevaluation of the role of prairie dogs in the Great Plains grasslands. Conservation Biology. 12: 1253-1259.

Stapp, P. 2007. Rodent communities in active and inactive colonies of black-tailed prairie dogs in shortgrass steppe. J. Mammal. 88(1): 241-249.

Stenseth, N.C., N.I. Samia, H. Viljugrein, K.L. Kausrud, M. Begon, S. Davis, H. Leirs, V.M. Dubyanskiy, J. Esper, V.S. Ageyev, N.L. Klassovskiy, S.B. Pole, and K-S. Chan. 2006. Plague dynamics are driven by climate variation. Proceedings of the National Academy of Sciences. 103(35): 13110-13115.

Stephens, R.M., A.S. Johnson, R. Plumb, K.K. Dickerson, and M.C. Mckinstry. 2005. Secondary lead poisoning in golden eagle and ferruginous hawk chicks consuming shot black-tailed prairie dogs, Thunder Basin National Grassland, Wyoming. US Fish & Wildlife Publications. 230.

Stephens, T., S.C. Wilson, F. Cassidy, D. Bender, D. Gummer, D.H.V. Smith, N. Lloyd, J.M. McPherson, and A. Moehrenschlager. 2018. Climate change impacts on the conservation outlook of populations on the poleward periphery of species ranges: A case study of Canadian black-tailed prairie dogs (*Cynomys ludovicianus*). Global Change Biology. 24(2): 836-847.

Stockrahm, D.M.B., and R.W. Seabloom. 1988. Comparative reproductive performance of black-tailed prairie dog populations in North Dakota. Journal of Mammalogy. 69: 160-164.

Terborgh, J. 1988. The big things that run the world -- a sequel to E. O. Wilson. Conservation Biology. 2: 402-403.

Terborgh, J., J. Estes, P. Paquet, K. Ralls, D. Boyd, B. Miller, and R. Noss. 1999. Role of top carnivores in regulating terrestrial ecosystems. Continental conservation: design and management principles for long-term regional conservation networks. M. Soulé, and J. Terborgh (eds). Island Press. pp. 39-64.

Thiagarajan, B., Y. Bai, KL. Gage., and J.F. Cully Jr. 2008. Prevalence of *Yersinia pestis* in rodents and fleas associated with black-tailed prairie dogs (*Cynomys ludovicianus*) at Thunder Basin National Grassland, Wyoming. Journal of Wildlife Diseases. 44(3): 731-736.

Tosh, D.G., Shore, R.F., Jess, S., Withers, A., Bearhop, S., Montgomery, W.I., McDonald, R.A. 2010. User behaviour, best practice and the risks of non-target exposure associated with anticoagulant rodenticide use. Journal of Environmental Management. 92: 1503-1508.

Treviño-Villarreal, J. 2000. Mexican prairie dog. Endangered Animals: A Reference Guide to Conflicting Issues. R.P. Reading and B.J. Miller (eds). Greenwood Press. pp. 202-206.

Treviño-Villarreal, J. and W. E. Grant. 1998. Geographic range of the endangered Mexican prairie dog (*Cynomys mexicanus*). Journal of Mammalogy. 79: 1273-1287.

Tripp, D.W., K.L. Gage, J.A. Montenieri, and M.F. Antolin. 2009. Flea abundance on black-tailed prairie dogs (*Cynomys ludovicianus*) increases during plague epizootics. Vector-borne and Zoonotic Diseases. 9(3): 313-321.

Tripp, D.W., L.M. Corro, S.R. Magstadt, and D.A. Sack. 2018. Plague Management Techniques and Monitoring in Colorado's Prairie and Shrub-steppe Ecosystems. Colorado Parks and Wildlife Technical Publication 51.

Tripp, D.W., S. P. Streich, D. A. Sack, D. J. Martin, K.A. Griffin, and M.W. Miller. 2016. Season of deltamethrin application affects flea and plague control in white-tailed prairie dog colonies. Journal of Wildlife Diseases. 52(3): 553-561.

Tripp, D.W., T.E. Rocke, S.P. Streich, N.L. Brown, Jr-R. Fernandez, and M.W. Miller. 2014. Season and application rates affect vaccine bait consumption by prairie dogs. Journal of Wildlife Diseases. 50(2): 224–234.

Tripp, D.W., T.E. Rocke, S.P. Streich, R.C. Abbott, J.E. Osorio, and M.W. Miller. 2015. Apparent field safety of a raccoon poxvirus-vectored plague vaccine in free-ranging prairie dogs (Cynomys spp.), Colorado, USA. Journal of Wildlife Diseases. 51(2):.401-410.

Trudeau, K.M. 2002. Effects of sylvatic plague and geographic isolation on genetic variability in black-tailed prairie dogs (*Cynomys ludovicianus*) in north-central Montana. M.S. Thesis. University of South Dakota. 55 pp.

Trudeau, K.M., H.B. Britten, and M. Restani. 2004. Sylvatic plague reduces genetic variability in black-tailed prairie dogs. Journal of Wildlife Diseases. 40(2): 205-211.

Truett, J.C. 2002. Aplomado falcons and grazing: Invoking history to plan restoration. Southwestern Naturalist. 47: 379-400.

Truett, J.C., M. Phillips, K. Kunkel and R. Miller. 2001. Managing bison to restore biodiversity. Great Plains Research. 11:123-44. U. S. Bureau of Land Management. 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on BLM-Administered Lands in the Western United States. June 2005.

Twidwell, D., B.W. Allred, and S.D. Fuhlendorf. 2014. Summary of a national-scale assessment of the Ecological Site Description (ESD) database. Rangelands. 36(4): 13-17.

Uresk, D.W. 1985. Effects of controlling black-tailed prairie dogs on plant production. Journal of Range Management. 38(5): 466-8.

Uresk, D.W., G.L. Schenbeck, J.T. O'Rourke (technical coordinators). 1996. Conserving Biodiversity on Native Rangelands: Symposium Proceedings, August 17, 1995. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. General Technical Report RM-GTR-298. 38 p.

Uresk, D.W., and G.L. Schenbeck. 1987. Effect of zinc phosphide rodenticide on prairie dog colony expansion as determined from aerial photography. The Prairie Naturalist. 19(1): 57-61.

Uresk, D.W. and J.C. Sharps. 1986. Denning habitat and diet of the swift fox in western South Dakota. Great Basin Naturalist. 46: 249-253.

USDA Forest Service. (United States Department of Agriculture Forest Service). 2007. USDA Forest Service Update. The Black-tailed Prairie Dog.

USDA, MBNF & TBNG. 2019. Biological Evaluation of Animal Species and Potential Animal Species of Conservation Concern Report. Thunder Basin National Grassland 2020 Plan Amendment.

USFS, MBNF & TBNG (United States Forest Service, Medicine Bow National Forest and Thunder Basin National Grassland). 1985. Final Environmental Impact Statement for the Medicine Bow National Forest and Thunder Basin National Grassland Land and Resource Management Plan.

USFS (United States Forest Service). 2001. Biological Assessment and Evaluation, Appendix H, Final Environmental Impact Statement for the Northern Great Plains Management Plans Revision.

USFS (United States Forest Service). 2017. Letter to the Wyoming County Commissioners Association from Mr. Brian Ferebee, Regional Forester of the Rocky Mountain Region. May 19.

USFS, MBNF & TBNG (United States Forest Service, Medicine Bow National Forest and Thunder Basin National Grassland). 1985. Final Environmental Impact Statement for the Medicine Bow National Forest and Thunder Basin National Grassland Land and Resource Management Plan.

USFS, MBNF (United States Forest Service, Medicine Bow National Forest). 1998. Medicine Bow National Forest Land and Resource Management Plan Annual Monitoring and Evaluation Report Fiscal Year 1998, Land and Resource Management Plan.

USFS, MBNF (United States Forest Service, Medicine Bow National Forest). 1985. Biological Assessment for the Medicine Bow National Forest and Thunder Basin National Grassland Draft Land and Resource Management Plan. January 19.

USFS, MBRNF & TBNG (United States Forest Service, Medicine Bow-Routt National Forests and Thunder Basin National Grassland), United States Fish and Wildlife Service, and Wyoming Game and Fish Department. 2017. Interagency Statement. December 4.

USFS, MBRNF & TBNG. 2017. U.S. Forest Service Announces One-year Suspension of black-tailed prairie dog shooting restrictions on Thunder Basin National Grassland. Press Release. March 3.

USFS, TBNG (United States Forest Service, Thunder Basin National Grassland). 2014. Completed prairie dog management on Thunder Basin National Grassland. Unpublished report, 12 p.

USFS, TBNG (United States Forest Service, Thunder Basin National Grassland). 2009. Record of Decision, Thunder Basin National Grassland Prairie Dog Management Strategy and Land and Resource Management Plan Amendment #3.

USFWS (United States Fish and Wildlife Service). 2013. Recovery Plan for the Black-footed Ferret (*Mustela nigripes*), Second Revision. United States Fish and Wildlife Service, Region 6. November.

USFWS (United States Fish and Wildlife Service). 2019. Species status assessment report for the black-footed ferret (Mustela nigripes). Version 1.0. U.S. Fish and Wildlife Service, Denver, Colorado. 142 pages.

Van Pelt, W.E. 1999. The black-tailed prairie dog conservation assessment and strategy. Nongame and Endangered Wildlife Program Technical Report 159. Arizona Game and Fish Department, Phoenix, Arizona.

van Nimwegen, R.E., J. Kretzer, and J.F. Cully Jr. 2008. Ecosystem engineering by a communal mammal: How prairie dogs structure rodent communities. Ecology. 89(12): 3298-3305.

Vosburgh, T.C. 1996. Impacts of recreational shooting on prairie dog colonies. Ph.D. Thesis. Montana State University-Bozeman, College of Letters & Science.

Vosburgh, T.C., and L.R. Irby. 1998. Effects of recreational shooting on prairie dog colonies. Journal of Wildlife Management. 62(1): 363-372.

Wallace, M.G., H.J. Cortner, M.A. Moote, and S. Burke. 1996. Moving toward ecosystem management: examining a change in philosophy for resource management. Journal of Political Ecology. 3: 1-36.

Wang, H., S.D. Schubert, R.D. Koster, and Y. Change. 2019. Attribution of the 2017 Northern High Plains drought. Explaining Extreme Events of 2017 from a Climate Perspective. S.C. Herring, N. Christidis, A. Hoell, M.P. Hoerling, and P.A. Stott (eds). Bulletin of the American Meteorological Society. 100(1): S1-S117.

Waples, R.S. 2002. Definition and estimation of effective population size in the conservation of endangered species. Population Viability Analysis. S.R. Beissinger and D.R. McCullough (eds). The University of Chicago Press. pp. 147-168.

Weltzin, J.F., S. Archer, and R.K. Heitschmidt. 1997b. Small-mammal regulation of vegetation structure in a temperate savanna. Ecology. 78(3): 751-763.

Weltzin, J.F., S.L. Dowhower, and R.K. Heitschmidt. 1997a. Prairie dog effects on plant community structure in southern mixed-grass prairie. Southwestern Naturalist. 42: 251-258.

Westemeier, R.L., J.D. Brawn, S.A. Simpson, T.L. Esker, R.W. Jansen, J.W. Walk, E.L. Kershner, J.L. Bouzat, and K.N. Paige. 1998. Tracking the long-term decline and recovery of an isolated population. Science 282: 1695-1698.

Whicker, A. and J. K. Detling. 1993. Control of grassland ecosystem processes by prairie dogs. Pp. 18-27, in Management of prairie dog complexes for the reintroduction of the black-footed ferret. J. L. Oldemeyer, D. E. Biggins, and B. J. Miller (Eds.). U. S, Department of the Interior, Washington, D. C.

Whicker, A.D. and J.K. Detling. 1988a. Ecological consequences of prairie dog disturbances. BioScience. 38: 778-785.

Whitlock, M.C. 2004. Selection and drift in metapopulations. Pp. 153-173 in Ecology, genetics, and evolution of metapopulations (I. Hanski and O.E. Gaggiotti, eds.). Elsevier Academic Press, San Diego, California.

Wilcox, B.A., and D.D. Murphy. 1985. Conservation strategy: the effects of fragmentation on extinction. American Naturalist 125: 879-887.

Wilcove, D.S., D. Rothstein, J. Dubow, A. Phillips, and E. Losos. 1998. Quantifying threats to imperiled species in the United States. BioScience. 48: 607-615.

Whitlock, M.C. 2004. Selection and drift in metapopulations. Ecology, Genetics, and Evolution of Metapopulations. I. Hanski and O.E. Gaggiotti (eds). Elsevier Academic Press. pp. 153-173.

Winter, S.L., J.F. Cully, Jr., and J.S. Pontius. 2003. Breeding season avifauna of prairie dog colonies and non-colonized areas in shortgrass prairie. Trans. Kans. Acad. Sci. 106 (3/4): 129-138.

Wuerthner, G. 1997. Viewpoint: The black-tailed prairie dog—headed for extinction? Journal of Range Management. 50: 459-466.

Wyoming Game and Fish Department and Wyoming Black-footed Ferret Working Group. 2018. Wyoming Black-footed Ferret Management Plan. November 14.

WGFD (Wyoming Game and Fish Department) and WBFFWG (Wyoming Black-footed Ferret Working Group). 2018. Wyoming Black-footed Ferret Management Plan. November 14.