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Comments: Dear Supervisor Bacon:

Please accept our comments on Thunder Basin National Grassland's proposed amendment to the 2002 Land and Resource Management Plan and Draft Environmental Impact Statement, in response to notice 84 Federal Register 54899. We are concerned about the direction the Forest Service is proposing in the preferred and action alternatives as they do not appear to provide the ecological conditions needed for sustaining population viability of native wildlife nor ameliorate the social concerns over prairie dog conservation and management on the Grassland. Herein we provide science-based reviews, recommendations, and supporting information on the Draft Environmental Impact Statement. We previously provided the Working Group suggestions for reducing social conflicts over prairie dogs while providing the ecological conditions on the Grassland needed to recover black-footed ferrets. Please reference the Appendix to this comment letter for these recommendations.

As long-time partners dedicated to the conservation of wildlife, we believe solutions exist to create balance among the multiple uses in harmony with the people living on the Grassland.
I. Executive summary
The Thunder Basin National Grassland (TBNG or Grassland) proposed "2020 Plan Amendment" is unnecessary and will remove essential protections for native prairie wildlife, particularly the black-tailed prairie dog (prairie dog or BTPD; Cynomys ludovicianus)[mdash]a keystone species that creates and maintains habitat for a host of other native prairie wildlife. The Forest Service's proposal to eliminate the current prairie dog protected area (the designated Management Area or MA 3.63) will harm prairie dogs on TBNG and other at-risk species associated with prairie dogs. This will also destroy essential habitat for the endangered black-footed ferret (ferret; Mustela nigripes)[mdash]one of the most imperiled species in the United States, with only about 300 individual ferrets remaining in the wild. Ferrets depend on prairie dogs for their survival. Black-tailed prairie dog numbers have already declined by over 97% since the early 1900s. The amendment will enable the Forest Service to poison and allow the shooting of prairie dogs in the only area on this public Grassland where the species is protected from these threats: MA 3.63, Black-footed Ferret Reintroduction Habitat.

Other native species will also suffer from the amendment, particularly mountain plovers (Charadrius montanus) and burrowing owls (Athene cunicularia). In the grasslands of North America, these birds depend on prairie dog colonies for their habitat. Both species are imperiled and declining across their range in the Great Plains.

None of the three action alternatives for the proposed amendment sufficiently protect prairie dogs, mountain plovers, burrowing owls, and other wildlife. The amendment will preclude black-footed ferret recovery. The Forest Service has identified several purposes of the amendment in its Draft Environmental Impact Statement (DEIS) on page 17, including to:

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* provide a wider array of management options to respond to changing conditions;
* minimize prairie dog encroachment onto non-Federal lands;
* reduce resource conflicts related to prairie dog occupancy and livestock grazing;
* ensure continued conservation of at-risk species; and
* support ecological conditions that do not preclude reintroduction of the black-footed ferret.

The 2015 Black-tailed Prairie Dog Conservation Assessment and Management Strategy (2015 Strategy) resulted from a compromise among stakeholders. The Grassland's 2002 Land and Resource Management Plan (2002 LRMP), the Amendment 3 to the 2002 LRMP, along with the 2015 Strategy include a sufficient array of tools to address conflicts with area livestock ranchers. It provides several protections for prairie dog colonies and associated at-risk species that the proposed amendment will remove.
The Action Alternatives for the Proposed Amendment are harmful to native wildlife.
The Forest Service claims each action alternative of the proposed amendment[mdash]the Proposed Action, Alternative 3, and Alternative 4[mdash]will meet the purposes and needs in the DEIS, including the purposes identified above. There are problems common to each action alternative that will prevent them from achieving legal, regulatory, and policy mandates to conserve wildlife, including at-risk species. These problems are identified below.

Loss of MA 3.63. The Forest Service claims in its DEIS that it must change management direction in MA 3.63, the "Black-footed Ferret Reintroduction Habitat" area. Within MA 3.63, prairie dogs are currently protected from poisoning and shooting, but this would change under each action alternative. The Forest Service is proposing to shrink and re-designate MA 3.63, calling it MA 3.67 "Rangelands with Short-Stature Vegetation Emphasis," which prioritizes livestock grazing in the management area over wildlife conservation. The change in purpose and change in management will result in conditions incompatible with ferret reintroduction and recovery.

Limits on prairie dog colony area. Each action alternative proposes to put a cap on prairie dog colony area in either the MA 3.63/3.67 or across the Grassland. The caps and the lethal management that will be required to limit prairie dog expansion to meet these caps are not conducive to maintaining the viability of prairie dogs, mountain plovers, burrowing owls, and possibly other at-risk species. Additionally, ferrets require large prairie dog colony complexes (groups of nearby colonies), and the prairie dog caps do not meet the ecological requirements to support a self-sustaining population of ferrets.

Density control. Each action alternative includes plan components that allow lethal "density control" of prairie dogs when prairie dog colony area has reached target caps. 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. Mountain plovers, burrowing owls, and ferrets all require habitat with high densities of prairie dogs.

Lack of plague management standards. Unfortunately, human intervention is a necessity to prevent mass prairie dog die-offs from sylvatic plague. Plague can quickly kill 100% of the prairie dogs in a colony. The recent plague epizootic killed roughly 98-99% of the TBNG's prairie dogs, a reduction from 48,000 active acres to 625 acres. Mandating the use of tools to mitigate plague in order to maintain prairie dog populations on the Grassland is not required under any action alternative but must be a standard in the management plan to ensure the Forest Service complies with its statutory responsibilities.

Granting authority to the State of Wyoming. The Forest Service may be unlawfully ceding its authority over wildlife management to the State of Wyoming by committing to follow the Wyoming Game and Fish Department's Black-footed Ferret Management Plan (Wyoming Ferret Plan) and allowing Wyoming to lead any ferret reintroduction actions on TBNG. Because of the

Wyoming Ferret Plan requirements for ferret reintroduction, this management arrangement may make it nearly impossible to recover ferrets on the Grassland, and thus contribute to the overall recovery of the species.
The proposed amendment alternatives will preclude black-footed ferret recovery.
The U.S. Fish and Wildlife Service (USFWS) and scientists have long considered Thunder Basin National Grassland to be one of the most important areas to recover ferrets. In fact, TBNG is among only a handful of

places that has the ecological capacity to support 100 breeding adult ferrets. Establishing 10 reintroduction sites, each with 100 breeding adults, is a key recovery and delisting requirement. MA 3.63 was set up to host a viable ferret population and could have the capacity to support a population of 100 breeding adults, but the amendment will likely prevent this and risk the species' overall recovery.

Even the 18,000-acre target in MA 3.63/3.67 for prairie dogs under Alternative 4 may not be sufficient to support a population of 100 breeding adult ferrets for long-term persistence; recent research is finding that a minimum range of 20,495 to 47,931 acres of active prairie dog colonies may be necessary. The prairie dog acre caps under the Proposed Alternative - Alternative 2 (7,500-10,000 acres in MA 3.63/3.67) and Alternative 3 (10,000 acres across the entire Grassland) do not provide adequate habitat in colony size and configuration, prairie dog densities and abundance. Density control prescribed under all action alternatives will degrade ferret habitat to where prairie dog colonies will likely not support a self-sustaining population of ferrets on the TBNG. Additionally, plague management must be a requirement in the plan.

The proposed amendment alternatives put black-tailed prairie dog viability at risk.

Without a plan standard that requires plague prevention and mitigation, none of the action alternatives will likely be able to manage plague in a way that will sustain a viable prairie dog population. Prairie dog density control, which is prescribed in each action alternative, is likely inconsistent with long-term persistence of prairie dogs on TBNG.

The proposed amendment alternatives will likely result in the loss of mountain plover viability on the Grassland.

The mountain plover is a designated Regional Forester Sensitive Species (Sensitive Species), a potential Species of Conservation Concern (SCC) for the Forest Service, and a Wyoming Species of Greatest Conservation Need. Mountain plovers require short vegetation and bare ground conditions that prairie dogs create by eating and clipping vegetation. These conditions help the birds see potential predators and find the insects they feed on. Prairie dog colony area caps and prairie dog density control will reduce and degrade mountain plover habitat. Additionally, without a prescription that requires plague mitigation, it is likely that the TBNG will not be able to maintain sufficient numbers of prairie dogs to maintain a viable population of mountain plovers.

All the action alternatives for the proposed management plan amendment fail to provide the ecological conditions required by at-risk species associated with prairie dogs and may harm other wildlife species on TBNG. The Proposed Action and other alternatives will preclude ferret reintroduction and recovery on the Grassland.

II. Introduction

The proposed TBNG management plan amendment will preclude black-footed ferret recovery because it will render the Grassland unsuitable to support a viable population of 100 breeding adult ferrets. The ferret is an obligate of prairie dogs, whereby they rely on prairie dogs for food and their burrows for shelter and raising young (Hillman 1986; Biggins 2006). TBNG is essential to recovering the ferret as, currently, there not enough reintroduction sites that have sufficiently large prairie dog colony complexes to support self-sustaining ferret populations. The USFWS recently affirmed the importance of TBNG for recovering this endangered species:

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.1

Each action alternative for the proposed amendment will set limits on prairie dog colony area and diminish prairie dog habitat quality to such an extent that TBNG may not have the capacity to sustain a ferret population.

Until recently, the trend toward recovery for the black-footed ferret had been considered a great Endangered Species Act (ESA) success story. Once completely extinct in the wild, several government agencies began a captive breeding program in the 1980s and started releasing ferrets back into the wild in the early 1990s. By

2008, the wild ferret population had grown to nearly 900 ferrets total (J. Hughes, personal communication, January 7, 2020.) across recovery sites within their historic range, including wild-born ferrets[mdash]a sign of progress.

The USFWS's 2013 Recovery Plan for the Black-footed Ferret Recovery Plan (BFF Recovery Plan) calls for, among other benchmarks, the establishment of 10 free-ranging populations of 100 breeding adult ferrets and the maintenance of 494,000 ac (200,000 ha) of habitat occupied by prairie dogs (among C. ludovicianus, gunnisoni, and leucuris) at reintroduction sites for the species to be considered recovered (USFWS 2013). The black-tailed prairie dog range makes up about 85% of the ferret range with the remainder split between Gunnison's and white-tailed prairie dogs (USFWS 2013).

Just after 2008, the reintroduced ferret population began to decline. The BFF Recovery Plan reported that in 2009, 468 ferret breeding adults were estimated to occur in the wild (USFWS 2013 at 22). In 2012, the estimated breeding adult population was 362. Of the 13 currently active ferret reintroduction sites, ranging in size from 406 ac (164 ha) to 53,648 ac (21,711 ha), zero are supporting 100 breeding adults and only one is supporting 30 breeding adults, the minimum required for a self-sustaining population. As of fall 2019, there were approximately 340 wild ferrets, of which 170 were breeding adults (Black-footed Ferret Recovery Implementation Team, Conservation Subcommittee, August 10, 2019.).

Due to the ferret's close association with prairie dogs, their fate is subsequently connected to prairie dogs. The range wide abundance and distribution of black-tailed prairie dogs has declined by at least 97% since the early 1900s due to conversion of native grassland into cropland, widespread prairie dog poisoning, and sylvatic plague (a non-native disease; Biggins 2006; USFWS 2013; 74 Fed. Reg. 63343). Consequently, current prairie dog habitat is highly fragmented and large prairie dog colony complexes are scarce.

While more than 75% of habitat on national grasslands is suitable for prairie dogs (Sidle et al. 2006), prairie dogs inhabit less than 2% of these lands (Sidle et al. 2006). The national grasslands, and managed by the Forest Service, constitute just 1.1% of the Great Plains (Miller et al. 2007), and other public land areas are scarce. In Wyoming, it is estimated that BTPD occupy 0.01% of their historic range (Buseck et. al. 2005) with a reduction in habitat of over 80% from pre-settlement estimates (Van Pelt 1999). With the exception of the potential to host 48,000 acres of prairie dogs on TBNG, and small colonies occurring on Bureau of Land Management lands, most prairie dogs occur on private land in Wyoming (Van Pelt 1999). The most current estimate of BTPDs in Wyoming is 2,505 active black-tailed prairie dog colonies, totaling 216,166 acres (McDonald et al. 2015).

The TBNG management plan must include plan components[mdash]desired conditions, objectives, standards, and guidelines[mdash]to provide for the ecological conditions necessary to contribute to the recovery of federally threatened and endangered species to comply with the National Forest Management Act (NFMA) as well as the Endangered Species Act. To support 100 breeding adult ferrets on a BTPD complex that is periodically affected by plague epizootics, similarly to TBNG, the best available science indicates the following conditions are necessary:

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* 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 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; Eads et al. 2011; Livieri and Anderson 2012; Eads et al. 2012; USFWS 2013)
* Annual sylvatic plague mitigation. (USFWS 2013; Poch[eacute] 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 and shooting. (USFWS 2013)

None of the action alternatives will result in these conditions. Again, the proposed amendment puts at risk the viability of other imperiled prairie dog associated species on the Grassland, including the mountain plover and burrowing owl. And the persistence of BTPDs is also not assured.

The Proposed Action (Alternative 2) as well and the other action alternatives may be failing to meet a range of requirements mandated in the Forest Service's 2012 Planning Rule, which revised the 36 CFR 219 subpart of NFMA's implementing regulations (16 U.S.C. [sect][sect] 1600 et seq.). For management plan amendments, the Forest Service must follow requirements in 36 CFR 219.13 and identify which substantive requirements are "directly relevant" to the proposed plan direction. The Forest Service determined 219.8 and 219.9 are directly relevant to the TBNG amendment process. We agree, however, we believe that none of the action alternatives for the amendment fulfill all of these requirements. The Proposed Action, other action alternatives, and Draft Environment Impact Statement (DEIS) are likely violating requirements in the National Environmental Policy Act (NEPA; 42 U.S.C. [sect][sect] 4321 et seq.), and Endangered Species Act (ESA; 16 U.S.C. [sect][sect] 1531 et seq.), and other laws and their associated regulations.

We do not support the Forest Service's proposed TBNG management plan amendment.
III. Need to amend the management plan
NFMA and NEPA regulations require the Forest Service to adequately describe and justify a legitimate purpose and need to amend the TBNG Plan (36 CFR 219.13 and 40 CFR 1500). The Forest Service has provided an arbitrary and outdated rationale for needing to change the management plan.

The Forest Service must provide justification for amending the Grassland's management plan that meets the criteria established by NFMA. Although NFMA authorizes the Forest Service 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 C.F.R. [sect] 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, [sect] 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, [sect] 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[hellip]" (36 C.F.R. [sect] 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 C.F.R. [sect] 219.3). The planning Directives provide further support for and guidance to uphold these requirements (FSH 1909.12, ch. 20, [sect] 21.2; FSH 1909.12, ch. 20, [sect] 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.

With respect to NEPA regulations, a purpose and need statement should be brief and specific (40 CFR [sect] 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[mdash]and the ESA, which has made

conservation and recovery of listed species an integral part of the Forest Service's mission.
A. The Forest Service's basis for changing the management plan is arbitrary and based on outdated information. The DEIS notes that 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 area expanded to an estimated 48,000 acres in 2017 across the Grassland (DEIS at 14). A widespread plague epizootic that began in 2017 reduced the area occupied by prairie dogs down to 625 acres by 2018.

The DEIS indicates the prairie dog colony area expansion to 48,000 acres required management action. However, the Forest Service has provided no science to justify "management action" based on ecology but, rather, vague statements implying a need for action, for example:

Not long after Forest Service staff completed the 2015 update to the 2015 Prairie Dog Conservation Assessment and Management Strategy, prairie dog colonies on and around the national grassland began to expand significantly. The population expansion

continued into 2016 and 2017, exceeding anything seen in recent history. [hellip] the Prairie Dog Conservation Assessment and Management Strategy provided no direction and little flexibility regarding such a management situation. (DEIS at 14) (emphasis added)

The 2000 Biological Assessment and Evaluation for TBNG's 2002 Land and Resource Management Plan (2002 LRMP) predicted that the prairie dog colony area would increase to 30,000 to 48,000 acres within 10 years (i.e., by 2010-2011). "If drought conditions prevail and vegetation conditions are conducive to colony expansion and establishment, the upper end of the ranges is expected" (Biological Assessment and Evaluation for Revised Land and Resource Management Plans and Associated Oil and Gas Leasing Decisions 2000 at H-99). 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. The 2017 count of 48,000 acres of prairie dog colonies was accurately predicted by the Forest Service as natural expansion. 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.

More importantly, if any change should be made to the management plan, it should be based on the number of occupied prairie dog colony acres from the more recent survey in 2018, which recorded 625 acres (DEIS at 14). The science on the prairie dog ecology and associated species viability demonstrates that 625 prairie dog colony acres is not enough to support sustainable populations of ferrets, mountain plovers, burrowing owls, and perhaps others. The following excerpts from Forest Service documents make this case:

[hellip] a minimum of 10,621-acres of prairie dogs at a moderate density are needed to support a self-sustaining population of ferrets (Jachowski et al. 2011). (2015 Strategy at 12) [Note, though, that more recent science has raised this prairie dog area threshold.]

An area of 9,884-acres for a colony or complex is also cited as the minimum area necessary for a fully functional grassland ecosystem that can provide suitable habitat for species of conservation concern such as burrowing owls, mountain plover and other species that depend on prairie dogs for survival (Proctor et al. 2006). (2015 Strategy at 12.)

The best available scientific information, much of which was collected on the Thunder Basin National Grassland, shows 10,000 acres of colonies is the lower limit likely to adequately provide for the long-term persistence of the mountain plover population on the Thunder Basin National Grassland. [hellip] Based on the mountain plover survey data available for the national grassland, an estimated average density of 0.8 to 2.5 birds per 100 acre could be expected on prairie dog colonies, with few to no birds occurring outside prairie dog colonies (Duchart et al. 2018) [sic]. At 10,000 acres of colonies, this expected bird density yields approximately 80 to 250 birds; at 7,500 acres of colonies,

this yields approximately 60 to 190 birds. Concepts from conservation biology suggest these estimates may be sufficient to sustain a viable population of plover (Lehmkuhl 1984). (DEIS at 61 and 62.)

We disagree with the Forest Service that prairie dog colonies on the Grassland could be managed down to between 7,500 and 10,000, as prescribed by the Proposed Action, and maintain viable populations of prairie dogs and prairie dog associated species. This is especially true given lethal control of those acres would be allowed. However, the statements above show that the Forest Service's interpretation of key science indicates that plague mitigation was the appropriate management response to the 2018 management situation where prairie dog colony acreage fell far below thresholds to support associated species. And, if anything, the dramatic loss of prairie dogs should be triggering an amendment that would emphasize restoring prairie dog populations and mandate a plague prevention program.
B. The stated purposes and needs for the proposed amendment are flawed.
The purpose and need statements are not supported by information provided in the DEIS, arbitrary, ambiguous, not consistent with federal laws or regulations, and/or already accounted for in the current plan. On pages 13-14, the DEIS seems to be framing the problem the amendment is intended to address in the following way:

Challenges related to prairie dog management and the potential reintroduction of black- footed ferret have existed since completion of the grassland plan. These challenges have continued through prairie dog population cycles of expansion and decline and through several planning efforts. (DEIS at 13)

In particular, Forest Service personnel have had limited success in minimizing impacts of prairie dog encroachment onto private and State lands during times of population expansion and minimizing rapid landscape-scale declines during plague epizootics. (DEIS at 14)

The current plan provides provisions that are responsive to these problems[mdash]or they could be if the Forest Service appropriately applied them. As we've discussed elsewhere in these comments, a key problem underlying the conflict over prairie dogs on the TBNG isn't the failure of the plan to provide sufficient management tools but the failure of the Forest Service to use the tools the plan provides (Defenders et al. 2019 at 4-7). Yet, given that the Forest Service seems committed to adding a plan amendment to change how prairie dogs are managed, the purpose and need for the amendment and amendment prescriptions should be focused on these identified problems.

Importantly, the amended plan must meet the requirements of 36 CFR 219.8 and 219.9. The Forest Service recognized these requirements as being "directly related" to the proposed amendment in accordance with 36 CFR 219.15(b)(5). We examine the purpose and needs for the amendment outlined in the DEIS (at 17).
1. The purpose to "provide a wider array of management options to respond to changing conditions" is vague, ambiguous, arbitrary, and not supported by the DEIS.
The Forest Service must be clear which "changing conditions" it is referring to. Does this mean prairie dog colony expansion, decline due to plague, or both? We are assuming both, but this is unclear, especially because addressing plague-induced prairie dog decline is not included as a purpose and need (See Section III.C.1 below). The statement could also be referring to climatic conditions, such as increased weather extremes, especially drought, induced by climate change. Variations in precipitation and temperature can impact prairie dog abundance and colony expansion and contraction. The "changing conditions" must be specified.

More importantly, is this statement referring to ecological conditions outside of the natural range of variation (NRV) for the Grassland? If the statement is referring to natural fluctuations in prairie dog colony area, this is not a valid purpose. This would not include plague, which is not a native disease to North America or the region.
2. The purpose to "minimize prairie dog encroachment onto non-Federal lands" is sufficiently met in the current plan.
The 2015 Strategy contains the following provision:

Use of rodenticides on Federal lands may only be employed within approximately [frac12]- mile of the TBNG boundary and only in cases where appropriate and available non- lethal options have been considered and used, unless they have been found to be ineffective for changing the rate and direction of colony expansion. (2015 Strategy at 12)

This direction provides the Forest Service a significant amount of discretion regarding how to judge when lethal control can be employed. It is difficult to see how this is prohibiting the Forest Service from conducting "boundary management" to limit prairie dog colony encroachment onto private lands.
3. The purpose to "reduce resource conflicts related to prairie dog occupancy and livestock grazing" is already met in the current plan.
The current consensus-based Black-tailed Prairie Dog Conservation Assessment and Management Strategy, developed by the stakeholders of TBNG, has the management tools and provides flexibility within its framework to address prairie dog conflicts on TBNG. The problem is the 2015 Strategy has not been fully implemented, particularly concerning buffer management. With this defined purpose, it is important to consider the range of options (included in the current Strategy) for reducing prairie dog conflicts.

It is difficult to see how the Forest Service is not providing for multiple uses under the current plan. The Final Environmental Impact Statement (at 3-89) for the 2002 LRMP reported that 532,060 acres, or 96%, of the TBNG is suitable for livestock grazing. Under the current plan, Category 1 and 2 areas that provide protections for prairie dogs make up 12% of the TBNG.
4. The purpose to "ensure continued conservation of at-risk species" is not construed in a way that complies with 2012 Planning Rule requirements.
This is the wrong purpose. Under the 2012 Planning Rule, at-risk species include those listed under the ESA as threatened or endangered, those species proposed or candidates for ESA listing, and Species of Conservation Concern (SCC) about which there are substantial concerns about their long-term persistence in the plan area (36 CFR 219.9(b)(1)&(c)). Regarding at-risk species, under the 2012 Planning Rule, the management plan must:

provide the ecological conditions necessary to: contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern within the plan area. (36 CFR 219.9(b)(1))

The Forest Service stated in the DEIS that 36 CFR 219.9 is a Planning Rule requirement that is "directly related" to the proposed amendment (36 CFR 219.13(b)(5)).

Because the 2002 LRMP was developed under the 1982 Planning Rule, and any new amendments must be developed under 2012 Planning Rule, the Regional Forester need not go through the Species of Conservation Concern (SCC) selection process outlined in 36 CFR 219.9(c), but rather follow 36 CFR 219.13(b)(6), which requires, if scoping or NEPA effects analysis for the proposed amendment reveals substantial adverse impacts to a specific species, or if the proposed amendment would substantially lessen protections for a specific species, the responsible official must determine whether such species is a potential SCC, and if so, apply section [sect] 219.9(b) with respect to that species as if it were an SCC.

Though the selection process differs for SCC and "potential SCC," the result is these at-risk species should be treated the same in an amendment process: the plan, including the amendment, must provide the ecological conditions necessary to maintain the viability of a potential SCC population.

For the proposed amendment, the Forest Service will be retaining its Regional Forester Sensitive Species (Sensitive Species) for the Grassland. Under the 1982 Planning Rule, the Forest Service was obligated to maintain viable populations of all native species. Sensitive Species are "plant and animal species identified by a regional forester for which population viability is a concern" (FSM 2670.5). The Forest Service has the following objectives with regard to managing Sensitive Species:

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* Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions. (FSM 2670.22(1))
* Develop and implement management objectives for populations and/or habitat of sensitive species. (FSM 2670.22(3))

This purpose statement must be revised to reflect that the TBNG proposed amendment plan components are required to maintain viable populations of Sensitive Species and potential SCC. For potential SCC, the responsible official is to determine whether ecosystem-specific (coarse- filter) plan components will be sufficient to maintain persistence or if additional species-specific (fine-filter) components must be developed. Additionally, the DEIS must include a science- based assessment to determine if the aggregate plan components will result in maintaining at- risk species' persistence.
5. The need to "revise management direction in Management Area 3.63 - Black-Footed Ferret Reintroduction Habitat" is arbitrary.
This stated need is misleading. The proposal is not merely intended to revise MA 3.63 management but intended to eliminate the MA 3.63 designation in the Grassland entirely. 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.
6. The need to "adjust the boundaries of Management Area 3.63 to be more conducive to prairie dog management" is vague and arbitrary.
The Forest Service is proposing to adjust the boundary of MA 3.63 to have zero acres of MA

3.63 designated in the Grassland, and thus zero acres of prairie dog colonies protected from poisoning and shooting. This is not consistent with the need to maintain the viability of potential SCC associated with prairie dogs.

Is this purported need referring to the "boundary management zones" proposed in alternatives 2, 3, and 4 or the proposed reduction of MA 3.63 under alternatives 2 and 3, which would change the boundary? This is not clear. The Proposed Action would change the size, and thus the boundaries, of MA 3.63 from 51,000 acres to 35,000 acres. Alternative 3 proposed to shrink MA 3.63 down to 29,000 acres. The DEIS includes no information or justification as to why reducing the size of MA 3.63, proposed to be MA 3.67 under the amendment, would be "more conducive to prairie dog management." The need for an amendment on this basis is arbitrary.
7. 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 (see Defenders et al. 2019 at 4-7).

In addition, the way this need statement is written is unclear. Are the "management situations" of "encroachment," "natural and human-cause disturbance," and "disease" an exhaustive list of the "variety of management situations" or are there others? The clause "variety of management situations" lacks needed specificity. What are the "natural and human-caused disturbances" represented by this statement? It is not clear how enabling the killing of more prairie dogs on the Grassland addresses any problems associated with natural and human disturbances. As used here, "disturbances" is too vague to be understandable. Is "disease" specifically referring to sylvatic plague? If so, this is arbitrary. Killing prairie dogs is not an appropriate management response to plague. Plague is carried by fleas, not prairie dogs.

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

A stated purpose and need is unreasonably (and unlawfully) narrow when "the EIS becomes essentially a foreordained formality." Webster v. U.S. Dept. of Agriculture, 685 F.3d 411, 422 (4th Cir. 2012) (internal quotes omitted). Agencies have "'the duty under NEPA to exercise a degree of skepticism in dealing with self-serving statements from a prime beneficiary of the [proposed action].'" Simmons v. U.S. Army Corps of Eng'rs, 120 F.3d 664, 669 (7th Cir. 1997) (quoting Citizens Against Burlington v. Busey, 938 F.2d 190, 209 (D.C. Cir. 1991) (Buckley, J., dissenting)). 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.

1. 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.

Supporting ecological conditions to not preclude the ability to reintroduce ferrets is not the appropriate purpose regarding black-footed ferrets nor the Forest Service's obligation to contribute to the recovery of threatened and endangered species. As stated in the section above, to meet the requirement in the Planning Rule, the amended plan must "provide the ecological conditions necessary to: contribute to the recovery of federally listed threatened and endangered species" (36 CFR 219.9(b)(1)). Under Section 7(a)(1) of the ESA, the Forest Service must use its authority "in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species" (16 U.S.C. [sect] 1536(a)(1)).

Stated another way, the Forest Service has an obligation to help recover black-footed ferrets, and the purpose and need abandons that obligation.

2. 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. Many scientists call the short- and mixed-grass ecosystems of the Great Plains "the prairie dog ecosystem," because prairie dogs are essential to this system (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). Prairie dog activity (e.g., clipping vegetation and digging and maintaining burrows) is a natural disturbance process that is a driver of these grassland ecosystems, and the plan must take into account "[s]ystem drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession, wildland fire, invasive species, and climate change," required by 36 C.F.R. [sect] 219.8(a)(1)(iv); and the key driver of the shortgrass prairie ecosystem is the interactive disturbance regime of prairie dogs, bison, fire, and drought (Coppock and Detling 1986; Uresk et al. 1996; Truett et al. 2001), with periodic occurrences of extreme drought conditions like that which occurred in 2017 (Wang et al. 2019). Extensive poisoning removes prairie dogs from the equation and likely has significant effects that upset these natural processes.

3. Mandatory plague mitigation must be a purpose and need of the proposed amendment.

We note that there is no purpose or need statement that addresses the problem of rapid prairie dog declines due to plague, despite this being identified as a prairie dog management problem (DEIS at 14). Again, the DEIS stated, "Forest Service personnel have had limited success in" [hellip] "minimizing rapid landscape-scale declines during plague epizootics" (DEIS at 14). The 2015 Strategy (at 10) includes the provision, "Plague management tools (e.g., dusting and vaccination) will be used where practical and effective to control plague within prairie dog complexes." Alternatives 2, 3, and 4 all include a guideline to allow plague mitigation. However, based on the Forest Service's refusal to use plague mitigation tools detailed in the current plan to prevent the spread of plague in 2017 and 2018, there is a need for plague mitigation to become a Standard if the Forest Service amends the TBNG plan. Mandatory plague mitigation must be included as a purpose and need for the amendments.

IV. The Draft Environmental Impact Statement has not provided a range of reasonable alternatives, in violation of NEPA.

We appreciate that the Forest Service has presented action alternatives with varied sets of plan components, which we considered very closely. Unfortunately, our analysis of these alternatives demonstrates that the range is not sufficient to meet NEPA's requirement 40 CFR [sect] 1502.14 specifying the need for a range of reasonable alternatives. Reasonable alternatives are those that are viable, feasible, and accomplish the purpose and need of the amendment.

The DEIS did not provide an action alternative that would enable the TBNG to support a ferret population with 100 breeding adults. In our scoping comments, we emphasized that any amendment would need to provide the ecological conditions to support 100 breeding adult ferrets. None of the action alternatives do this.

None of the action alternatives meet the purpose and needs for the proposed amendment with regard to at-risk species recovery and persistence. They do not meet NFMA's "diversity requirement" because they do not comply 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)). None of the action alternatives fulfill the ESA's requirement to "carry out programs for the conservation" of the black-footed ferret by using "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," which is the definition of "conservation" under the Act.

Additionally, the alternatives include plan components that hinder maintaining or restoring ecological integrity of the TBNG's grassland ecosystems and do not comply with 36 CFR 219.8(a)). In particular the DEIS does not reflect that the Forest Service fully understands the importance of prairie dog activity as a natural and essential disturbance process[mdash]a key characteristic of the system[mdash]that promotes ecological integrity of the short- and mixed-grass prairie ecosystems found on TBNG. The plan components in the action alternatives all work to limit the role of prairie dogs as ecosystem drivers by artificially constraining prairie dog distribution across the Grassland, keeping the prairie dog population at a depressed level, reducing natural prairie dog density levels, and disrupting density fluctuations. The result of implementing any of the action alternatives will preclude the recovery of ferrets and put at risk long-term viability of the mountain plover and burrowing owl, both at-risk prairie dog associated species, and possibly even the prairie dog.

While recent research has provided some important new best available science regarding the ecological conditions required to support 100 breeding adult ferrets, the essence of our recommendations has not changed. We do believe that biologically and socially, TBNG can support a ferret population that contributes to national recovery criteria. A reasonable alternative would include plan components that support the provision of these conditions, which we summarize in our introduction. We believe plan components that provide for these conditions would also provide for the ecological requirements of the BTPD, mountain plover, burrowing owl, and other grassland species.

We identify the problems with the action alternatives below.

A. Problems common to each action alternative

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, the lack of a standard that mandates annual plague mitigation, the failure to manage for sufficiently large and optimally configured prairie dog complexes, and the use of an undefined collaborative stakeholder group to inform Grassland policy versus relying on set policy prescriptions 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.

Additionally, each alternative includes desired conditions for using "ecological site descriptions" developed by the Natural Resource Conservation Service (NRCS) to "portray ecological processes and dynamics." It is not clear what this means. The Forest Service also proposed in the DEIS using ecological site descriptions for monitoring grassland conditions. We believe a management and monitoring framework, that appears to only improve and increase forage for livestock, rather than balance multiple uses, is inappropriate for a national grassland that is required to restore and maintain ecological integrity provide and protect wildlife habitat.
1. Elimination of Management Area 3.63 - Black-footed Ferret Reintroduction Habitat
The elimination of all designated MA 3.63 in TBNG would be a massive loss to ferret recovery[mdash] ecologically, policy-wise, in on-the-ground progress toward national recovery criteria, and symbolically. The proposed change signals that the Forest Service is giving up on making additional strides in the decades-old, multi-institutional, national effort to save the species. The American taxpayers, who consistently show 79-90% support for the ESA and endangered species conservation programs (Bruskotter et al. 2018), have invested millions of dollars in the recovery program. Scientists in and outside of government have devoted years, in some cases most of their careers, toward improving ferret research and conservation techniques. As we have asserted in other sections of these comments, the loss of TBNG as a future reintroduction and recovery site will preclude the species' recovery. And the change in management direction will lift prohibitions on prairie dog shooting and poisoning on the only area where prairie dogs and, thus, ferret habitat have been protected from these threats. The current MA 3.63 designation constitutes only 9% (51,000 acres) of the total Grassland, and the size is sufficient to help support 100 breeding adult ferrets. The long-term success of the Conata Basin ferret population on the Buffalo Gap National Grassland[mdash]even in the face of plague[mdash]is, in part, attributed to the presence and protections afforded by a MA 3.63 designation.

Prairie dog poisoning and shooting not only kill prairie dogs directly but also have a range of deleterious impacts on the behavior of prairie dog survivors of poisoning and shooting and prairie dog habitat that can negatively affect prairie dog associated species, including ferrets, mountain plovers, burrowing owls, and others among the 100-plus native species that benefit from prairie dogs. In more detail below, we examine these impacts, based on the best available science, to the recovery of ferrets and viability of other at-risk species that occur on the Grassland, including prairie dogs.

The proposed transition of much of the current MA 3.63 designation to MA 3.67 (Rangelands with Short-stature Vegetation Emphasis) indicates wildlife conservation will no longer be a priority anywhere within the TBNG's grassland ecosystems. And for reasons that are unclear and not justified in the DEIS, the former MA 3.63 will shrink from 51,000 acres to 35,367 acres as MA 3.67 under Alternative 2, down to 29,193 acres under Alternative 3, and 44,968 acres under Alternative 4.
2. Caps on prairie dog colony area
Each action alternative prescribes, with plan standards, ceilings on how large prairie dog colony areas can become. Keeping prairie dog populations at artificially depressed levels will reduce ecological integrity sustained by prairie dog colonies as well as put at risk the viability of mountain plovers, burrowing owls, and possibly prairie dogs. The colony area caps represent a significant departure from current direction that sets no cap on prairie dog area expansion but has a target of at least 33,000 acres. Capping prairie dog colonies does not support the conservation of prairie dog habitat for black-footed ferret recovery. According to the BFF Recovery Plan, a total of 225 acres of BTPD per adult female ferret is needed, or 4,500 acres for 30 breeding adults (20 females and 10 males, with overlapping territories) and 15,000 acres for 100 breeding adults (67 females and 33 males USFWS 2013). Recent science shows a minimum range of 20,495 - 47,931 acres (average of 33,323 acres) of active prairie dog colony area is likely needed to support 100 breeding adult ferrets. TBNG likely hosted enough acreage to support 100 breeding adult ferrets prior to the 2017 plague outbreak.

The Alternative 2 cap is 7,500 to 10,000 acres in proposed MA 3.67, where 10,000 is the target but can be reduced down to 7,500 during drought periods using lethal methods. TBNG has 128,282 acres of potential prairie dog habitat (2015 Strategy), so these limits would represent only 6-8% of potential habitat. The cap of 7,500-

10,000 acres is not sufficient to support a self- sustaining population of 100 breeding adult ferrets (and likely not even 30 adults given recent science) and will not assure that mountain plovers can be maintained on the Grassland.

Alternative 3 set a cap at 10,000-15,000 acres across the entire Grassland. This is just 8-11% of potential habitat. This is nowhere near what is required to support a self-sustaining population of 30 or 100 breeding adult ferrets due to the lack of prairie dog complex structure and is likely too few acres to maintain a viable population of mountain plovers.

Alternative 4 seeks to limit prairie dog colony area to 27,000 acres, 21% of potential available prairie dog habitat, across TBNG in accordance with the following standard:

Active prairie dog colonies in Category 1 will be managed toward a target of 18,000 acres. When the total area of active prairie dog colonies within Category 1 is less than 18,000 acres, lethal control is prohibited, except in boundary management zones. Active colonies in Category 2 areas will be managed toward a combined target of 9,000 acres. When the total area of active prairie dog colonies in Category 2 areas is less than 9,000 acres, lethal control is prohibited, except in boundary management zones. To work toward acreage targets, a variety of conservation and control tools may be used. (Appendix A at A-66)

Category 1 largely overlaps with the current MA 3.63 area and is proposed to be 49,856 acres with 8,174 acres of boundary management zone. Category 2 is listed as 18,215 acres with 1,593 acres of boundary management zone. Though 18,000 acres is much closer to the minimum prairie dog colony area required by ferrets and is hovering at the threshold of what it would take to support a self-sustaining population of 100 breeding adults based on the best available science. In the best years (i.e., absence of drought and plague, high prairie dog pup production), where an adult ferret female might use 305.9 acres, 18,000 acres might be able to support 58 adult ferret females, but in more challenging years (i.e., drought, plague, low prairie dog pup production) where an adult ferret female might require more than 715.4 acres, 18,000 acres could likely not support 30 breeding adults. The natural fluctuations in habitat conditions based on weather and other factors could limit the ability of the Grassland to support a viable ferret population over the long-term.
3. Prairie dog density control
Though the plan components vary, each action alternative allows for reducing prairie dog densities with lethal and non-lethal methods. The Forest Service defines "density control" for each alternative as,

A management action or set of management actions implemented with the intent to reduce the number of live prairie dogs within a prairie dog colony or some portion of a colony without reducing the total area of the colony. Such management actions would occur most often via the use of rodenticides but other control tools may be used. (Appendix A at A-45, A-64, A-83)

Under the Alternative 2, lethal density control can occur in the proposed MA 3.67 under any circumstances regardless of whether prairie dog colony acreage targets have been met, which is incorporated as a standard (Appendix A at A-39). Under Alternative 3, density control is permissible anywhere on the Grassland under any circumstances, which is included as a standard (Appendix A-47). Alternative 4 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.

Alternative 2 includes the following standard,

When the total area of prairie dogs in Management Area 3.67 and satellite colonies is less than 7,500 acres, density control will not occur in more than 50% of the area of any colony. (Appendix A at A-40)

Alternative 3 includes the following standard,

When the total area of prairie dogs across the Grassland is less than 10,000 acres, density control will not occur in more than 50% of the area of any colony. (Appendix A at A-47)

Alternative 2 and 3 share the following guideline,

Density control (for example, using rodenticides, translocation, or collapsing of burrows) may be used to maintain desired vegetation conditions within a prairie dog colony.

Desired vegetation structure and composition may vary by ecological site or colony. Where density control occurs, pretreatment data must be collected, and monitoring data must be collected for a minimum of two years after treatment. (Appendix A at A- 40) The plan documents provide no information on what circumstances would trigger density control applications.

The plan documents offer no science regarding how density control would impact wildlife. The plan documents do not provide any science to support that density control will yield the intended outcomes either.

One of the primary threats to biological diversity is habitat fragmentation (Wilcox and Murphy 1985; Wilcove et al. 1998; Crooks and Sanjayan 2006). The effects of fragmentation results in genetic differentiation of populations, loss of genetic diversity, and inbreeding depression (O'Brien et al. 1996; Saccheri et al. 1998; Westemeier et al. 1998). It can also lead to reduction of effective population size, and lack of adaptability to changing conditions (Pannell and Charlesworth 2000; Hanski and Gaggiotti 2004; Whitlock 2004). As stated in Magle et al. 2010:

In the absence of dispersal, loss of genetic diversity often is the result of geographic isolation over long periods of time (Frankham 2006; Frankham et al. 2002; Gilpin and Soul[eacute] 1986) and is exacerbated in populations that remain small (Frankham 2006).

Prairie dogs, whose colonies complexes can function as metapopulations (Roach et al. 2001), can only persist with regular dispersal among colonies (Lomolino et al. 2003; Antolin et al.

2006). Their need to disperse to new colonies is especially important when sylvatic plague occurs and causes local extinctions (Roach et al. 2001).

The fragmentation of prairie dog colonies due to plague and human-caused factors (e.g., 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).

The 51,000 acres of grassland that currently exist in the MA 3.63 are largely free from fragmentation; this provides conditions that enable prairie dogs to fulfil their ecological role on the landscape. The result of implementing any of the action alternatives will exacerbate the deleterious effects of human caused habitat fragmentation.

4. Lack of plague mitigation standards

None of the action alternatives include a standard that mandates the Forest Service conduct plague mitigation. If anything, the plague epizootic that hit TBNG beginning in 2017, demonstrated that plague mitigation is crucial to sustaining a sufficient prairie dog abundance and distribution to maintain ecological integrity of the grassland ecosystems, maintain viable populations of mountain plovers and burrowing owls, and recover ferrets. While 625 acres of prairie dogs out of over 48,000 acres the existed pre-plague remained active, plague can wipe out 100% of the prairie dogs in a colony (Cully et al. 2010). Sylvatic plague is the most pernicious threat to prairie dogs. It is imminent, pervasive, and we know little about when or where it will erupt. We do know, however, that we need a suite of tools to prevent plague from occurring or to stop it when it is detected. The most reliable tool to prevent and curtail plague in prairie dog populations is deltamethrin powder, or "dust," which when deployed into prairie dog burrows reduces flea populations - the vector of plague (Seery et al. 2003; Biggins et al.

2010; Matchett et al. 2010).

Each action alternative proposes the same guideline:

To mitigate the risk of epizootics caused by sylvatic plague, plague control tools such as deltamethrin or sylvatic plague vaccine may be used in prairie dog colonies. (Appendix A at A-47).

A guideline is not sufficient. The Forest Service refused to conduct mitigation when the plague was detected in 2017 and did not commence deltamethrin dusting until the summer of 2019 after plague had decimated all but 625 acres of prairie dogs in the MA 3.63.

5. Management directed by a collaborative stakeholder group

The Forest Service provides no clear direction on the makeup and ground rules for the proposed collaborative stakeholder group. Although having additional 'eyes' on the ground to detect and monitor changes in climatic conditions, vegetation, and wildlife may be helpful, the Forest Service is ultimately responsible for monitoring and implementing management plan directives. 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.

6. Monitoring grassland conditions with "ecological site descriptions"

Desired conditions for each action alternative include the following, "Ecological site descriptions are used to portray ecological processes and dynamics" (A-30, A-50, A-70). Ecological Site Descriptions (ESDs) are a tool for range not ecosystem management, with a need for managing for heterogeneity. They were developed by the Natural Resources Conservation Service, which has the mission of, "to provide resources to farmers and landowners to aid them with conservation." Twidwell et al. (2014) assessed ESDs and found them highly subjective, prone to bias, overemphasize livestock grazing as an ecosystem driver over other drivers, and unable to project climate change impacts.

B. Problems unique to Alternative 2 (the Proposed Action)

Alternative 2 fails to be a reasonable alternative for reasons beyond those described above. The alternative includes a standard to limit prairie dog colony area down to 7,500 acres (versus 10,000 acres) during drought. "Drought" is not defined in the definitions included as part of the Alternative or in the DEIS, so it is impossible to know when dry conditions would trigger the shift to managing toward 7,500 acres; decisionmaking would be arbitrary. While prairie dog colonies tend to expand during drought conditions, actual prairie dog numbers tend to go down due to food scarcity. 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.

Alternative 2 includes the concept of satellite colonies. A "satellite prairie dog colony" is defined as "A prairie dog colony that occupies National Forest System lands outside of Management Area 3.67 and has been designated for the purpose of meeting colony acreage targets" (Appendix A at A-45). The same standard discussed above also proposes, If the responsible official determines that lethal control beyond density control is warranted and the total area of prairie dog colonies is less than 7,500 acres within Management Area 3.67, then satellite colonies may be identified outside of Management Area 3.67 to temporarily allow lethal control within Management Area

3.67. The sum of satellite colony acres and colony acres in Management Area 3.67 should be greater than 7,500 acres before allowing lethal control within Management Area 3.67, so that at least 7,500 acres remain following control. (Appendix A at A-40)

There a no minimum acreage targets for colony area outside of the proposed MA 3.67. There are no plan components that protect colonies outside of MA 3.67 unless satellite colonies are designated, which is not required. All colonies outside MA 3.67 are vulnerable to extermination. Technically, the Alternative direction could result in only 7,500 acres of prairie dog colony area across the entire Grassland, and fewer if plague mitigation is not regularly conducted.

C. Problems unique to Alternative 3

Similar to Alternative 2, Alternative 3 has specific drought direction. Again, "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." Again, the high end of the range is 15,000 acres.

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[reg] at current and future reintroduction sites, however, is prohibited by the EPA label that governs use of Rozol (USFWS 2013a, p. 50).

Fumitoxin, Phostoxin, and zinc phosphide all kill target species through creation of phosphine gas, which disrupts metabolic processes. Fumitoxin is problematic in that it indiscriminately kills any respiring organism living in the burrow at the time of application (Sheffield 1997). While Phostoxin and zinc phosphide are more targeted, these products can also kill nontarget species that happen to ingest the treated bait or tablets. Rozol prairie dog bait, an anticoagulant rodenticide, not only kills prairie dogs but remains active in the tissues of the animals and can kill any species that predates or scavenges these species (Sheffield 1997).

From the conservation standpoint, two issues from this alternative and use of fumigants and anticoagulant poisons are of concern: 1) Immediate mortality to nontarget wildlife or predators of prairie dogs; 2) Long-term impacts from reduced habitat (either nesting or feeding).

Anticoagulant poisons are hazardous to burrowing owls, for example. Burrowing owls typically occupy Wyoming prairie dog colonies from April to September. After that time, most will likely migrate to wintering grounds in the southwestern U.S. or Mexico. While most nesting is completed by August, migrants from habitats as far north as Canada may continue to flow through Wyoming prairie dog colonies, using existing prairie dog colonies along their path as they migrate south. Thus, there is a likelihood that burrowing owls could be killed using fumigants through September. While outside of the label restrictions for Rozol, burrowing owls feed on small mammals that would likely ingest Rozol. Anti-coagulant rodenticides (e.g., brodifacoum and other second generation (or super warfarin) compounds such as Rozol) have been shown to cause mortality in many different owl species, including through the ingestion of as few as one poisoned prey item (Sheffield 1997).

Continued efforts to control prairie populations in the West have been detrimental to burrowing owl populations (Sheffield 1997). Burrowing owls are considered a Species of Greatest Conservation Need in much of their range on the Great Plains, including in Wyoming. Active prairie dog colonies benefit burrowing owls in several ways. Prairie dogs are preferred prey for badgers, so the presence of numerous prairie dogs in a colony lowers the risk of predation on burrowing owl nests. Large prairie dog colonies also allow owls to nest in clusters that may promote better predator detection (Desmond et al. 1995). This is due to prairie dog alarm calls or by the dilution effect (increased safety from predation due to the abundance of alternative prey, prairie dogs, in the same area (Desmond et al. 2000). In addition, burrowing owls select for areas with reduced grass coverage and height, possibly allowing for increased predator and prey detection (Desmond et al. 2000). Through their grazing and clipping of vegetation, prairie dogs may help maintain conditions suitable for burrowing owls. Active burrow densities are also positively related to fledging success (Desmond et al. 2000). Thus, reducing colony sizes will ultimately result in lower nesting success for burrowing owls over time.

For adequate recruitment into a burrowing owl population, the health of the young is vital. Juvenile owls will use numerous satellite prairie dog burrows within colonies and select for active burrows because they are better maintained (Desmond and Savidge 1999). When prairie dogs are poisoned, killed and their numbers decrease, the number of active burrows decreases thus jeopardizing the survival of burrowing owl young.

Burrowing owl numbers also are positively related to the size of prairie dog colonies (Desmond and Savidge 1996). Thus, sufficient habitat for numerous nesting pairs is important whether they benefit from the presence of other nesting owls or some other factor provided by large colonies.

The prairie dog is an important prey item to many raptors, including ferruginous hawks (Buteo regalis). Control of prey species such as the prairie dog, through use of rodenticides can result in localized food shortages for ferruginous hawks (Cook et al. 2003). Ferruginous hawks have also been closely associated with prairie dogs for raising their young. Prairie dogs can have a significant effect on their nest site selection, as well as the abundance in nesting pairs and overall productivity of ferruginous hawks in arid grasslands of the American West (Cook et al. 2003).

The importance of black-tailed prairie dogs to ferruginous hawks particularly in the winter, compounded with the ferruginous hawk preference for easy to capture prey, suggests a potentially greater risk of secondary poisoning for ferruginous hawks if the prey vulnerability has resulted from poisoning (U.S. Geological Survey, USGS, 2017). Ferruginous hawks appear to optimize their foraging before and after Rozol application by taking easy-to-capture prey presumably due to Rozol poisoning (Thunder 2017). Additional research revealed a high probability of raptor mortality after digesting poisoned rodents. A USFWS 2007 report diagnosed one bald eagle suffered trauma from poisoning by an anticoagulant Chlorophaenicene, Rozol in Red Willow County, Nebraska. The blood clotting caused by the anticoagulant resulted in massive or sustained hemorrhaging, which lead to anemia, shock and subsequent death.

D. Problems 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[mdash]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.

V. Unlawful relinquishment of federal authority to the State of Wyoming over black- footed ferret recovery

As we discussed above in the Introduction, the Forest Service is beholden to several federal laws (e.g., NFMA, NEPA, and the ESA), regulations (e.g., the 2012 Planning Rule), and additional policies (e.g., the planning directives detailed in the Forest Service Handbook 1909.12). As a federal agency, the Forest Service cannot relinquish its authority over wildlife management on TBNG to a state. Yet, this is apparently what the Forest Service is doing through this management plan amendment process[mdash]using the DEIS and earlier memoranda of understanding as the mechanisms to increase the Wyoming Game and Fish Department's (WGFD) decision-making authority over ferret reintroduction on the TBNG (DEIS at 9; BE at 5-6). To the extent the plan amendment constructively 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. The proposed amendment should be modified to clarify that final authority concerning reintroductions resides with the Forest

Service and Fish and Wildlife Service.

The Forest Service misunderstands its statutory obligations to the extent it believes that it must abide by WGFD's Black-footed Ferret Management Plan (Wyoming ferret plan). The Forest Service's position is similar to that of the U.S. Fish and Wildlife Service (USFWS), which similarly appears to have relinquished its own authority to Wyoming over ferret recovery in the 10(j) rule: Establishment of a Nonessential Experimental Population of Black-footed Ferrets in Wyoming (80 Fed. Reg. 66822) (Wyoming 10(j) Rule). This 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. Regardless, the Forest Service, following this Rule, considers the Wyoming ferret plan the "regulatory" framework governing ferret reintroduction and recovery. This is explained in the DEIS (at 9):

The rule [Wyoming 10(j) Rule] promotes reintroduction by establishing all populations in Wyoming as nonessential and experimental, thus relaxing the take and consultation requirements associated with endangered species and facilitating acceptance by local landowners and managers. In this rule, U.S. Fish and Wildlife Service personnel also passed leadership of ferret reintroduction to the Wyoming Game and Fish Department. The Wyoming Game and Fish Department has developed a black-footed ferret management plan based on the U.S. Fish and Wildlife Service black footed ferret recovery plan [hellip] (footnotes omitted)

The TBNG's Draft Biological Assessment states:

In regard to species recovery, recovery plans are not regulatory documents, but are instead intended to provide guidance to the 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 plan components for the preferred amendment do little more than state that reintroduction "will not be precluded" (DEIS Appx A at A-40)[mdash]which of course does not satisfy the Forest Service's obligations under the ESA or NFMA. However, the Forest Service appears to further restrict the likelihood of ferrets every being reintroduced by implicitly allowing the state of Wyoming's ferret plan to govern when and where ferrets may be reintroduced. The DEIS (at

1. states,

Wyoming Game and Fish Department personnel have developed a strategy to evaluate and prioritize among potential sites to best allocate efforts to meet recovery goals for the state. The prioritization matrix in the management plan includes the following as the minimum requirements for allocating captive-bred ferrets to a reintroduction site:

*
* habitat suitability, stability, and management, including the funding and capacity to provide prairie dog boundary control where needed and desired
* disease monitoring and management, with a particular emphasis on sylvatic plague
* ability to address statewide objectives, including the ability to assess and monitor the status of ferret and prairie dog population
* stakeholder support of reintroduction activities, with particular emphasis on local communities and landowners, including adjacent landowners, permittees, and lessees

The "prioritization matrix"2 itself is perplexing and looks like a draft. It is not clear who or what institution wrote it or what the "Working Group" is and who is a member. Basing decisions on this document, which has not been reviewed through a NEPA process, is arbitrary and capricious because it does not represent the best available science of what is necessary to recover black-footed ferrets. The Wyoming ferret plan requirement to achieve local community support within a reintroduction site sets the bar for approving ferret reintroductions so high that returning ferrets to TBNG will likely be impossible. In particular, much of the current local community opposition to ferret reintroduction can be traced to the Forest Service's failure to use the tools already at its disposal. Nothing in proposed amendment resolves that issue, including the implicit relinquishment of authority over reintroduction to the WGFD or the indeterminate "Working Group" in WGFD's prioritization matrix. Regardless, the Forest Service cannot tie itself down with implicit requirements before satisfying its NFMA and ESA obligations toward endangered species. Any plan amendment must explicitly lay out the process by which the Forest Service (and Fish and Wildlife Service) will reintroduce ferrets to the Grassland.

We fully understand WGFD's and the Forest Service's desire to achieve nearby landowner and local community support for ferret recovery. This has been and continues to be a strong desire of ours as well. We have been committed to a stakeholder process aimed at resulting in this objective.3

If the Forest Service had developed an alternative for the amendment that we thought would provide the necessary ecological conditions required to contribute to ferret recovery and increase local support for ferret reintroduction to TBNG, we would support it. Yet, local support seems to be increasingly unfavorable. This is exemplified by the Forest Service's belief in the necessity of the plan amendment and the development of a Proposed Action that risks ferret recovery and elevates livestock grazing as a Grassland use far above wildlife conservation, in violation of NFMA.

Dwindling local support has been occurring despite a series of measures aimed at reducing social conflicts related to ferret recovery. For example, it has become USFWS policy to conduct all endangered and threatened species reintroductions under ESA 10(j) rules that establish reintroduced populations as non-essential, experimental and denies them full protection as listed species to facilitate greater landowner acceptance of ferrets. The state-wide Wyoming 10(j) Rule that includes the TBNG has not seemed to quell opposition. In addition, the USFWS developed Programmatic Safe Harbor Agreements (77 Fed. Reg. 75185; 64 Fed. Reg. 32717) to encourage landowners to host ferrets and their prairie dog prey in a manner that does not disrupt their grazing and farming practices and to enable management flexibility of prairie dogs adjacent to designated ferret conservation zones. Landowners and grazing allotment lessees are also protected by a Candidate Conservation Agreement with Assurances (CCAA) with the USFWS in the event that the black-tailed prairie dog, mountain plover, burrowing owl, ferruginous hawk, and/or 4 sagebrush associated species were to be listed under the ESA (81 Fed. Reg. 85629).

We are not suggesting the Forest Service abandon its aspiration to achieve public support for, or at least neutrality toward, ferret recovery on TBNG, but the ferret is on a downward decline toward extinction. Instead of embracing the Wyoming ferret plan, which has a high probability of making ferret recovery unattainable, the Forest Service must work toward restoring and maintaining ferret habitat to support 100 ferret breeding adults to fulfill its mandates under NFMA and the ESA. And it must base planning and management decisions on science.

We made the following point in our scoping comments. We believe this is worth repeating here for emphasis.

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 C.F.R. [sect] 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 Thunder Basin's existing management plan, including the 2009 Amendment #3 of Thunder Basin's land management plan. Despite the 2012 Planning Rule's instruction to coordinate with other government entities under 36 C.F.R. [sect] 219.4(b)(1), the Forest Service cannot abdicate its statutory responsibilities to manage the federal public lands in line with Congress's direction.

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 Fish and Wildlife Service 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. 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), 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." 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). The Forest Service clearly has the authority to manage wildlife habitat and species populations. This includes managing the public's use of wildlife on national forests and grasslands.

VI. Compliance with the National Forest Management Act

1. The need to recognize the distinctive roles and contributions of Thunder Basin National Grassland

The TBNG management plan must reflect the distinctive roles and contributions of the Grassland. According to the Planning Rule,

A plan reflects the unit's expected distinctive roles and contributions to the local area, region, and Nation, and the roles for which the plan area is best suited, considering the Agency's mission, the unit's unique capabilities, and the resources and management of other lands in the vicinity. (36 CFR [sect] 219.2(b)(1))

A plan must "[d]escribe the plan area's distinctive roles and contributions within the broader landscape" (36 CFR [sect] 219.7(f)(1)(ii)). The Forest Service's Planning Handbook provides additional support for this endeavor:

The plan area's distinctive roles and contributions within the broader landscape can provide focus or context and can aid in developing plan components. Well-described distinctive roles and contributions can also help provide an all-lands perspective and a framework for potential collaborative restoration efforts. (FSH 1909.12, ch. 20, 22.32)

The Responsible Official should note those roles and contributions that are most relevant to the unit's land and resource management. This description is important because it provides a foundation for desired conditions and objectives. (FSH 1909.12, ch. 20, 22.32)

The distinctive roles and contributions of a Forest System Lands unit can certainly include grassland uses as part of the Forest Service's multiple use mandate under NFMA and under the Multiple-use Sustained-Yield Act of 1960 (FSH 1909.12, ch. 20, 22.32(2)). However, the essential roles of TBNG in restoring and maintaining prairie dog complexes and the recovery of black- footed ferrets must remain central elements of the management plan. As an example of a distinctive role and contribution a Forest System Lands unit can make in the broader landscape could be: "[a] primary conservation area for grizzly bear" (FSH 1909.12, ch. 20, 22.32(2)(d)).

Additionally, federal public lands in the Great Plains are rare, and the national grasslands play a distinctive role as islands within an ocean of private land that have a legal mandate to protect wildlife and enable input into

management by the larger public.
1. Importance of the national grasslands for protecting unique Great Plains wildlife, including the black-footed ferret
The prairie dog ecosystem on the national grasslands provides important habitat for the endangered black-footed ferret and other native prairie species. Of the 20 national grasslands in the United States, 17 are in the Great Plains. In 1981, black-tailed prairie dogs occupied approximately 22,800 hectares (56,316 acres) on 11 of the national grasslands (Schenbeck 1981); there are likely 50% fewer occupied acres today given the presence of sylvatic plague, drought, and human caused factors. These federally-managed grasslands offer some of the last remaining vestiges of intact prairie habitat that subsequently support myriad imperiled prairie wildlife species.

The most notorious of national grasslands is the Buffalo Gap in South Dakota where the Forest Service has been leading the way in one of the most successful ferret reintroduction efforts in the history of the species. Through Forest Service leadership, a MA 3.63 was established in the Conata Basin and ferrets were reintroduced in 1996. At its peak in 2008, the ferret population was estimated at 312 individuals (>100 breeding adult ferrets) occupying approximately 12,141 hectares (30,000 acres) (Livieri 2013). By 2009, both ferret and prairie dog populations were decimated by plague. Today, about 119 ferrets (>30 breeding adults) occupy 5,463 hectares (13,500 acres), which are actively protected from plague Livieri 2018). Despite this decline, Conata Basin remains the most successful reintroduction site in all of North America due to its ferret numbers, management strategies (e.g., protection of prairie dogs and ferrets from plague, shooting and poisoning, boundary management zones, and federal land consolidation within the 3.63) and dedicated team of federal and non-federal partners committed to the population's long-term persistence.

There is only one other national grassland in the Great Plains with the biological capacity to replicate Buffalo Gap's contributions to ferret recovery: Thunder Basin. TBNG is unique in that it situated along a transition zone between the Great Plains and the sagebrush steppe. As such, the variety of temperature, precipitation, and elevation gradients that create habitat for over 100 species of birds, ungulates, small mammals, bats, and mesocarnivores (Duchardt and Scasta 2017).
2. The unique capacity of Thunder Basin National Grassland to support complexes of black-tailed prairie dogs
Thunder Basin National Grassland is one of the last best places to support a viable black-footed ferret population. At 221,565 hectares (547,499 acres), it is the third largest national grassland in the United States behind Little Missouri in North Dakota and Buffalo Gap in South Dakota.

TBNG rivals Buffalo Gap in its habitat suitability for black-tailed prairie dogs; both grasslands have the biological capacity to support 100 breeding adult black-footed ferrets because of the abundance and distribution of prairie dogs.

Due to the unique grassland ecosystem and minimal habitat fragmentation on TBNG, prairie dog colonies are distributed in complexes that function as metapopulations (Roach et al. 2011). This grassland evolved with disturbance from prairie dogs, drought, grazing and fire (Samon and Knoph 1994). Prairie dog population connectivity in TBNG's MA 3.63 has enabled the persistence of the species on the landscape despite fluctuations in acreage and density caused by changes in climate and plague outbreaks. Prairie dog populations on the TBNG were drastically reduced by plague in 2002, 2006, 2007, and 2017; yet after each event, populations rebounded because of the metapopulation complexes endemic to this landscape.
3. The essential role of Thunder Basin National Grassland in black-footed ferret recovery
It has never been more important for the Forest Service to reaffirm its commitment to manage TBNG for ferret recovery. The BFF Recovery Plan (at 46) noted the need for additional national grasslands to contribute to ferret recovery:

Support is needed from Federal, State, and local agencies and Tribal governments for prairie dog conservation and management. For example, new recovery projects could be undertaken on National Grasslands in Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas, and Wyoming.

The Forest Service has recognized the important role of the national grasslands in recovery, not just in Conata Basin on the Buffalo Gap National Grassland, but at others, including TBNG. The Biological Assessment and Evaluation for TBNG's 2002 LRMP assessed whether the Grassland could support a viable ferret population, and found,

Estimated current and 5-year ferret carrying capacities for ferrets in this area as determined using 2 different modeling approaches are 162 to 208 (Biggins et al. 1993) and 158 to 204 (U.S. Fish and Wildlife Service et al. 1994) ferret families, respectively. These projections did not include capacity provided by dispersal habitat located outside the reintroduction area. These projections demonstrate that both current and projected carrying capacities for this reintroduction area exceed the viability probabilities of a 50 to 100 year survival period for 90 to 100 ferrets reported by Harris et al. (1989). [hellip] Allocation of this area as black-footed ferret reintroduction habitat represents a significant contribution to the national recovery program [hellip] . (Biological Assessment and Evaluation for Revised Land and Resource Management Plans and Associated Oil and Gas Leasing Decisions 2000 at H-45)

The following excerpt from a letter by Rick Cables (then Forest Service Region 2's Regional Forester) confirmed this commitment, which is included in TBNG's Black-tailed Prairie Dog Conservation and Management Strategy of 2015 (2015 Strategy).

As a part of the Northern Great Plains Land Management Plan revision process, the USFS designated ferret reintroduction sites (in addition to Conata Basin NG) on the Buffalo Gap National Grassland (NG), Little Missouri NG, and the TBNG (USFS 2009 and ROD Appendix B). In a letter dated May 8, 2007, the Regional Forester for Region 2 committed the USFS to providing habitat for future ferret reintroductions and said: "Despite our important contributions to the national recovery program to this point, recovery of the black-footed ferret still remains tenuous at best. Opportunities likely remain for the [U.S.] Forest Service to continue to be a leader in the national recovery effort (Cables 2007)." (2015 Strategy at 29)

The 2015 Strategy (at 29) also noted the importance of ferret recovery on the national grasslands to the USFWS, citing an excerpt from a letter to the Forest Service by the USFWS.

In a letter dated March 16, 2007, the USFWS stated the following: "Perhaps no other agency or entity can contribute to more assured and rapid recovery of the ferret than the [U.S.] Forest Service. Ferret recovery cannot be achieved on National Grasslands alone, but likewise, the establishment of adequate numbers of ferret populations across the historical range of the species may not be possible without concerted support by the [U.S.] Forest Service and expansion of field recovery efforts across more of the [U.S.] Forest Service's vast western holdings. Even with more focused [U.S.] Forest Service Management and development of additional sites for prairie wildlife, the amount of managed land actually required to meet these needs would represent a small percentage of the almost 4 million acres of National Grasslands (USFWS 2007)."
B. Need to manage the Grassland for ecological integrity by complying with requirements in 36 CFR 219.8(a) of the 2012 Planning Rule
The Forest Service has identified 36 CFR 219.8(a) as Planning Rule direction "directly related" to the proposed amendment, and we agree with this determination, which is required under 36 CFR 219.13(b)(5). The substantive requirements in 36 CFR 219.8(a) deal with ecological sustainability; the section notes,

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 (36 CFR 219.8(a)(1))

This requirement is the same as 36 CFR 219.9(a)(1), emphasizing the importance of restoring or maintaining ecological integrity to meet Rule requirements related to wildlife, including at-risk species. Need to consider the broader landscape beyond the Grassland boundaries

In developing plan components for maintaining or restoring ecological integrity for ecosystems, the plan must take into account "[c]ontributions of the plan area to ecological conditions within the broader landscape influenced by the plan area" (36 CFR [sect] 219.8(a)(1)(ii)) and "[c]onditions in the broader landscape that may influence the sustainability of resources and ecosystems within the plan area" (36 CFR [sect] 219.8(a)(1)(iii)). Broader landscape is defined as, "the plan area and the lands surrounding the plan area. The spatial scale of the broader landscape varies depending upon the social, economic, and ecological issues under consideration" (FSH 1909.12, Zero Code, 05). In the proposed amendment and associated analyses in the DEIS and BE, the Forest Service fails to consider ecological conditions, habitats, and key ecosystem characteristics in the plan area that are under-represented across the broader landscape and the effect of outside conditions on the FS ability to manage for integrity.

There is additional guidance in the planning directives, FSH 1909.12, ch. 20, 23.11b:

1.
1. Contributions of the plan area to ecological conditions within the broader landscape influenced by the plan area. When developing plan components the Interdisciplinary Team should consider:

1. Ecological conditions within the broader landscape and how those conditions may be influenced by resources or management within the plan area (FSH 1909.12, ch. 10, sec. 12.14c, paragraph 3).
2. Ecological connectivity at multiple temporal and spatial scales that would provide landscape linkages facilitating the exchange of resources and the movements of species across the broader landscape (FSH 1909.12, ch. 10, sec. 12.14c, paragraph 1).
3. Ecological conditions, habitats, or key ecosystem characteristics in the plan area that are unique, under-represented, or rare across the broader landscape

(FSH 1909.12, ch. 10, sec. 12.14c, paragraph 3).

1.
1. Conditions in the broader landscape that may influence the sustainability of resources and ecosystems within the plan area. When developing plan components the Interdisciplinary Team should consider the ecological conditions in the broader landscape that may influence the sustainability of the plan area and should consider the following:

1. Existing conditions of the broader landscape outside National Forest System boundaries that may influence the plan area's ability to maintain or restore ecological integrity of plan area ecosystems. Such conditions may include habitat fragmentation, land use patterns, resource management, or urbanization

(FSH 1909.12, ch. 10, sec. 12.14c, paragraph 3).

1.
1.
1. Facilitating or mimicking dominant ecological processes and system drivers of the broader landscape, especially those related to fire-adapted ecosystems (FSH 1909.12, ch. 10, sec. 12.3).
2. Collaborating with other land managers across the broader landscape when developing an all-lands approach to planning for ecological resources in a manner that promotes the ecological integrity of terrestrial, riparian, and

aquatic ecosystems in the plan area (FSH 1909.12, ch. 40).

2. Opportunities for landscape scale restoration. When developing plan components regarding opportunities for landscape-scale restoration of ecological integrity the ID team should consider the following:

a. Multiple spatial and temporal scales. The arrangement of ecological conditions, key ecosystem characteristics, and management goals at multiple spatial and temporal scales are important.

1.
1. The ecological role of the plan area within the broader landscape, including capability and condition of terrestrial, aquatic, and riparian systems.

2. Opportunities to compensate for degraded conditions in the broader landscape. [i.e., the absence of ferrets]
3. The broad-scale context of scarcity and abundance, and Agency ability to restore and maintain desired features or conditions that are scarce in the broader landscape (FSH 1909.12, ch. 10, sec. 12.14c, paragraph 3). [i.e., ferrets]
2. Black-tailed prairie dogs, ecological integrity, and ecosystem services
In developing plan components to restore or maintain ecological integrity, the Forest Service must take into account,

System drivers, including dominant ecological processes, disturbance regimes, and stressors, such as natural succession, wildland fire, invasive species, and climate change; and the ability of terrestrial and aquatic ecosystems on the plan area to adapt to change. (36 CFR 219.8(a)(1)(iv))

For the TBNG, this means the management plan must acknowledge the essential role of prairie dog activity as a natural disturbance process and grassland ecosystem driver; not doing so would ignore best available science. Prairie dog presence and activity must be included as part of the NRV for the Grassland. The presence and distribution of prairie dogs within the planning area provide ecosystem services and have a significant effect on species diversity and ecosystem function. They sustain the long-term integrity of the ecosystem by creating and maintaining wildlife habitat, increasing soil moisture infiltration and storage, and vegetative heterogeneity[mdash]including sparsely vegetated and bare ground conditions. As the DEIS recognizes (at 4), prairie dogs are keystone species.
a) Prairie dog colonies as a unique ecosystem
Black-tailed prairie dogs are keystone species and ecosystem engineers. Scientists often refer to the short- and mid-grass prairie grassland area that prairie dogs inhabit as "the prairie dog ecosystem" (Reading et al. 1989; Miller et al. 1990; Mulhern and Powell 1993; Miller et al.

1994; Roemer and Forrest 1996; Mulhern and Knowles 1997; Kotliar et al. 1999; Seery and Matiatos; Lomolino and Smith 2001; List and Macdonald 2003; Bangert and Slobodchikoff 2004; Dinsmore et al. 2005; Bangert and Slobodchikoff 2006; Hanson et al. 2007; Dinsmore and Smith 2010; Biggins et al. 2012; Shipley et al. 2013; Kenney et al. 2016).

The best available scientific information supports the conception of black-tailed prairie dogs as keystone species and ecosystem engineers of short- and mid-grass Great Plains grasslands (Coppock et al. 1983a, b; Detling and Whicker 1987; Whicker and Detling 1988a, b; 1993; Reading et al. 1989; Wuerthner 1997; American Society of Mammalogists 1998; Kotliar et al. 1999; Kotliar 2000; Miller et al. 2000, 2007; Reading 2009; Ceballos et al. 2010; Cully et al. 2010; Davidson et al. 2012; Mart[iacute]nez-Est[eacute]vez et al. 2013; Lacher et al. 2019; Augustine et al. 2019).

Prairie dogs meet these definitions by having ecosystem impacts larger than predicted based on their biomass

(Paine 1980; Terborgh 1988; Mills et al. 1993; Power et al. 1996; Kotliar et al.

1999; Miller et al. 1998/1999).

b) Prairie dog effects on ecosystem structural, compositional, and functional characteristics of Thunder Basin's grassland ecosystem

Prairie dog grazing and burrowing activities have a large effect on vegetation structure, composition, productivity, nutrient cycling, soil quality, and other ecosystem processes (Bonham and Lerwick 1976; Coppock et al. 1983; Detling and Whicker 1987; Whicker and Detling 1988a, b; 1993; Weltzin et al. 1997a; Stapp 1998, Ceballos et al. 2010; Baker et al. 2013; Connell et al. 2019; Gervin et al. 2019; Geaumont et al. 2019). The activities of prairie dogs, especially their grazing and clipping of tall vegetation, result in changes in plant composition (Bonham and Lerwick 1976; Coppock et al. 1983, Detling and Whicker 1987; Whicker and Detling 1988a, b; 1993, Weltzin et al. 1997a; Detling 1998; Ceballos et al. 2010; Gervin et al. 2019). In general, the vegetation on prairie dog colonies is characterized by lower biomass and a greater preponderance of annual forbs and short grasses compared to tall grasses and shrubs, but is higher in nitrogen content than vegetation from surrounding areas (Bonham and Lerwick 1976; Coppock et al. 1983, Weltzin et al. 1997a; Detling 1998, Baker et al. 2013; Connell et al. 2019; Gervin et al. 2019). Kotliar et al. (1999: 177) concluded that collectively these functions are large, not wholly duplicated by other species (either in form or extent), and that the loss of prairie dogs would lead to "substantial erosion of biological diversity and landscape heterogeneity across the prairie."

Prairie dogs provide a number of ecosystem services. In northern Mexico, Mart[iacute]nez-Est[eacute]vez et al. (2013) found consistently higher ground water recharge, lower rates of soil erosion, increased soil carbon storage, improved soil potential, and higher forage availability compared with surrounding areas. Prairie dog burrowing activities modify ecosystem processes such as water, mineral and nutrient cycling. Prairie dogs turn over approximately 225 kg of soil per burrow system, which translates to several tons of soil per hectare (Whicker and Detling 1993). By mixing in nutrient-rich urine and manure, prairie dog digging can change soil composition, chemistry, and microclimate, facilitate below-ground herbivory, increase porosity of soil to permit deeper penetration of precipitation, and increase the incorporation of organic materials into the soil (Ingham and Detling 1984; Whicker and Detling 1988 a, b; Munn 1993; Outwater 1996; Mart[iacute]nez-Est[eacute]vez et al. 2013). As a result, prairie dog colonies support higher numbers of nematodes and higher levels of soil nitrogen (Ingham and Detling 1984, Detling 1998). All of these processes contribute to aboveground plants with a higher nutritional content, greater digestibility, and a larger live plant to dead plant ratio, creating favorable feeding habitat for other herbivores (Whicker and Detling 1993; Connell et al. 2019).

c) Species composition and diversity affected by prairie dogs

Over 200 vertebrate species have been observed on prairie dog colonies (Table 1) (Koford 1958; Tyler 1968; Campbell and Clark 1981, Clark et al. 1982; O'Meilia et al. 1982; Agnew et al. 1986; Reading et al. 1989; Sharps and Uresk 1990; Mellink and Madrigal 1993; Hoogland 1995; Barko 1996; Ceballos and Pacheco 1997; Ceballos et al. 1999; Kotliar et al. 1999, Reading 2009; Davidson et al. 2012, Lacher et al. 2019). Some of these species appear to depend on prairie dog colonies for their survival, several are strongly associated with prairie dogs and their colonies, and many[mdash]perhaps over 100[mdash]benefit from prairie dogs (Reading et al. 1989; Hoogland 1995; Ceballos et al. 1999; Kotliar et al. 1999; Reading 2009; Ceballos et al. 2010; Cully et al. 2010).

For example, mountain plover and horned larks (Eremophila alpestris) benefit from the short stature of the plants on prairie dog colonies. (Dinsmore et al. 2005). Indeed, pronghorn (Antilocapra americana) and bison (Bison bison) preferentially graze on prairie dog colonies (Coppock et al. 1983; Krueger 1986; Detling and Whicker 1993, Detling 1998). Burrowing owls, and likely other species, benefit from the vigilance of prairie dogs, who issue alarm calls when the spot potential predators (Bryan and Wunder 2014).

Prairie dogs and other animals inhabiting prairie dog colonies are prey species for a large number of predators (Reading et al. 1989; Miller et al. 1996; Plumpton and Anderson 1997; Berry et al. 1998; Kotliar et al. 1999; Reading 2009). Prairie rattlesnakes (Crotalus viridis), golden eagles (Aquila chrysaetos), great horned owls (Bubo virginianus), weasels (Mustela frenata), bobcats (Lynx rufus), coyotes (Canis latrans), and others prey on prairie dogs and small mammals that have a higher abundance on prairie dog colonies (Agnew et al. 1986). Species, such as badgers (Taxidea taxus), swift foxes (Vulpes velox), and ferruginous hawks (Buteo regalis), benefit substantially from the presence of prairie dogs as prey (Uresk and Sharps 1986; Sharps and Uresk 1990; Plumpton and Andersen 1997, 1998; Berry et al. 1998; Goodrich and Buskirk 1998). Ferruginous hawks have also been closely associated with prairie dogs for raising their young. Prairie dogs can have a significant effect on their nest site selection, as well as the abundance in nesting pairs and overall productivity of ferruginous hawks in arid grasslands of the American West (Cook et al. 2003). Results from the Cook et al. (2003) study suggest that prairie dogs can have a significant effect on nest-site selection, abundance of nesting pairs, and productivity of ferruginous hawks in arid grasslands of the American Southwest.

A range of species use prairie dog burrows for hibernacula, dens, and nests. Some of these species include black-footed ferrets, swift foxes (Vulpes velox), American badgers (Taxidea taxus), cottontails (Sylvilagus spp.), burrowing owls (Athene cunicularia), shrews, other rodents, and several species of reptiles and amphibians (Reading et al. 1989; Sharps and Uresk 1990; Fitzgerald et al. 1994; Desmond et al. 1995; Kretzer and Cully 2001; Shipley and Reading 2006; van Nimegen et al. 2008; Reading 2009). These species and more also use the burrows as refugia from predators or temperature extremes. As a result, researchers have found that desert cottontails (S. audonbonii) and northern grasshopper mice (Onychomys leucogaster) exist in higher numbers on prairie dog colonies than in surrounding grasslands (O'Meilia et al. 1982; Agnew et al. 1988; Dano 1952 in Stapp 1998, Cully et al. 2010). Similarly, studies in Mexico found higher rodent species richness, density, and diversity, and higher avian species richness on prairie dog colonies compared with surrounding grasslands in Chihuahua, Mexico (Ceballos and Pacheco 1997; Ceballos, et al. 1999; Ceballos et al. 2010). Most of the research to date has focused on birds and mammals. Considerably less research has examined reptiles and amphibians associations with prairie dogs, but those findings were similar; namely, that some species appear to benefit from prairie dog activities, while others are harmed, but overall richness is greater (Kretzer and Cully 2001; Shipley and Reading 2006; and Shipley et al. 2008). Similarly, little is known about prairie invertebrates (but see Bangert and Slobodchikoff 2004; Bangert and Slobodchikoff 2006; Kenney et al. 2016), yet the burrows and altered vegetation in a prairie dog colony should offer habitat advantages to some invertebrates as well.
d) Faulty assumptions in the Draft Environmental Impact Statement about the Grassland reference condition and prairie dogs
The DEIS developed an analysis of rangeland vegetation that has wrongly excluded prairie dog presence and activities as an element of and integral to reference conditions for the TBNG. The analysis seems to be determining that any disturbance that affects forage quantity for livestock is outside of NRV. The proposed amendment does not reflect that the Forest Service fully appreciates the importance of prairie dogs to grassland ecology. Instead of offering alternatives that sufficiently protect prairie dogs and associated species, all action alternatives include plan components the limit the ability for prairie dogs to perform their role as ecosystem engineers. Some of these harmful plan components include caps on prairie dog colony area, density control, and allowances for prairie dog poisoning and shooting across the entire grassland. According to the fossil record, the black-tailed species of prairie dog appeared on the Great Plains over a million years ago and the genera Cynomys is at least 2 million years old (Goodwin 1995). To determine that prairie dog disturbance is not a part of the reference condition for the Grassland defies logic and the best available science information. Yet, this presumption occurs throughout the vegetation analysis in the DEIS. The following statements demonstrate this.

For this analysis, the "representative value" for production of each ecological site's reference plant community was compared to the representative value for production of the vegetative state expected from long-term prairie dog occupation, commonly the "increased bare ground" state or plant community with short-stature vegetation based on target acres for prairie dog occupancy. The reference state and increased bare ground state were chosen for analysis purposes to estimate differences in forage availability among alternatives. (DIES at 70) (footnote omitted; emphasis added)

In a mixed-grass prairie in northern Montana, Johnson-Nistler and others (2004) found prairie dog colonies had increased the presence of warm-season grasses, forbs, and dwarf shrubs, while off-colony sites were dominated by cool-season grasses. Over time, grasses favorable to livestock, such as western wheatgrass and green needlegrass, decrease, and short-stature grasses, such as blue grama and threadleaf sedge, become more established. Ultimately, prairie dog colonies cause increases in bare ground and in grasses and forbs that are undesirable for livestock (Archer et al. 1987). (DEIS at 80)

Plant communities change as prairie dog colonies become more established through time and as population density grows and forage needs increase. In areas recently colonized (less than 10 years), there may be little difference in species composition and production, whereas repeated heavy grazing on older colonies often results in lower overall plant productivity and change in species composition (Johnson and Collinge 2004). Removal of prairie dogs following short-term prairie dog occupation may allow the community to shift back toward the reference plant community, as long as a disturbance threshold has not been crossed. (DEIS at 80) (emphasis added)

Transition pathways included in ecological site description state-and-transition models that capture effects of prairie dog disturbance are heavy continuous grazing with overstocking; long-term continuous grazing without adequate recovery; frequent and severe utilization; and fire, brush management, or both with long-term continuous grazing without adequate recovery during the growing season. For ecological sites occupied by more than 1 percent of the prairie dog population in 2016 and 2017, these transition pathways typically result in increased bare ground and decreased production in plant species most commonly utilized by livestock. (DEIS at 81)

In the loamy ecological site description state-and-transition model, a transition is initiated as a result of frequent and severe utilization during the growing season of cool- season grasses. Continued long-term occupation by prairie dogs will result in a transition to the blue grama sod or blue grama sod/plains pricklypear/bare ground state.

Significant economic inputs, management, and time may be required to move these plant communities toward a more productive stable plant community. The pathway toward the reference plant community is highly variable, depending upon availability and diversity of a viable seed bank of higher successional species within the existing plant community and neighboring plant communities. These plant communities can be altered to improve the production capability, but management changes would be needed to maintain the new plant community (USDA Natural Resources Conservation Service 2001). (DEIS at 82)

Temporary changes to forage quantity rarely have lasting impacts on livestock production; however, a long-term plant community shift to a forb/bare ground- dominated site with decreased overall grass production could have lasting impacts, as described in the ecological site descriptions for the Thunder Basin National Grassland. (DEIS at 83)

Table 11 [see below] shows the estimated differences in available forage and AUMs if current management continues and prairie dogs expand to target acres, and includes estimates that consider a 25 percent harvest efficiency for livestock grazing. The harvest efficiency is the percentage of forage actually ingested by animals from the total amount of forage produced (USDA Natural Resources Conservation Service 2003). (DEIS at 86)

Table 10 clearly distinguishes between a "reference state" and a "disturbed state for ecological site descriptions with prairie dog colonies," with the implication that prairie dogs are not part of the reference state. The table calculates the difference between forage production under the "reference state" and under the state of "frequent and severe defoliation" (i.e., with prairie dog presence).

Tables 9 seems to demonstrate that the state-and-transition modeling results conclude that "bare ground" is a departed state from reference conditions. As we stated above, the purpose of this table is unclear, given the DEIS includes very little explanation regarding the values the tables include. Table 11 clearly shows the vegetation analysis concludes that any presence of prairie dog transitions vegetation conditions outside of reference conditions. Table 11 (DEIS at 86), "Resource indicators and measure for the no-action alternative," is reproduced below:

Table in attachment: Replication of Table 11 in the DEIS

We note the "Target acres occupied by prairie dogs that would transition away from the vegetation reference state" in column 2, row 2 shows the target of 33,000 acres for the No Action Alternative "would transition away from the vegetation reference state" (DEIS at 86, Table 11). Bare ground is indeed within NRV for short- and mid-grass prairie ecosystems and natural heterogeneity of the Great Plains' grassland vegetation.

The analysis is summarized on page 90 of the DEIS as follows:

The following tables [tables 15 and 16] summarize the information presented above for each alternative. The tables display a loss of available forage, calculated as the difference in estimated forage production for an increased bare ground state associated with target acres for prairie dog occupancy compared to the estimated forage production in the same area in reference state. Although forage is presented as a decrease in availability from the reference state, all alternatives would have more forage available than what is estimated for the no-action alternative (table 15 and table 16). The difference is directly proportional to the target acres for prairie dog occupancy. For example, the decrease in forage availability for the proposed action is only 4,839,270 pounds, while the decrease for the no-action alternative is more than three times that amount, 15,969,587 pounds (table 15).

It's just not possible for prairie dog activity[mdash]a natural ecological process[mdash]to transition grassland conditions outside of reference conditions, given that prairie dogs are occupying their natural, historic habitat on the Grassland. The model used to assess the effects of prairie dogs on TBNG vegetation is faulty; it is based on the wrong reference conditions; it also violated 36 CFR 219.3 and 219.9(a).

This faulty analysis is used to justify prairie dog shooting and poisoning in the 3.63/3.67 to reduce prairie dogs to 7,500 to 10,000 acres of colonies specified in the Proposed Action and the removal of current Category 2 and 3 prairie dog protections. Appendix B indicates that density control will be used to move grassland conditions away from a bare ground state, as stated below,

The initial use of lethal density control would be limited to more productive ecological sites such as the loamy and lowland where the likelihood of achieving vegetation objectives is higher. Lethal density control would be considered when grass/forb ratios are shifting towards a community dominated by forbs and increased bare ground. (Appendix B at B-4)
3. Presence of black-footed ferrets as key compositional and functional characteristics of Thunder Basin's grassland ecosystem
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.
C. Meeting the National Forest Management Act's "diversity requirement"

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. Specifically, 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 U.S.C. [sect] 1604(g)(3)(B)). In April 2012, the Forest Service finalized the 2012 Planning Rule, implementing the NFMA (See 16 U.S.C. [sect] 1604, 36 CFR [sect] 219). 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 [sect]

1.

1. 8 and 36 CFR [sect] 219.9 make this principle a mandate. A forest or grassland management plan is intended to be the vehicle that balances these purposes.

The Planning Rule's two-tiered conservation approach (alternatively called the "ecosystem- species" or "coarse-fine filter" planning method) relies on the use of surrogate measures, or key characteristics, to represent the condition of ecosystems, as well as the identification of at-risk species and evaluation of whether those species will be sustained through ecosystem-level plan components or whether they require specific management attention in the form of species- level plan components.

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) and 36 CFR 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.

The concept of ecosystem integrity is used to represent the condition of an ecosystem. When its key ecosystem characteristics occur within the natural range of variation (NRV), an ecosystem is considered to have integrity (36 CFR 219.19). NRV can be thought of as a reference condition reflecting "natural" conditions that can be estimated using information from historical reference ecosystems or by other science-based methods. The 2012 Planning Rule directs the Forest Service to manage key characteristics in light of these reference conditions, for the purpose of sustaining ecosystems and wildlife. For example, some present forest ecosystems have deficits of old-growth trees, compared to historical abundances, and would therefore be considered as having diminished integrity for that key characteristic.

In the case of TBNG, black-tailed prairie dogs are a key compositional characteristic of the ecosystem, and their activities, such as burrowing and clipping vegetation, must be considered key functional characteristics that establish the reference condition for the Grassland. Prairie dogs thus play an essential role in maintaining and restoring ecological integrity[mdash]their activities are a natural ecological disturbance process. Many scientists call the ecosystem prairie dogs create and maintain "the prairie dog ecosystem." This system provides habitat for a host of other species, and prairie dog activities must be a central characteristic TBNG's grassland ecosystem NRV. The Forest Service acknowledges this in the DEIS[mdash]to an extent. The DEIS includes an array of science supporting the consensus among prairie dog experts that prairie dogs are ecosystem engineers. However, a close look at the DEIS effects analysis for "rangeland vegetation and livestock grazing," does not fully incorporate this convention in its conclusions. We discuss this in detail below.

Additionally, the Planning Rule recognizes that managing selected ecosystem characteristics for the diversity and integrity of ecosystems may not sustain populations of all native plant and animal species. The rule therefore requires species-specific plan components, if necessary, to provide the ecological conditions (i.e., habitat requirements) necessary to meet the various conservation requirements for individual at-risk species (36 CFR 219.9(b)(1)). Ecological conditions are not just the biophysical ecosystem and habitat features that the species needs to persist over time, but also other influences on species persistence, including human uses.

The Proposed Action favors livestock grazing over wildlife conservation on the Grassland and may be violating several dictates of the Planning Rule and, thus, NFMA. This is evident from plan components that, for example, intentionally reduce prairie dog populations to a depressed level with mandated poisoning, insufficient shooting restrictions, and the failure to include standards for plague mitigation. Not only does the Proposed Action risk not maintaining the persistence of prairie dogs and some prairie dog associated species, including mountain plovers and burrowing owls, on the Grassland, it does not sufficiently take into account the importance of prairie dog activity as a driver of grassland ecosystem integrity. Moreover, the Proposed Action will preclude black-footed ferret recovery[mdash]not just on the Grassland but range-wide.

1. Need to comply with the requirements of 36 CFR 219.9 of the 2012 Planning Rule

The Forest Service has determined that 36 CFR 219.9 is applicable to the amendment and must therefore meet the section's substantive requirements. The amendment decision document must include a rationale for how those requirements were applied. To fulfill the requirements of section 36 CFR 219.9, plan components added or modified by the amendment must provide the ecological conditions necessary to: 1) contribute to the recovery of federally listed threatened and endangered species; 2) conserve proposed and candidate species, and; 3) maintain a viable population of each species of conservation concern within the plan area. The Forest Service must also address the removal of plan components against these requirements.

The Proposed Action and Alternative 4 do not contain plan components that are sufficient to ensure that the necessary conditions for at-risk species are provided. The EIS must evaluate the effects of those specific plan components on the conditions for at-risk species before the Forest Service can make a lawful determination that the requirements of 36 CFR 219.9 have been met. The DEIS fails to demonstrate that the plan will provide conditions necessary for the recovery and viability of the at-risk species associated with the Grassland.

The ecological conditions that have been deemed necessary to meet the NFMA species diversity requirement as implemented in 36 CFR 219.9(b) must be identified, and then translated into plan components. Planning documents must indicate 1) what the necessary ecological conditions are for each at-risk species 2) the plan components that provide for these conditions, and 3) how the condition will be achieved (either maintained or restored) through the implementation and application of plan components. If relevant for the species, plan components must address ecological conditions other than biological characteristics because the Planning Rule defines the term to include not only habitat but "other influences on species and the environment," including threats such as "human uses" (36 CFR 219.19). In other words, plan components for at-risk species are not limited to the management and protection of habitat conditions.

In order to provide the necessary ecological conditions, the plan components must respond to the factors that are causing substantial concern over the persistence of the planning area population, including factors introduced via the amendment. Plan components must respond to the relevant information concerning the status of at-risk species and address limiting factors, threats, and stressors to each at-risk species (FSH 1909.12, sec. 23.13).

In order to meet the Planning Rule's requirements it is necessary for the Forest Service to provide a logic trail for each at-risk species implicated by the amendment, from its 1) necessary ecological conditions, to 2) specific plan components that are retained, added, modified or removed via the amendment, to 3) conditions that would result from the plan components, to the 4) legal sufficiency of those conditions. The documentation must show that because of the plan components, the at-risk species implicated by the amendment will meet all of the regulatory criteria. Specifically, for SCC viability, the documentation must show that the potential SCC will 1) continue to persist over the long term, 2) with sufficient distribution to be 3) resilient and 4) adaptable to stressors and likely future environments, as per the definition of a viable population in 36 CFR 219.19.

The Forest Service must make clear the relationship between NEPA procedures and NFMA requirements. NEPA requires procedures: the analysis of effects. However, NFMA requires that those effects meet a substantive threshold and that determination should be based on documented analysis found in the EIS. While this analysis may be contained in a NEPA document, it must demonstrate compliance with a substantive legal requirement in NFMA, and therefore requires rigor and certainty that go beyond the disclosure purpose of NEPA. The planning documents must do more than just list or restate the plan components that "support" a conclusion; they must present a reasoned rationale for viability based on reference to specific plan components. Unfortunately, the DEIS and BE have not met this bar.

The EIS must demonstrate that the effects of the amendment on plan components result in providing the necessary ecological conditions for each of the affected at-risk species over time; this includes the affirmative and protective effects of the touted plan components, as well as the effects of all of the other plan components for other uses. This analysis enables the agency to make the key determination that the amended plan is in compliance with NFMA diversity requirements. This determination must be made concerning the persistence of each species identified in accordance with 36 CFR 219.9(b) and must in some way reference and/or summarize the specific rationale and supporting analysis. The effects analysis must produce convincing evidence that implementation of the amended forest plan will provide the amount and distribution of necessary ecological conditions.
a) Contributing to the recovery of the black-footed ferret
The amended TBNG management plan must include plan components that provide the ecological conditions necessary to contribute to the recovery of ferrets (36 CFR 219.9(b)). This section describes the conditions required by ferrets and how each action alternative fails to provide for these conditions. Ferrets live almost exclusively in prairie dog colonies, and prairie dogs make up over 90% of the ferret diet. To summarize, ferrets need the following:

* Large* areas of occupied prairie dog colony habitat.
* Prairie dogs distributed in large* complexes of multiple, closely spaced colonies.
* High* and naturally occurring densities of prairie dogs and prairie dog burrows.
* Annual sylvatic plague mitigation (ferrets and prairie dogs).
* Annual restrictions on prairie dog poisoning and shooting.
* Of course, the terms "high" and "large" are based on contemporary conditions across the black-tailed prairie dog range with a loss in prairie dog occupancy of over 97% since the early 1900s (see Section V.1.b.1 below).

We have identified these conditions based on the best available science found in the recovery plan and other sources and discuss them in more detail below. Scientists have been studying ferrets for decades. While there are always scientific uncertainties and unanswered questions, research has built a considerable knowledge bank about ferret habitat requirements. The BFF Recovery Plan synthesized science from reintroduction sites across the ferret's range. Research conducted at Conata Basin, South Dakota[mdash]the most successful ferret recovery site in black- tailed prairie dog habitat[mdash]should be particularly instructive for TBNG, given some key site and management similarities. Since 2008, periodic plague epizootics have occurred across the prairie dog landscape at Conata Basin and adjacent Badlands National Park. The Conata Basin prairie dog complex sits primarily within the Buffalo Gap National Grassland and also overlaps with Badlands National Park (referred to hereafter as "Conata/Badlands").

Based on the collection of research findings from Conata/Badlands and elsewhere, these are minimum conditions required to sustain a population of 100 breeding adult ferrets on plague- affected black-tailed prairie dog habitat. Any amendment to the TBNG management plan should contain plan components that manage toward these conditions.

(a) Minimum occupied prairie dog colony area

In black-tailed prairie dog habitat where plague is present in the ecosystem, a minimum range of 20,495 - 47,931 acres (average of 33,323 acres) active prairie dog colony area is likely needed to support 100 breeding adult ferrets. And this is assuming annual management measures are taken to prevent the occurrence and spread of plague.

Ferrets require large expanses of occupied prairie dog colonies. Ferret experts recommend calculating the minimum total prairie dog colony area on territory use by one breeding adult female, serving as a proxy for a ferret family group. The following excerpts from the BFF Recovery Plan explain how the habitat area needs of a ferret female were calculated at the time the plan was released in 2013:

Home ranges of female ferrets occupying high density black-tailed prairie dog habitat average approximately 148 ac (60 ha) whereas males average approximately 321 ac (130 ha) (Jachowski et al. 2010, Livieri and Anderson 2012). Territories, a defended area within an animal's home range, average 32 ac (13 ha) for females and 89 ac (36 ha) for males and contain higher burrow densities than the rest of the home range (Livieri and Anderson 2012). (USFWS 2013 at 16-17)

Approximately 75 ac (30 ha) of black-tailed prairie dog occupied habitat or approximately 100-150 ac (40-60 ha) of white-tailed or Gunnison's prairie dog occupied habitat are required to support one female black-footed ferret (Biggins et al. 2006a). (USFWS 2013 at 73)

At Conata Basin, South Dakota, at least 146 adults (including 97 females) were estimated to occur on 21,000 ac (8,500 ha) in 2009. This approximates the previously reported sex ratio. However, this equates to 1 female per 216 ac (88 ha), which is nearly 3 times the acreage anticipated by Biggins et al. (2006a). The reasons for this higher than anticipated acreage include undercounting ferrets, climatic factors, poisoning, and disease. Thus, we conservatively suggest that 225 ac (90 ha) of black-tailed prairie dog habitat per female ferret, or 3 times the 75 ac (30 ha) estimated by Biggins et al. (2006a) and Livieri and Anderson (2012), is appropriate based upon the Conata Basin data. (USFWS 2013 at 73)

Male territories tend to overlap with female territories. The male - female sex ratio is generally 1:2; i.e., a population of 100 breeding adults contains 33 males and 67 females. If 67 females require 225 acres of prairie dog habitat, that equates to at least 15,075 acres to support 100 breeding adults. Male and female territories overlap, and operational sex ratio is 1:2, so 33 males and 67 females require 15,075 acres (67 females x 225 acres). It should be noted that this is under ideal conditions, in an ecosystem without plague. In an ecosystem where plague is endemic (e.g., TBNG) a greater area per adult female would likely be needed in addition to annual plague management (e.g., dusting, vaccination of ferrets).

While the BFF Recovery Plan provides a helpful starting point for calculating the prairie dog colony area needs of ferrets, much of the science was compiled before plague really took hold as a constant presence at Conata/Badlands and elsewhere in the ferret range. These figures may only apply in ideal conditions where plague is absent or where plague is diligently controlled with ferret vaccination and applications of pulicides (flea killers) or other effective tools to colonies to protect prairie dogs from plague-infected flea bites. Shoemaker et al. (2014) suggest that areas of 222,400 ac (90,000 ha) may be necessary to support a sustainable population of ferrets in plague-affected landscapes, unless there is effective plague control.

Recent empirical data from Conata/Badlands ferret surveys provide an enhanced understanding of the extent of prairie dog colony area required by ferrets in a plague-affected landscape where plague prophylaxes measures are taken annually for both prairie dogs and ferrets. We used the number of prairie dog colony acres surveyed per year divided by the reported number of adult females identified annually by the Forest Service, National Park Service, and partners in their annual ferret report (Livieri 2014, 2015, 2016, 2017, 2018, 2019) to calculate the actual prairie dog colony acres per adult female; see table below. The Conata/Badlands data constitute the best available science and should inform TBNG management.

Table in attachment: Annual estimates of Conata/Badland's black-footed ferret population and associated acres per female

As the table illustrates, an average of 496 acres and possibly over 700 acres of black-tailed prairie dog habitat in some years is required to support an adult female ferret. And, thus, a range of 20,495 acres (305.9 acres x 67 adult female ferrets) in "good" years and 47,931 acres (714.4 x 67) in "bad" years with an average of 33,323 acres of occupied prairie dog colony area. This natural fluctuation and variation is needed.

Each action alternative includes a standard that caps 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 caps 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 or 3 would be able to support a self- sustaining population of ferrets[mdash]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. The Category 1 area would not be able to support a ferret population with 100 breeding adults and would not likely to be able sustain a ferret population of any size over the long-term.
(b) Prairie dog distribution within colony complexes
To support ferrets, prairie dog colonies must be 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). Thus, 20,495 - 47,931 acres minimum of prairie dog habitat should be distributed within a 7 km complex that contains multiple, subcomplexes of prairie dog colonies.

The prairie dog complex habitat configuration enables regular ferret dispersal between colonies, which facilitates genetic diversity (Forrest et al. 1985). The inter-colony distance parameter of 4.4 miles is based on observations of maximum nightly movement of ferrets (Richardson et al. 1987; Biggins et al. 1993). Biggins et al. (2006b) introduced the subcomplex definition based on observations of ferret movements between colonies; they found ferrets rarely move more than 0.9 mi (1.5 km) between colonies.

Although the 7-km [4.4 mi] complex remains a useful construct, we propose additional, smaller-scale evaluations that consider 1.5-km [0.9 mi] subcomplexes. The original model estimated the carrying capacity of complexes based on energy requirements of ferrets and density estimates of their prairie dog prey. Recent data have supported earlier contentions of intraspecific competition and intrasexual territorial behavior in ferrets. We suggest a revised model that retains the fixed linear relationship of the existing model when prairie dog densities are <18/ha and uses a curvilinear relationship that reflects increasing effects of ferret territoriality when there are 18-42 prairie dogs per hectare. (Biggins et al. 2006b at 143)

The idea is to have a large "7-km complex" that contains multiple "1.5-km subcomplexes" to form a metapopulation to enable frequent exchange of ferrets within a subcomplex and regular exchange of ferrets between subcomplexes.

None of the action alternative 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) High densities of prairie dogs and prairie dog burrows
As inferred in the subsection above, ferrets require prairie dog colony complexes with high prairie dog densities and high prairie dog burrow densities (Biggins et al. 2006b; Eads et al. 2011; Livieri and Anderson 2012; USFWS 2013; Eads et al. 2012). Higher prairie dog densities within a colony lessen the distance ferrets have to move to find a meal, which conserves energy that may be needed for other activities such as defending territory from other ferrets, fleeing predators, grooming, or rearing kits. Ferrets tend to select for the highest burrow density areas within a complex. Higher densities of prairie dog burrows provide ferrets with more escape routes from predators (Eads et al. 2014).

Livieri (2007 at 56) found that 4 adult females in Conata Basin centered their territories on high density prairie dog areas that contained 46-68 prairie dogs/hectare (or 147-214 active burrows per hectare). Jachowski (2007 at 18) reported that high density prairie dog burrow patches in UL Bend National Wildlife Refuge, MT contained 84-89 active burrows per hectare, while high density areas in Conata Basin contained 197-210 active burrows per hectare. Eads (2009 at 30), studying BFF resource selection in Conata Basin, reported prairie dog density of 41 prairie dogs per hectare on the study colony that supported 12-14 adult black-footed ferrets. All three studies concurred that ferrets selected for high density prairie dog areas that were critical to the survival and persistence of the population.

Prairie dog densities should be allowed to fluctuate naturally within the environment to allow the full range of density values that contribute to wildlife, including the endangered black- footed ferret. Each action alternative 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) Sylvatic plague mitigation
Annual plague mitigation is requirement to maintain adequate prairie dog habitat, including a mix of flea control in prairie dogs and ferret vaccination. The BFF Recovery Plan states,

We believe that the threat from plague can be ameliorated by insecticidal dusting, ferret vaccine, prairie dog vaccine, and the maintenance of more reintroduction sites. Ferret recovery objectives could then be achieved despite periodic losses to plague. (USFWS 2013 at 34)

The successful establishment of black-footed ferret recovery sites that result in the eventual downlisting and delisting of the species will require coordinated management of prairie dogs including: (1) management of plague by control of flea vectors that transmit it and use of appropriate vaccines; [hellip] (USFWS 2013 at 48)

Unlike many other mustelids, ferrets are susceptible to plague, and animals who contract plague have a high probability of dying from the disease (Williams et al. 1994; Rocke et al. 2006). So, plague not only threatens their prairie dog prey but is also a direct threat.

Sylvatic plague abatement measures offer some of the most important protections for prairie dogs and ferrets. While much progress has been made, there is currently no singular strategy that offers comprehensive assurances that colonies will not succumb to sylvatic plague. For the foreseeable future, a diverse and well-timed sylvatic plague management strategy will be key to maintaining prairie dog colonies in strategic conservation areas, where they can play their role as a keystone species. The use of several plague abatement tools, with careful consideration of timing both in delivery and for longer-term annual diversification will likely offer the best plague management (Poch[eacute] et al. 2017; Tripp et al. 2017; Tripp et al. 2018; Eads et al. 2018; Eads et al.

2019).

Highly effective in mitigating sylvatic plague in black-footed ferret and prairie dog populations is the use of 0.05% deltamethrin (trade name DeltaDust[reg]; Seery et al. 2003; Biggins et al. 2010; Matchett et al. 2010). Another product being evaluated to curtail plague in prairie dogs to advance black-footed ferret recovery is systemic 0.005% fipronil on grain.

Deltamethrin has been commonly used since the early 2000's by land managers in North America to reduce flea populations within prairie dog burrow systems and on prairie dogs to advance recovery of black-footed ferrets. Fleas are the vector of the non-native disease, sylvatic plague, which is lethal to black-footed ferrets and their prairie dog prey (Cully 1993; Gage and Kosoy 2006; Abbott and Rocke 2012). Preventing the occurrence of plague in prairie dog populations occupied by black-footed ferrets annually is essential in the survival of both species. Dusting burrows with deltamethrin has proven effective in suppressing the fleas that transmit plague, which is why it is one of the most effective tools for conserving black-footed ferret and prairie dog populations (Seery et al. 2003; Biggins et al. 2010; Matchett et al. 2010). In addition, it is the only plague mitigation tool currently available with no documented negative impacts to black-footed ferrets and their prairie dog prey.

Eads et al. 2018 observed that fleas developed resistance to deltamethrin after it was applied consecutively for six years on two prairie dog colonies in South Dakota. Because of this discovery, additional tools are needed to manage plague to restore black-footed ferret populations. Systemic 0.005% fipronil on grain is being evaluated as another tool to curtail fleas on prairie dogs at study sites in South Dakota. Systemic fipronil grain is attractive because the insecticide is not sprayed into burrows (like deltamethrin is) and may reduce effects on non- target species.

Though each action alternative includes a guideline to allow plague mitigation, none contain a standard that would mandate plague prevention. Without standards that assure 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) Prairie dog poisoning and shooting restrictions

Potential ferret reintroduction areas should be protected from prairie dog poisoning and shooting year-round. We discuss these threats in more detail in Section VI.C.1.b. To help summarize, the BFF Recovery Plan stated the following about prairie dog shooting:

Depending on its intensity, shooting can negatively impact local prairie dog populations (Knowles 1988, Vosburgh and Irby 1998, Keffer et al. 2000), and the resulting loss in prey base likely affects black-footed ferret reintroduction sites (Pauli 2005, Reeve and Vosburgh 2006). In Conata Basin, prior to the establishment of shooting closures within the ferret recovery area, an estimated 75 percent of the prairie dog population was reduced by recreational shooting (U.S. Fish and Wildlife Service 1998). Recreational shooting not only reduces the number of prairie dogs in a colony, but also decreases prairie dog density (Knowles 1988), occupied acreage (Knowles and Vosburgh 2001), and reproduction (Stockrahm 1979). (USFWS 2013 at 27)

The TBNG 2015 Strategy (at 6-7) stated,

Recreational shooting of prairie dogs on the TBNG depresses colony productivity and health, fragments populations, and can reduce recovery of colonies from plague (Luce 2006). Shooting of prairie dogs can also reduce population densities, diminish body condition and reproduction, cause behavioral changes, and increase emigration (USFWS 2009). Non-target scavengers and predators have an increased potential of lead poisoning from consuming prairie dogs containing lead shot (Pauli 2005; USFWS 2009).

And that 2015 Strategy (at 7) stated of poisoning, Toxicants can kill non-target species other than prairie dogs such as granivorous birds, insects, and mammals, as well as scavengers that consume poisoned prairie dogs (Forrest and Luchsinger 2006). Anticoagulants, such as Rozol and Kaput, pose risks of secondary poisoning to non-target wildlife (USFWS 2009).

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 poisoning and shooting. Ferret habitat has to be protected from poisoning and shooting to enable the size of colonies and densities of prairie dogs sufficient to support a viable ferret population.
b) Maintaining the viability of potential species of conservation concern
1. Black-tailed prairie dog

Below, we will discuss in more detail the DEIS's effects analysis of the action alternatives on prairie dogs, but we disagree with the effects determination for the prairie dog under the Proposed 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. DEIS (at 110, Table 24)

This statement is inaccurate. The purpose of the proposed amendment is to substantially lessen protections for prairie dogs. The level of prairie dog poisoning and shooting enabled by the Proposed Action and other action alternatives are intended to have population-level impacts, keeping the prairie dog population on the Grassland unnaturally low. This, combined with the inevitability of future plague epizootics and the lack of plague mitigation standards in any action alternative, could lead to extinction across the Grassland. Adopting any of the action alternatives may indeed result in the loss of prairie dog persistence in the plan area.

One of the most profound inaccuracies in the DEIS and BE is the notion that prairie dogs are resilient to the myriad threats the species experiences and the synergistic impacts of these combined threats (DEIS at 4; BE at 163). After identifying threats, particularly poisoning, plague, and shooting[mdash]which have helped, along with permanent habitat destruction, hammer the species down to a mere 2-3% occupancy of its historic range, based on the 2009 USFWS BTPD "not warranted" finding (74 Fed. Reg. 63343)[mdash]the BE states,

Despite the severity of these threats and the associated precipitous population declines, colonies are highly resilient to complete eradication. Some individuals can survive plague epizootics, allowing for later colony recovery, and complete eradication by rodenticides occurs only after systematic, annual use in an area. Following an epizootic or poisoning, prairie dogs can reproduce and recover relatively quickly.

Though some prairie dogs may survive plague epizootics, plague can kill off 100% of the prairie dogs in a colony (Miles et al. 1952; Barnes 1993; Cully and Williams 2001, Collinge et al. 2005a, b; Antolin et al. 2006; Holmes et al. 2006; Griebel 2009, Cully et al. 2010; Tripp et al. 2016).

Black-tailed prairie dogs reproduce slowly. In fact, Dr. John Hoogland, one of the foremost experts on prairie dogs, studied black-tailed prairie dog reproduction and entitled one of his papers, "Black-tailed, Gunnison's, and Utah prairie dogs reproduce slowly" (Hoogland 2001).

Quick or any recovery from plague is not assured; recovery is dependent on post-plague prairie dog survivorship, in-migration from nearby colonies, and habitat conditions, which can vary.

The BE references some key scientific sources in the "Range-wide Information, Distribution and Abundance" section on page 163. However, the BE text reflects that the Forest Service does not fully understand and appreciate the implications of several of these sources, which indicate that the black-tailed prairie dog is not resilient to the threats it faces. For example, the BE makes the following statements:

Range contractions and population declines have occurred since the late 19th century. Population declines have been especially pronounced in the southwestern edge of the range, and the current range is restricted to the east of the Rocky Mountains. (BE at 163)

Within the current range, colonies are greatly reduced in area and are more fragmented than historical populations (Van Pelt 1999, Lomolino and Smith 2001, Knowles et al.

2002). (BE at 163)

While individual colonies could often rebound due to incomplete poisoning or later immigration from neighboring colonies, complete eradication occurred after systematic, repeated poisoning in Arizona and southwestern New Mexico (Oakes 2000). (BE at 166)

What the USFWS concluded about the black-tailed prairie dog in 2000 is still true today:

It might be assumed that the persistence of the black-tailed prairie dog as a species is secure because it is relatively abundant in absolute numbers when compared with many other species with smaller populations that are not thought to be vulnerable. Many wildlife species in North America that have experienced significant population declines remain viable, e.g., various game species such as the pronghorn (Antilocapra americana). However, the black-tailed prairie dog is a highly social species that for the most part responds to major factors causing population reductions (e.g., plague and control) as a colony rather than on an individual basis. Additionally, inadequate regulatory mechanisms are in place for the black-tailed prairie dog as compared to game species. Therefore, populations may not be as viable as their absolute numbers might suggest. (65 Fed. Reg. 5476)

The BE (at 163) notes that the USFWS estimated the species' total area across its historic range dropped from 80 to 104 million acres down to about 2.4 million acres[mdash]a 97% loss (citing the USFWS "not warranted" finding for the BTPD, 74 Fed. Reg. 63347). That is equivalent to an area between the size of New Mexico and California, the fifth and third largest states in the US, respectively. In 2015, McDonald et al. (2015) provided an estimate of 1,932,826 acres of total BTPD colony area across the US range. The methodologies used for the surveys differed, and the difference between the 2009 and 2015 counts cannot be interpreted as a trend. The point is that both surveys, using different survey protocols, found the same thing[mdash]a huge lose in prairie dogs.

The BE also notes that "colonies can grow to vast sizes, with recorded areas of nearly 80,000 acres in the 1980s and historical estimated sizes ranging into the tens of millions of acres in the early 20th century (Avila-Flores et al. 2012; Schmidly and Bradley 2016)" (BE at 164). The point should not be that 80,000 acres is a vast size for a colony; the message should be that 80,000 acres is miniscule compared to historic colony sizes.

One disturbing indicator for prairie dogs is the trend in losses of large colony complexes. The USFWS identified 7 significant complexes in its 2000 Warranted but Precluded Finding (65 FR 5476: 5487), stating,

A significant portion of existing black-tailed prairie dog occupied habitat rangewide occurs in a few large complexes. Using current estimates of occupied habitat for the species and information about the size of the seven large remaining prairie dog complexes from the Service's black-footed ferret recovery program, it may be determined that 36 percent of the remaining occupied habitat for the species in North America occurs in seven complexes larger than 10,000 acres (4,000 hectares). These complexes include[mdash]Buffalo Gap National Grassland, Conata Basin, South Dakota (approximately 15,000 acres/6,000 hectares); Cheyenne River Sioux Tribe Reservation, South Dakota (approximately 45,000 acres/18,000 hectares); Fort Belknap Reservation, Montana (approximately 15,000 acres/6,000 hectares); Janos Nuevo Casas Grandes, Mexico (approximately

90,000 acres/36,000 hectares); Pine Ridge Reservation, South Dakota (approximately 20,000 acres/8,000 hectares); Rosebud Sioux Tribe Reservation, South Dakota (approximately 70,000 acres/28,000 hectares); and Thunder Basin National Grassland, Wyoming (approximately 20,000 acres/8,000 hectares). The potential vulnerability of these complexes to control efforts or plague is notable.

Four of these complexes dropped below 10,000 acres years ago and have yet to fully recover, even with active plague mitigation at one site (Fort Belknap). During the most recent ferret surveys, researchers found 4 of these complexes to be less than 3,000 acres (USFWS 2019).

*
* Fort Belknap, MT: 1,700 acres
* Cheyenne River, SD: 1,500 acres
* Janos, Mexico: 0 acres
* Rosebud, SD: 2,500 acres

Pine Ridge Reservation still hosts substantial prairie dog acreages, and Conata Basin, which has 13,576 acres (USFWS 2019) conducts annual plague mitigation to protect this ferret recovery site. Both Pine Ridge Reservation and Conata Basin are both, notably, on the eastern edge of the "plague range." Of course, TBNG's last prairie dog count was 625 acres, but after an historic high recorded in 2017 of over 48,000 acres, and the complex has experienced volatile fluctuations since plague hit the region. These fluctuations could be ameliorated with annual plague mitigation.

The 2015 Strategy reported TBNG has 128,282 acres of potential prairie dog habitat (2015 Strategy at 19, Table 2). Even when prairie dog area reached its peak in 2017 at 48,346 acres, this was only 38% of available potential prairie dog habitat on the TBNG. The prairie dog acreage targets (not caps) in the current plan constitute 25% of that potential habitat, with 14%, in the Category 1 Area, being completely protected from poisoning and shooting and an additional 7% in the Category 2 Area protected from poisoning. The Proposed Action prairie dog colony size target/cap in the proposed MA 3.67, 7,500 - 10,000 acres is 6-8% of the available potential habitat.

The Proposed Action reduces the area protected from prairie dog poisoning and shooting from 65,074 acres (Cat 1 + Cat 2) in the No Action Alternative to 0 acres (if 10,000- or 7,500-acre prairie dog targets are met) and reduces prairie dog objective acres protected from poisoning and shooting from 27,000 acres (Cat 1 + Cat 2) in the No Action Alternative to 0 acres (if 10,000- or 7,500-acre prairie dog targets are met).

Subtracting the size of the proposed MA 3.67 from the areal extent of potential habitat, this leaves 92,915 acres of potential habitat completely unprotected from poisoning and shooting, if the Forest Service designates no satellite colonies, which the agency is not required to designate. It is possible that the Proposed Action could result in far fewer than 7,500 acres of prairie dogs across the entire Grassland, since plague mitigation is not mandated in the plan components. 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.

The ecological conditions most required to maintain BTPD viability include plague mitigation and protection from poisoning and shooting. Poisoning and shooting will increase under all action alternatives and the current poisoning and shooting prohibitions in MA 3.63 will be lost under all action alternatives with the transition to the proposed MA 3.67. Without mandatory plague mitigation, TBNG colonies will continue to experience wild population fluctuations, with the possibility of not being able to recover to former sizes.
(a) Vulnerability of Prairie Dogs to Existing Threats
Despite their relatively wide-ranging distribution across most of the Great Plains, black-tailed prairie dogs are not particularly adaptable. They require specific plant species for forage and short vegetation. They normally do not

establish colonies on slopes greater than 10%. Specific soil types are necessary to maintain their burrow structures. They require large open areas, free of visual obstructions in order to see predators.

Historically, large colony complexes were common throughout the species range with a mix of smaller and larger isolated colonies interspersed among large complexes. Thus, black-tailed prairie dog populations/colonies are distributed in "metapopulations," defined as aggregates, often shifting mosaics, of fluctuating or temporary populations linked together by migration (Hanski et al. 1996; McCullough 1996; Hanski and Simberoff 1997; Primack 1998). A complex consists of 2 or more colonies, where the colonies are no more than 7 kilometers (4 miles) apart to facilitate male dispersal; subcomplexes consist of 2 or more colonies 1.5 km apart (0.9 miles) (USFWS 2013). To maintain genetic diversity, yearling males disperse while females remain in their natal coterie for life. Male dispersal distances average 2-3 kilometers (1-2 miles), but they have been known to travel up to 6-10 kilometers (3.7-6.2 miles).

Black-tailed prairie dogs live in "coteries"[mdash]territorial family groups that normally comprise 1 male and several related female adults along with juveniles. They reproduce slowly, which is a barrier to recovery (Hoogland 2001). Unlike many other rodents, breeding females have just 1 litter per year. Litter sizes range from 1-8 pups at birth, but the average size at 6 weeks is 3.

Primary natural causes of mortality include: predation, infanticide, and the inability to survive the winter. If they survive their first year, a male will average a 2-3-year lifespan and a female 4- 5 years.

Coteries are aggregated into colonies or towns that could historically extend for 10s of kilometers in all directions. Colony densities vary seasonally (with highest densities in the spring when the pups first appear) and from year to year depending on forage availability, climatic conditions, predation, disease (particularly sylvatic plague), and anthropogenic threats including shooting and poisoning.

Coloniality has its costs and benefits. Prairie dogs share the responsibility for detecting predators, so everyone gets to spend more time eating. Prairie dogs have a sophisticated language that includes a wide variety of alarm calls to distinguish various predator types (Slobodchikoff et al. 1991; Placer and Slobodchikoff 2000). This enables individuals to determine the best response to avoid being eaten without using excessive energy. However, close proximity also facilitates the spread of disease by passing around fleas, ticks, and lice and spreading communicable diseases pneumatically. Large colonies tend to foster more aggressive behavior between individuals, resulting in injuries and sometimes death. Juveniles in large colonies are also more likely to succumb to infanticide by relatives, particularly lactating females.

The colony complex system represents an important adaptation for species survival. It enables the repopulation of a colony whose inhabitants disappeared due a catastrophic event, via immigration from other nearby colonies. This is an example of a "rescue effect"[mdash]the ability of a healthy species population or subpopulation to rebound in the face of stochastic occurrences (Brown and Kodric-Brown 1977; Harrison 1991). Eradication programs and habitat destruction largely broke apart the colony complex aggregation pattern across the Great Plains and Chihuahuan Desert grasslands. Just a handful of these complexes remain today. Thus, black- tailed prairie dogs are extremely vulnerable to catastrophes because their colonies have become generally isolated and fragmented.
(b) Sylvatic plague impacts to prairie dogs
As the Forest Service stated, sylvatic plague is a non-native disease. It was unintentionally introduced by humans in the early 1900s and had spread from California to the Great Plains by the 1940s. The Forest Service's own interpretation of the science indicates this:

Plague and poisoning have fundamentally changed the distribution of black-tailed prairie dog across its range. Repeated plague outbreaks and poisoning can fragment colonies and isolate them from the potential dispersal range of neighboring colonies (Vanderhoof et al. 1994, Cully et al. 2010). This fragmentation has compounded the initial deleterious effects of population loss by resulting in lost genetic diversity within those isolated populations (Trudeau et al. 2004). Extreme inbreeding in isolated colonies could potentially result in genetic drift and eventual extinction of isolated colonies (Wilcox and Murphy 1985, Hoogland 2006). BE at 166

As asserted throughout these comments, without a plague standard that mandates mitigation, the viability of prairie dogs on the Grassland cannot be assured

(i) Sylvatic plague in prairie dogs

While, plague has been documented to have infected >200 species, prairie dogs can suffer large-scale catastrophic losses due to low immunity as it is a non-native disease (Cully et al. 2010; Eads and Biggins 2015). While sylvatic plague ecology is still not fully understood in terms of maintenance and transmission, often when plague has invaded an area it remains on the landscape and becomes an endemic resident that often features cycles of severe outbreaks interspersed with maintenance periods (Biggins and Eads 2019).

Losses from plague can reach 100% of the prairie dogs in a colony and can spread quickly across the landscape to infect other colonies (Miles et al. 1952; Barnes 1993; Cully and Williams 2001, Collinge et al. 2005a, b; Antolin et al. 2006; Holmes et al. 2006; Griebel 2009, Cully et al. 2010; Tripp et al. 2016). These landscape scale losses have included prairie dog colonies at TBNG that have suffered extensive reductions of 89% of colonies from plague in the past (Thiagarajan et al. 2008). More recently, TBNG colonies have experienced colony collapse of 99% from sylvatic plague during late 2017-2018 (USDA 2019). Cully and Williams (2001: 895) summarized some of the impacts of plague to prairie dogs:

Some of the important consequences of plague in prairie dogs are local extirpation of colonies, reduced colony size, increased variance in local population sizes, and increased distances between colonies [hellip] . The impacts of plague reduce the effectiveness of dispersal in demographic rescue among colonies and increase the probability of extinction of entire complexes.

The periodic epizootic episodes that lead to colony collapse and decimated prairie dog complexes are the most dramatic manifestation of sylvatic plague because of the rapid loss or complete extirpation of prairie dog colonies. Recovery from epizootic events is not guaranteed and, often, colonies subject to plague will not reach pre-plague populations (Hartley et al. 2009; Culley et al. 2010). Hartley et al. (2009) found that within a 15-year period, 98% of the colonies experienced an epizootic event (73% within 10-years) and of those colonies, nearly half of the colonies remained inactive 5 years following the epizootic event, and 56% of the colonies did not reoccupy the pre-plague footprint within 10 years of the epizootic event.

In addition to the catastrophic losses that occur during epizootic outbreaks, prairie dogs also experience deleterious effects from sylvatic plague while it is in a lessened or enzootic phase. While the maintenance of the bacterium Y. pestis is not definitively known, there are theories that it could be maintained in the soil, maintained in reservoir mammal species in which sylvatic plague is not lethal, persist within fleas, or be transmitted at low levels among highly susceptible prairie dog individuals, none of which is necessarily mutually exclusive (Biggins et al. 2010; Biggins and Eads 2019). Prairie dog survival rates were reduced by 40% with enzootic plague that was not accompanied with noticeable prairie dog die off (Biggins et al. 2010), similarly, enzootic plague has been found to decrease survival rates of black-footed ferrets by 240% (Matchett et al. 2010). Plague has infiltrated all states within the range of the black-tailed prairie dog (USFWS 2009; Mize and Britten 2016) and associated chronic mortality with enzootic plague likely limits prairie dog recruitment and expansion throughout the range.

Because of the relatively recent arrival of plague to North America and even later to the black- tailed prairie dog range (Ecke and Johnson 1952; Miles et al. 1952; Cully et al. 2000), black- tailed prairie dog populations have not evolved adaptations to the disease that allow them to withstand recurring epizootics and enzootic sylvatic plague.

(ii) Spatial dynamics and plague

Spatial dynamics present a complex facet to the ecology of prairie dogs in the face of sylvatic plague. The complex and not fully understood nature of sylvatic plague maintenance and cyclical epizootic outbreaks adds to the complexities of the exotic disease in a spatial framework. One poignant disjunct is that large, densely-populated colonies that are well- connected to form large prairie dog complexes are likely the ones that offer the most conservation value as these complexes are able to host the suite of prairie dog obligate and associated species, such as the black-footed ferret, but these same attributes may also lead to increased vulnerability to catastrophic losses to sylvatic plague (Shoemaker et al. 2014).

While some research indicates that plague may be less of a risk to isolated colonies of black- tailed prairie dogs (Cully et al. 2010; Savage et al. 2011; Eads and Biggins 2017), but there are other sites that indicate that sylvatic plague is maintained within a colony, in which case isolation may not provide any lessened threat from sylvatic plague (Matchett et al. 2010).

As the prairie dog range has become afflicted from sylvatic plague in a general west-to-east progression, with not all complexes being in the plague range at the same timeframe, it has provided the opportunity to elucidate some dynamics that are associated with the presence of sylvatic plague. Amongst colonies found within national grasslands (prior to the presence of sylvatic plague at all sites as is the case now), the colonies that were within plague regions were smaller, further from nearest neighboring colonies, and the proportion of habitat inhabited was smaller than those complexes that were not yet impacted by sylvatic plague (Cully et al. 2010). Conata Basin, South Dakota on the Buffalo Gap National Grassland, which was one of the study sites that was previously a non-plague complex in the aforementioned study, has since become invaded by sylvatic plague and similarly, colonies are much smaller and occupy smaller proportions of habitat (Griebel 2009). We know that small populations are vulnerable to permanent extinction from other threats, including habitat destruction, extermination, and shooting. The change from larger, less isolated colonies to small, isolated colonies as a result of plague may have an impact on the ecology of black-tailed prairie dogs and their ability to recover from plague epizootics. Smaller, more isolated colonies may be less susceptible to plague (Cully and Williams 2001; Cully et al. 2010; Eads and Biggins 2017). But Cully et al. (2006:163) point out, "Today's population structure is almost certainly not an evolved response to combat plague, however[mdash]but rather is the inevitable consequence of poisoning, loss of habitat, and plague itself." Trudeau (2002) demonstrated that colonies exposed to plague had significantly reduced heterozygosity, or genetic diversity, which can lead to inbreeding depression and inability to adapt to environmental change. At a site where a plague epizootic event eliminated all prairie dog colonies except for 3 that were treated with deltamethrin and presumably avoided collapse because of the plague abatement measure, researchers found that the remaining dusted colonies gene flow increased post-epizootic, indicating that remaining colonies likely act as refugia both physically and genetically (Jones et al. 2012).

Persistence of the BTPD in plague areas may depend on recolonization after local extinction, according to Antolin et al. (2002). The degree to which genetic flow can occur is, however, limited by the distance that prairie dogs will disperse (Jones et al. 2011). Knowles (1985) found that BTPDs disperse no more than 6.2 miles (10 km) from their natal colonies, therefore towns separated by more than this distance may not recover from plague epizootics. Most BTPD migration, however, appears to occur at distances less than 5 kilometers (3.1 miles) (Antolin et al. 2006) Additionally, the dispersal of BTPDs can be affected by anthropogenic and natural barriers. Unrestricted colonies have been shown to have increased dispersal rates as local food availability decreases (Garret and Franklin 1988). However, in studies in Phillips County, Montana and Boulder County, Colorado, it was found that barriers such as roads, rivers, and lakes can limit BTPD dispersal (Johnson and Collinge 2004; Collinge et al. 2005b). The long-term implications of this finding are not clear. Reduced dispersal may lead to increased density in colonies. Dense colonies have been shown to be more susceptible to plague outbreaks. Should plague epizootics occur, however, recolonization and recovery of isolated colonies may be limited. Recolonization of historically occupied prairie dog colonies occurs, albeit not in all cases and for some colonies after extended years of absence and rarely to pre-plague numbers (Hartley et al. 2009), but sylvatic plague also seems to cause accelerated shifting of some prairie dog colonies on the landscape (Augustine et al. 2008).
(iii) The influence of weather and climate
Weather and climatic regimes likely influence sylvatic plague dynamics through different mechanisms. As fleas

are a vector for sylvatic plague, weather can directly impact the number of fleas that can be found on their prairie dog hosts, which has implications for disease transmission and outbreaks of epizootic events. Higher densities of fleas within prairie dog colonies have been documented with dry conditions in 4 species of prairie dogs, including BTPD (Eads et al. 2016; Eads and Hoogland 2016; Eads and Hoogland 2017), which can seem counter- intuitive to laboratory research that has indicated that fleas have lowered survival rates from dry conditions. It is likely that the burrow system that prairie dogs construct and maintain offer a climatic refugia by providing relatively stable temperatures to fleas even during dry, hot conditions that otherwise could be detrimental to flea populations (Biggins 2012; Eads and Hoogland 2016). Another study with 5 BTPD sites throughout the range found that flea abundance was highest during intermediate weather and climate levels, no drought conditions were encountered during the study period and the flea collection at the sites were not inclusive of all seasons (Russell et al. 2018). Cumulatively, research indicates that weather conditions influence flea abundance and as sylvatic plague is a vector-borne disease, the conditions that lead to ideal flea conditions is of importance for conservation and management considerations for the prairie dog ecosystem.

Drought conditions likely lead to lowered forage availability and quality, which in turn can lead to lowered body condition and behavioral allocations can shift; thus, creating a cumulatively lowered immunological response and potentially a heightened risk to sylvatic plague epizootic outbreaks. Eads et al. (2016) found that during a drought period, fleas were 200% more abundant than during non-drought periods during which prairie dogs were in 27% better body condition and spent 287% more time grooming, with 40% fewer fleas on the prairie dogs. Over 13 years of data collected from a single prairie dog colony, adult prairie dogs with higher body mass consistently had higher flea loads than those with lower body mass, presumably due to weakened defenses against fleas (Eads and Hoogland 2016). In this same system, it was suspected that during forage-limited times associated with dry years, prairie dogs had weakened defenses, both immunological and behaviorally against fleas (Eads and Hoogland 2016). Epizootic, wide-spread sylvatic plague events have erupted following dry periods, or wet periods that were directly preceded by drought conditions (Eads and Biggins 2017; Stephens et al. 2017). Other sites in Colorado have shown that wet summers tend to facilitate epizootic conditions (Savage et al. 2011).

Climate change is likely impacting sylvatic plague dynamics within the prairie dog range. As previously described climatic regimes hold influence over flea abundance and forage quality and quantity, which likely influences flea loads through both behavioral and immunological means. For example, anticipated increases in drought conditions in the Northern Great Plains have led to hypotheses that not only the quantity, but the quality of forage will influence immunological defenses against ectoparasites, including fleas (Stephens et al. 2017). Research by Stenseth et al. (2006) demonstrated that climate plays a role in the relative prevalence of plague. Their studies in Central Asia suggest that climate change will create conditions more favorable to plague. This is likely true in North America as well, as projections indicate that the frequency of droughts will increase in the grasslands of western North America, which results in prairie dogs being at increased risk to parasitism from fleas (Eads and Hoogland 2017). With an increase in wetter springs and warmer summers there may be an increased threat from plague (Parmenter et al. 1999; Enscore et al. 2002).

(iv) Sylvatic plague management strategies

The disproportionate role that prairie dogs play in grasslands as a keystone species, with a plethora of associated species being highly dependent on the burrowing mammal as a food source, their burrows serving as important habitat, and vegetational habitat mosaics that are maintained through their clipping; combined with the severity that the non-native disease sylvatic plague can have on prairie dog populations has necessitated much research into best plague management strategies. Sylvatic plague abatement measures offer some of the most important protections to ensure that the diverse wildlife species found within the prairie dog ecosystem can be strategically maintained. While much progress has been made, there is currently no singular strategy that offers comprehensive assurances that colonies will not succumb to sylvatic plague.

Utilizing vector control by reducing the number of fleas has been one of the most commonly used tools for protecting prairie dogs from sylvatic plague in strategic conservation areas, including black-footed ferret reintroduction sites. Deltamethrin dust is an insecticide that can be administered into every individual burrow with various applicators (Tripp et al. 2018); dust may offer some protection to prairie dogs for up to 10-12 months, although the efficacy of dust lowering flea loads on mammals can vary from site to site (Biggins et al. 2010; Tripp et al. 2016; Maestas and Britten 2019). A meta-analysis of 30 studies in which insecticides were used to lower flea loads for sylvatic plague management was conducted and found that of those studies that used deltamethrin, vector abundance was reduced by 88.47% (Roth 2019). Lowered flea loads from deltamethrin likely increases survival rates of prairie dogs during catastrophic epizootic outbreaks, as indicated by the extirpation of all colonies that were not treated with deltamethrin at Conata Basin, SD (Griebel 2009); and also during less-dramatic, yet chronic simmering mortality experienced during enzootic periods by increasing adult survival rates by 31-45% (Biggins et al. 2010). The effect of deltamethrin wanes over time from application, so it does not offer sustained, uniform protection when applied annually (Tripp et al. 2017). While deltamethrin has shown to be an incredibly useful tool for combatting sylvatic plague (Biggins et al. 2010; Jones et al. 2011; Tripp et al. 2016; Roth 2019) - and remains the most effective plague mitigation tool available - one underlying and alarming problem with the annual application of the insecticide that has been required to adequately control fleas is that after 5-8 years of continual application, a proportion of the fleas develop resistance to deltamethrin (Eads et al. 2018). While not surprising that resistance develops within fleas, it has demonstrated the need for a diversified plague management strategy.

Another tool that has arisen is the sylvatic plague vaccine (SPV) distributed in the form of a palatable bait, which has been in laboratory and field-testing research. Currently, it is not available for commercial purchase. Field sites that were included in SPV research, have had varying levels of increased survival of prairie dogs in the face of sylvatic plague (Rocke et al. 2017). Protection from sylvatic plague is best achieved if SPV is distributed well in advance of an epizootic outbreak (Tripp et al. 2017). Herd immunity offers the best protection, and this generally is achieved through successive annual applications of SPV to ensure that the level of vaccination within the colony is high (Rocke et al. 2017; Tripp et al. 2017). Timing of SPV application, as with deltamethrin, likely influences the effectiveness of the treatment by increasing chances of uptake of the bait by prairie dogs (Tripp et al. 2014) and by strategically maximizing juvenile prairie dog vaccination (Tripp et al. 2014; Rocke et al. 2015). Fall application of SPV is recommended for greatest uptake and juvenile protection (Tripp et al. 2014; Rocke et al. 2017) and to maximize even distribution the utilization of transects are recommended (Tripp et al. 2014). While SPV provides another tool for prairie dog conservation in the face of sylvatic plague, it does not offer complete assurances against plague-related losses (Rocke et al. 2017) and in a meta-analysis that looked at 7 publications regarding SPV efficacy, prairie dog survival increased by 4% with the use of SPV (Roth 2019).

Another sylvatic plague abatement tool that is currently not in widespread use, but preliminary research is promising that fipronil deployed in grain, or in the future palatable baits, may offer further vector control for the suppression of sylvatic plague. Fipronil is commonly used topically on domestic pets as a tick and flea control. Prairie dogs that ingested bait with fipronil reduced the mean number of fleas per prairie dog by [ge]95% for a minimum of 52 days post initial uptake, which was the last recapture event that occurred post-treatment (Poch[eacute] et al. 2017). At another research site that had longer post-application monitoring, prairie dogs treated with fipronil-treated bait had decreased flea loads by 97-100% for 3 months and there was a residual effect of fipronil for 12 months (Eads et al. 2019). Some benefits of both SPV and fipronil, is that the insecticide is targeted to on-host vectors rather than broadly applied like deltamethrin, which likely affects some arthropod non-targets. Resistance to fipronil has not been documented in a cat flea, which is historically a species that has shown high levels of resistance to various insecticides (Poch[eacute] et al. 2017), although the flea species commonly found on prairie dogs are different species it is hopeful that issues with resistance after regular, annual applications may be less than those exhibited with deltamethrin. Research on the hypothesis that prairie dogs that have ingested this pulicide, defecate fipronil-laced excrement, which flea larvae may ingest and thus perpetuate long-term flea control (Eads et al. 2019) and will add to the exciting advances that fipronil may hold for sylvatic plague management.

For the foreseeable future, a diverse and well-timed sylvatic plague management strategy will be key to maintaining prairie dog colonies in strategic conservation areas, where they can play their role as a keystone species. The use of several plague abatement tools, with careful consideration of timing both in delivery and for longer-term annual diversification will likely offer the best plague management (Tripp et al. 2017; Eads et al. 2019).

(c) Poisoning impacts to black-tailed prairie dogs

Repeated poisoning of prairie dog colonies can result in habitat fragmentation and the eradication of colonies and localized extinctions that can culminated into large-scale, permanent losses of prairie dog throughout a region.

(i) Mortality and morbidity resulting from zinc phosphide poisoning

The most commonly used non-anticoagulant rodenticide approved for killing prairie dogs is zinc phosphide (chemical name: trizinc diphosphide), which is in the metal phosphide family that includes aluminum and magnesium phosphide[mdash]also used as rodenticides. Zinc phosphide is an inorganic compound that, when used for killing rodents, is often applied via a grain bait because the poison must be ingested (Gervais et al. 2010). When exposed to moisture and stomach acid, it converts to phosphine gas, which is toxic (and also flammable) (EPA 1998a).

Phosphine gas, released when metal phosphides react with moisture and stomach acids, disrupts mitochondrial respiration when it is absorbed from the gastrointestinal tract (Reigard and Roberts 1999; Mehrpour 2008). Scientists believe phosphine gas blocks enzyme and protein synthesis (Mehrpour 2008). The National Pesticide Information Center described physiological signs of toxicity from zinc phosphide:

Animals that ingest zinc phosphide may begin showing clinical signs within 1 to 4 hours. Early signs of exposure include loss of appetite and depressed activity followed by vomiting and painful retching. These signs progress to anxiousness, ataxia or uncoordinated movements, weakness, labored breathing, thrashing, muscle tremors and convulsions. [hellip] Onset of signs may be delayed for up to 12 hours or more in animals who consumed the bait without any other food in their stomachs. [hellip] Gastric acid release in animals that have recently eaten causes more rapid release of phosphine. [hellip] The vomit of poisoned animals may contain blood. The vomit can also include phosphine, which can be dangerous to humans at levels below which its odor can be detected. (Gervais et al. 2010, citing Johnson and Voss 1952; Albrestsen 2004; Knight 2006)

Studies have found mammals, including rodents, with zinc phosphide toxicity can experience the following symptoms before death: heart, liver, and kidney damage; pulmonary edema; kidney failure; internal organ congestion; organ damage; petechial hemorrhaging; diarrhea; respiratory distress; gastric ulcers; blood in the lungs and trachea; convulsions; paralysis; and other symptoms (Mason and Littin 2003). Poisoned rodents show signs of pain[mdash]"death agony" (Mason and Littin 2003: 8, citing Timm 1994)[mdash]and may kick their abdomens for hours and exhibit other behavioral changes. Symptoms often start rapidly, less than 15 minutes, but that death can be prolonged for days (Mason and Littin 2003, citing Roswell et al. 1979; Malhi et al. 1994).

When zinc phosphide exposure via ingestion and inhalation is not fatal, affected animals can experience chronic health problems when compared with unexposed animals including, though not limited to, less weight gain; less food consumption; lower body temperature; lower brain, lung, heart, and kidney mass; lung damage; excessive salivation; hydronephrosis (kidney swelling and excess urine); kidney infections; diarrhea; and blood chemistry imbalances such as reduced hemoglobin-to-iron ratios (Gervais et al. 2010, citing Robertson et al. 1945; Johnson and Voss 1952; Bell and Dimmick 1975; Hill and Carpenter 1982; Glahn and Lamper 1983; Newton et al. 1993; Barbosa et al. 1994; EPA 1998a; Newton et al. 1999).

(ii) Mortality and morbidity resulting from anticoagulant poisons

Alternative 3 allows for the use of anticoagulant poisons. Chlorophacinone is a blood thinner that depresses clotting and increases the permeability of capillaries predisposing the poisoned animals to widespread internal hemorrhaging. Death is prolonged, often occurring over a period of days to weeks, as the victims slowly bleed to death through skin membranes and orifices. The USFWS (2009) described its effects in a letter to the Environmental Protection Agency in 2009, stating,

Anticoagulants act as blood thinners, with poisoned animals losing blood through various orifices, including eventually the skin membranes, over a period of weeks. During this period, poisoned prairie dogs may wander around on the surface becoming increasingly debilitated and susceptible to predation. For example, two weeks after an illegal application of Rozol on 160 acres in South Dakota in 2005, Service biologists found over 50 dead, dying, and scavenged prairie dogs. This information was shared with EPA law enforcement. On a follow-up visit by both the Service and EPA four weeks after application, it was noted that 400-500 prairie dogs had been retrieved from the Rozol treated site during the previous two weeks.

Rozol and other anticoagulants cause a more prolonged period of distress for the target animal than zinc phosphide, the traditional choice for prairie dog control. During that time, the poisoned prairie dogs move between their burrows and the surface and often exhibit disorientation, weakness, and behavioral modifications, making them easier targets for predators and scavengers.

(d) Shooting impacts to prairie dogs

Prairie dog shooting kills and injures prairie dogs; that is the intent of this activity. Prairie dog shooting is episodic and can cause high levels of localized mortality (Reeve and Vosburgh 2006), which can lead to population-level impacts. Shooting can negatively impact prairie dog behavior and kill and injure non-target wildlife (see more on shooting impacts to non-target wildlife below). The prairie dogs on a colony that experiences shooting pressure can suffer from behavioral changes, loss of reproductive capacity, diminished body condition, and higher stress levels. Colony-level effects include higher levels of emigration, changes in population structure, increased predation, unpredictable and colony-specific effects, decreased population density, decreased colony expansion rates, and habitat fragmentation.

Even just a few shooters can cause substantial prairie dog mortality. Randall (1976) chronicled the activity of three individual shooters who traveled from Minnesota to shoot white-tailed prairie dogs in Wyoming. In one week, they concentrated on seven towns and tallied 1,023 kills. This was in 1976, and prairie dog shooters are much better equipped today. Jerry Godbey of the

U.S. Geological Survey Biological Resources Discipline reported that when he surveyed white- tailed prairie dog towns in Colorado, Utah, and Wyoming in 1997-1998, he found spent shells or dead prairie dogs at "virtually every site" (Jerry Godbey, USGS, personal communication to Erin Robertson, Center for Native Ecosystems, 3 August 2001). Mr. Godbey said that he met one shooter near Delta, Colorado with three rifles who said that he shot white-tailed prairie dogs at least four times a week. This shooter estimated that he used 10,000 rounds per year, with an estimated 95% kill rate. Those figures translate to take of 9,500 prairie dogs annually by a single person. Eads and Biggins (2019) observed >97 prairie dogs being shot one morning on colony with an estimated number of prairie dogs at 300.

Keffer et al. (2000) found that after they shot 22% of the black-tailed prairie dogs on one colony as part of a controlled shooting study, 69% (212 individuals) of the remaining prairie dogs left the colony. Small colonies may be particularly vulnerable to negative impacts from shooting (Knowles 2002). Entire colonies can potentially be eliminated from shooting pressure (Knowles 1988; Livieri 1999). Prairie dog population impacts

Entire colonies can potentially be eliminated from shooting pressure (Knowles 1988; Livieri 1999). Small colonies may be particularly vulnerable to negative impacts from shooting (Knowles 1988; Knowles 2002 citing J. Capodice, personal communication).

Prairie dog shooting significantly reduces prairie dog populations and population densities (Livieri 1999; Biggins et al. 2012). Irby and Vosburgh (1994) found that prairie dog shooters prefer higher densities of prairie dogs. This causes shooters to spread the pressure of their activity depending on population density (Vosburgh 1996), causing uniformity in prairie dog populations across colonies. Biologically, such uniformity is destabilizing to prairie dog populations.

Data demonstrate that prairie dog shooting can kill a significant number of prairie dogs. In their study of shooting on BLM and USFWS lands in Montana, shooters averaged 200 kills in 2-3 days (Vosburgh and Irby 1998). Reeve and Vosburgh (2006) summarized state figures documenting number of prairie dogs killed per year. They stated, "the cumulative number of victims can be substantial" (p. 142). Nebraska reported 301,000 individuals killed in 1998 and 356,000 in 1999 (Fritz 2001). South Dakota documented 1,186,272 shot in 2000 (South Dakota Prairie Dog Working Group 2001). In 2000, shooters killed 57,848 prairie dogs on the Rosebud Reservation (Reeve and Vosburgh 2006, citing Rosebud Sioux Department of Game, Fish, and Parks unpublished data). Gigliotti (2001) reported a single-year kill rate of 1.5 million prairie dogs on non-tribal lands in South Dakota. Shooters killed an average of 14,200 prairie dogs each year between 1993-2001 on the Lower Brule Sioux Reservation (Reeve and Vosburgh 2006, citing Lower Brule Sioux Tribe 2002).

Pauli (2005) systematically had 30% of the prairie dogs at five colonies shot, and then compared the results to five untreated colonies. Shot colonies showed a 50% reduction in pregnancy rates and a 76% decline in reproductive output. This study documented mechanisms for several additive impacts of shooting. Stockrahm and Seabloom (1998) also reported a significant difference in productivity between females on colonies that experienced shooting and those that did not. Their analysis of placental scars on yearling females revealed that 90% on un-shot colonies tried to reproduce but only 32% attempted reproduction on colony sites in North Dakota that experienced shooting for over 20 years.

Adult females have experienced a higher rate of mortality than males on shot colonies (Vosburgh and Irby 1998; Keffer et al. 2000; Reeve and Vosburgh 2006). Though Pauli (2005) found that adult males were most susceptible to shooting on his treated colonies, male populations were more likely to rebound while females experienced lower population densities for longer (see below). A female-bias in shooting victims would reduce colony reproduction rates. Even though male dispersal is important for reproduction, because 1 male can impregnate multiple females a loss of females in a colony would have a greater immediate impact on reproduction.

Spring is one of the most popular times of the year for recreational shooting and also a very vulnerable time for prairie dogs. Pregnant and lactating females are at risk between March and May, and thus, shooters can kill off two generations at once (Knowles 1988; Reeve and Vosburgh 2006).

Ken Keffer (of the University of Wyoming Cooperative Fish and Wildlife Research Unit) had 23% of the prairie dogs at one colony shot as part of a mark-recapture study, and the 212 surviving individuals emigrated from the colony (Keffer et al. 2000). In addition to direct mortality and the other effects documented in Pauli's work, mass emigration is a potential result of shooting pressure.

Studies also report that shooting may decrease colony expansion rates (Reading et al. 1989; Miller et al. 1993). One study revealed that a colony in Montana had a 15% annual expansion rate when prairie dogs were not hunted, contrasted with a 3% expansion rate when they were (Miller et al. 1993). This dramatic decrease in rates of expansion represents decreased migration, which constitutes human interference with an integral population dynamic in prairie dogs: prairie dog dispersal.

Even without shooting pressure, there is a low survival rate of dispersing males (Garrett and Franklin 1981). In addition, prairie dog dispersal takes place in late spring (Knowles 1985; Garrett and Franklin 1981), which is one of the most popular times of the year for recreational prairie dog shooting. The negative impacts of shooting on prairie dog migration can be considerable.

Knowles (1988) studied controlled shooting study on two colonies in the Charles M. Russell National Wildlife Refuge in Montana. Colonies were along a dirt road less than 3 km from a 247- acre colony, so immigration complicated results. Nevertheless, after a total of 40.3 hours of shooting over two years, there was a 74% decline in the number of adults at colony A. After a total of 42.5 hours of shooting over two years, there was a 100% decline in the number of adults at colony B. Only one juvenile prairie dog survived the shooting study. In this study, shooting was the identified source of prairie dog declines, stating, "Both treated colonies showed strong population recovery trends in 1980 in the absence of shooting" (p. 54). The study suggested that shooting might lead to direct extirpation, observing, "In the case of the smaller colony, shooting appeared capable of removing all prairie dogs" (p. 54).

In addition, Knowles (1988: 55) suggested that shooting might decrease prairie dog populations to the point where they are extremely susceptible to extirpation from stochastic events: In another small colony on the Refuge, 12 prairie dogs were removed by shooting in the spring of 1975. The three remaining prairie dogs were eliminated by natural causes by late fall of that year. This colony site had not been re-colonized by 1984 (year of last survey). Lewis et al. (1979) thought 10 to 20 prairie dogs were needed to start a colony. Possibly the reduction of prairie dogs below a certain threshold number may have a negative population consequence (Allee's Principle, Allee et al. 1949) because fewer prairie dogs are available to watch for predators (Hoogland 1981) and keep the vegetation clipped around burrows.

Livieri (1999) modeled population responses to shooting at the Buffalo Gap National Grassland. The starting population estimate was 105,035 prairie dogs. The model assumed that prairie dog population growth would be logistic. In this analysis, shooting caused population declines, finding, "At the [Buffalo Gap National Grassland] in 1998, it was estimated that the prairie dog population was reduced by as much as 75% by recreational shooting (USFWS 1998)" (unpaginated). In addition, shooting may cause extirpation, Livieri (1999) found, "Harvest levels of 50% would cause a precipitous decline from the current population size and 75% would cause the population to go extinct within 40 years" (unpaginated).

Reeve and Vosburgh (2003) also modeled prairie dog population response to shooting, stating,

[hellip] if the harvest exceeds some maximum yield level and continues over time, the population will eventually decline to zero. Figure 3 shows that an annual harvest of 75 animals or fewer can be sustained by a population initially of 1000 with Rmax=2.00.

When 79 animals are harvested annually, the population declines toward zero. The maximum sustained yield is approximately 77 animals and any annual harvest [less than or equal to sign] 77 stabilizes the population at some level less than the carrying capacity. But constant harvesting at excessive levels >77 animals first reduces population size and then reduces the population growth rate with eventual extinction (Caughley and Sinclair 1994, Akcakaya et al. 1999). (Reeve and Vosburgh 2003: 10-11).

These authors later state, "Constant numbers harvested each year, if slightly too high, will lead to extinction"; and,

An annual quota of 75, applied to 100 simulations of a population with demographic variability however, produces no such population stability (Figure 5). In fact, the Leslie matrix model (Akcakaya et al 1999) predicts an 11% chance that the population will become extinct within a 15-year period. (Reeve and Vosburgh 2003: 16)

Shooting impacts may be unpredictable and colony-specific. Knowles and Vosburgh (2001: 7) compared black-tailed prairie dog shooting studies conducted in Montana, and concluded, "Shooting can impact prairie dog populations and [hellip]it is just a matter of the number of hours of

shooting effort expended on a colony in relation to the size of the colony that determines the level of impact."

(i) Prairie dog behavior and body condition

Shooting also alters prairie dog behavior and causes stress (Lantz et al. 2004). For instance, Irby and Vosburgh (1994) found that even light shooting has a significant effect on prairie dog behavior, with 42% of prairie dogs retreating to the burrows on a lightly shot colony, contrasted with a 22% retreat rate on unshot colonies, and 55% retreat rate on heavily shot colonies. Pauli (2005) found that alert behavior was eight times higher on shot colonies after treatment, and above-ground activity declined by 66% on shot colonies after treatment. Surviving adult prairie dogs on shot colonies showed a 35% decrease in body condition, a 30% increase in flea loads (important to plague transmission), and an 80% increase in stress hormones (Pauli 2005).

Prairie dogs "plug" burrows where prairie dogs have died and burrows occupied by predators. Prairie dogs expend more energy plugging burrows when shooting is present (Biggins et al.

2012).
(ii) Trigger for plague positive feedback cycles
A study by Eads and Biggins (2019) demonstrated signs that shooting may trigger flea-plague positive feedback positive feedback cycles by causing flea carriers to migrate to the decreased number of live prairie dogs (see also Pauli 2005) and by affecting prairie dog body condition, making the surviving animals more susceptible to plague. During favorable weather conditions for the spread of plague, shooting may be even more likely to trigger a plague epizootic.
(e) Drought impacts to prairie dogs
The DEIS and BE failed to assess the effects of proposed management direction on prairie dogs under conditions of drought. Severe and multi-year droughts periodically hit the Northern Great Plains. Given the dramatic loss of prairie dogs since the advent of mass extermination campaigns and plague and continued human threats to prairie dogs, the species is less resilient to this stressor. The presence of confined livestock in prairie dog habitat likely exacerbates stress to prairie dog colonies during drought; colonies tend to expand but without corresponding increases in prairie dog abundance.

The total areal extent of prairie dog colonies in a region typically serves as a proxy for prairie dog abundance. It is unrealistic to conduct prairie dog population counts over large areas, yet assuming prairie dog populations (numbers of individuals) necessarily increase as colonies expand is misguided. The Forest Service has made this assumption, which will negatively affect prairie dog viability under the Proposed Action as well as alternatives 3 and 4. With each alternative, reaching prairie dog area targets triggers management to reduce colony size and prairie dog densities with poisoning and shooting. The Proposed Action prescribes poisoning and shooting during drought conditions intended to keep prairie dog acreage at below target levels. The DEIS states of the Proposed Action,

During times of colony growth, such as during drought conditions, Forest Service personnel may initiate lethal or nonlethal control activities that reduce colony acreages below the management target in anticipation of continued colony expansion. When colonies exceed 10,000 acres, Forest Service personnel will work with agency partners and members of the collaborative stakeholder group to identify strategic locations for lethal and nonlethal control activities that will keep acreages as close to 10,000 as possible. This could include eradication of colonies in the interior of management area

3.67. DEIS at 63

During drought and other conditions that diminish forage availability, poisoning and shooting would reduce a prairie dog population that is probably already depressed. Overgrazing and drought can both encourage prairie dog expansion by either decreasing vegetation height, which enables easier expansion, or decreasing forage availability, which influences prairie dog expansion to secure sufficient nutrients.

The Forest Service has conflated prairie dog areal extent with population size in the DEIS and BE (DEIS: 13 and 14; BE: 164 and 169). For example, page 169 of the BE includes a section entitled, "Distribution, Abundance and Population Trend in the Plan Area." However, this section refers back to Table 4 (BE: 22-23), which is merely a record of prairie dog colony area across the Grassland in years from 2001 through 2018. Without corresponding information about prairie dog density and whether the figures distinguish between inactive versus active or occupied colony area, this section says nothing about abundance and population trends.

The BE states,

Colonies may expand especially rapidly during drought, when forage is scarce within colonies (Cincotta et al. 1987, Derner et al. 2006, Archuleta 2014). Expanding colonies can grow enormously in a few years, increasing population size on the order of 30 to 300 percent annually (Hansen and Gold 1977, Collins et al. 1984, Uresk and Schenbeck 1987, Garrett and Franklin 1988, Reading et al. 1989). At low densities, such as after incomplete poisoning of a colony, prairie dogs increase their reproductive rates to quickly recolonize available empty burrows (Knowles 1986, Uresk and Schenbeck 1987, Radcliffe 1992, Andelt 2006). (BE: 164)

Science referenced in the excerpt above is outdated or has been misinterpreted. For example, published over 30 years ago, Knowles (1986: 250) speculated about his study results, "This information suggests that prairie dogs remaining after substantial population reduction by rodenticides have increased survival and/or reproductive rates." Hoogland (2001) found that black-tailed prairie dogs reproduce slowly for the following reasons:

First, survivorship in the 1st year is <60% for all 3 species, and it remains low in later years. Second, even under optimal conditions, females of all 3 species produce only 1 litter/year. Third, the percentage of males that copulate as yearlings is only 6%, 24%, and 49% for black-tailed, Gunnison's, and Utah prairie dogs, respectively. The percentage of females that copulate as yearlings is only 35% for black-tailed prairie dogs, but it is 100% for both Gunnison's and Utah prairie dogs. Fourth, the probability of weaning a litter each year is only 43%, 82%, and 67% for female black-tailed, Gunnison's, and Utah prairie dogs, respectively. Fifth, for those females that wean offspring, mean litter size at 1st juvenile emergence from the nursery burrow is 3.08, 3.77, and 3.88 for black-tailed, Gunnison's, and Utah prairie dogs, respectively. (Hoogland 2001: 917)

Prairie dogs do not "increase their reproductive rates" in response to being at low densities; Andelt 2006 does not make this claim. The BE mischaracterizes the findings of Reading et al. (1989). Reading et al. (1989: 19) found, "[hellip] colonies expand rapidly in the presence of abundant resources and low competition. As colonies grow competition increases and resource abundance decreases" (emphasis added). Reading et al. (1989: 19) also stated,

In this study, burrow density was not significantly related to colony size. This finding is consistent with King's (1955) suggestion that population densities are probably not related to colony size. Houston et al. (1986) noted that burrow density is not always an accurate indicator of population density. Burrow density reflects historical and recent past colony conditions. [hellip] Both population density and burrow density are probably more closely associated with habitat quality than with colony size. Potentially important factors affecting habitat quality include soil type, slope, vegetative cover type, and rainfall. (emphasis added)

Prairie dogs have endured drought for millennia. Indeed, the arid and semi-arid areas that prairie dogs inhabit feature drought as a natural, periodic occurrence. Moreover, black-tailed prairie dogs evolved with heavy grazing by bison. While recognizing drought as a natural phenomenon, the increased stress on prairie dogs during drought is likely exacerbated by other threats to prairie dogs.
(i) Drought in the Northern Great Plains
The Northern Great Plains has experience drought cycles throughout the Holocene with periodic occurrences of severe drought conditions like that which occurred in 2017 (Wang et al. 2019). As the Forest Service stated in the BE, heavy precipitation events are expected to increase in the region due to climate change, extreme weather events including drought are also predicted to increase with warming (Conant et al. 2018). However, the BE indicates the Forest Service does not appreciate that drought conditions do not encourage prairie dog populations to increase; in fact, prairie dog density and abundance tends to decline in response to drought (Facka et al. 2010; Stephens et al. 2018).

(ii) Drought impacts to prairie dog health and survival

Prairie dogs living in areas with relatively lower forage availability than other areas exhibit slower growth rates in juveniles, delays in the onset of sexual maturity, smaller litter sizes, and lower survival rates (Garrett et al. 1982; Hoogland 2001). Stephens et al. (2018: 843) stated,

Modelled prairie dog densities in our study consistently dropped by more than 50% following drought years, implying that survival and/or reproduction were negatively affected by drought conditions during the preceding summer. Like other mammals that rely on body condition to not only survive winter but also reproduce before green-up the next spring, prairie dogs face an energy trade-off between survival and reproduction when their body condition is insufficient (Neuhaus, 2000). Under severe conditions they may experience both lower survival rates and complete reproductive senescence (Smith & Johnson, 1985).

Drought can negatively impact prairie dogs experiencing food and moisture deprivation, causing energy depletion and dehydration (Eads et al. 2016). Drought conditions can also influence body condition going into the winter and negatively impact reproduction the following spring. (Facka et al. 2010). Stephens et al (2018: 484) posited that drought reduces prairie dog survival due to 4 forage-linked mechanisms:

(i) reduced forage quantity that translates to lower nutrient reserves in the form of body mass to sufficiently support prairie dogs through the winter; (ii) increased predation risk as foraging effort and foraging distances increase given lower forage availability; (iii) reduced forage quality with physiological implications for thermoregulatory behaviour (and presumably negative consequences for energy regulation in winter); and (iv) reduced forage quality with behavioural and immunological implications for susceptibility to ectoparasites and disease.

Additionally, prairie dogs may have less energy for grooming and spend less time grooming, which helps limit flea and other parasite numbers (Eads et al. 2016). Prairie dogs may be more vulnerable to plague during drought years because diminished body condition and more limited grooming may make them more susceptible to fleas (Eads and Hoogland 2016; Eads et al. 2016; Eads and Biggins 2019).

(iii) Drought and prairie dog colony dynamics

Koford (1961: 339) may have been among the first scientists to speculate that drought conditions can result in a loss of prairie dog numbers: " [hellip] as drought decreases the food supply of rodents, its first effect is probably to diminish prairie dog numbers." A 2007 "issues paper" entitled, "USDA Forest Service Update March 2007: The Black-tailed Prairie Dog" stated:

In 2004, acreage of black-tailed prairie dog colonies on National Forest System (NFS) lands totaled over 71,000 acres. This was a substantial increase over the nearly 48,000 acres recorded in 2002. Extended drought in much of the Great Plains has led to large expansions of prairie dog colonies, although not necessarily prairie dog populations. (USDA Forest Service 2007: 1)

The Forest Service paper also reported that prairie dog populations on NFS lands had declined substantially by 2006 due to plague. As noted above, Stephens et al. 2018 found that prairie dog mean densities across study plots dropped dramatically, by up to 70%, immediately following drought years. A study by Facka et al. (2010) found that prairie dog populations declined in response to drought.

In a study comparing ferret use of the UL Bend National Wildlife Refuge in Montana and Conata Basin at the Buffalo Gap National Grassland in South Dakota, Jachowski (2007) found that black- tailed prairie dog densities vary over time within colonies depending on soil type and forage availability. Prairie dogs move to the perimeter of colonies when vegetative cover decreases in the central, core areas of their colonies. In a prairie dog colony, there can be areas of high density and areas of complete inactivity. The implications of this study are that prairie dog densities decrease when less forage is available, such as during drought periods and in the presence of livestock overgrazing.

(2) Mountain plover viability

Black-tailed prairie dogs are "ecosystem engineers." Their clipping and grazing activities allow for the maintenance of the short, sparse habitat structure required by a suite of birds and mammals of the Great Plains. One such species is the mountain plover, which is in decline throughout most of its range. Although mountain plovers will use many different habitats, if adequate bare ground is available, along the eastern edge of its range, it is at least partially restricted to prairie dog colonies (Duchardt et al. 2019). This is also the case for the TBNG, which includes mixed grass prairie and sagebrush steppe.

Because TBNG has contained some of the largest black-tailed prairie dog colonies in North America, researchers have been able to examine how mountain plovers respond to the size, shape and vegetation cover within colonies to better assess mountain plover response for the species' viability. Duchardt et al. (2019) examined presence densities, nest-site use and nest success of mountain plovers across a range of colony sizes in TBNG during 2015-2017. These observations focused on BTPD habitat, which confirmed for the researchers that mountain plover almost completely rely on prairie dogs in this system. The research revealed that the abundance and distribution of plover nests varied substantially across all prairie dog colony sizes and ages. Specifically, BTPD 's role as an "ecosystem engineer" is directly related to higher densities and larger colony sizes (Hoogland 1995). As a result, mountain plovers generally show stronger association with colonies of black-tailed prairie dogs vs. white-tailed prairie dogs (Knowles et al. 1982, Manning and White 2001). This is likely because the engineering effects of BTPDs are much more intense, especially in mixed-grass prairie (Baker et al. 2013). As such, reducing densities of black-tailed prairie dogs below a certain point may reduce or eliminate the value of those colonies for mountain plover. Literature sources for identifying a density threshold may include the following: Hoogland 1995, citing >10 individuals per hectare (>4 individuals per acre); Johnson and Collinge 2004, which indicates individual densities between 32-120 individuals per hectare (12-48/acre) or burrow densities between 100-674 burrows per ha (40-273 burrows per acre); and Ray et al. 2013 indicate burrow densities between ~50- 100/ha (~20-40 burrows per acre), with burrowing owl abundance increasing with burrow density. According to the Biological Evaluation of Animal Species and Potential Animal Species of Conservation Concern Report, while peak mountain plover densities are typically reached on colonies between 250 - 800 acres, within the TBNG peak densities are generally observed on colonies between 250 and 1,250 acres in size (USDA 2019).

The mountain plover (Charadrius montanus) is a Forest Service Regional 2 sensitive species, and the Forest Service recently identified it as a potential SCC for the TBNG. The species' population is declining in the Northern Great Plains (Correll et al. 2019). Knowles and Knowles (2019) recently recorded steep declines in mountain plovers in Montana, based on research conducted on two study sites since 1992. The DEIS (at 109, Table 24) determined the action 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; No substantial adverse impacts or substantially lessened protections as a result of the plan amendment

The intent of each action alternative is to substantially lessen protection for mountain plover habitat, prairie dog colonies. The Proposed Action may lead to the loss of viability for the mountain plover population in the Grassland. Alternative 3 holds an even greater likelihood of resulting in the loss of persistence of mountain plovers in the plan area, and while less so, Alternative 4 also puts the population at risk.

At a broad level, the DEIS and BE accurately describe the ecological conditions necessary for the species' persistence on the TBNG. To summarize, mountain plovers are prairie dog associated species and depend on the sparsely vegetated and bare ground conditions that prairie dogs can create. However, the amendment documents show the Forest Service has made some faulty assumptions and misinterpreted key science, casting doubt on the conclusion that the Proposed Action and other action alternatives will maintain the mountain plover's viability in the plan area.

(a) Prairie dog colony area targets

Despite what the Forest Service contends in the DEIS and BE, the information used in these documents demonstrates the Proposed Action has set the prairie dog colony area too low to assure long-term mountain plover persistence. The DEIS (at 62) states,

The proposed amendment aims to stabilize prairie dog populations around a target acreage to the extent possible. This will reduce the negative effects of the boom-and- bust cycle that can reduce the quality of mountain plover habitat at both extreme lows and extreme highs in prairie dog colony area.

There is no science to support the assumption that managing prairie dog acreage to be artificially low will stabilize the population and benefit mountain plovers. This supposition is contradicted in the BE, which states,

The Thunder Basin Research Initiative surveys additionally showed a clear correlation between total prairie dog colony area and mountain plover abundance. Duchardt et al. (2018) found a decrease in the number of mountain plover as the total area of prairie dog colonies decreased after a 2017 outbreak of sylvatic plague. mountain plovers declined by a factor of approximately 15 in 2018 from pre-plague encounter rates in 2016 and 2017; typical encounter rates at observation points were 40-50 observations in 2016 and 2017, but decreased to only three birds in 2018 (Duchardt, C., unpublished data). This strong population link with total prairie dog colony area is consistent with previous studies in Colorado and Montana (Augustine et al. 2008, Augustine and Skagen 2014). (BE at 145-146)

The DEIS asserts that 7,500 to 10,000 acres of prairie dog colonies is sufficient to support a persistent population of mountain plovers over the long-term, as quoted below:

The best available scientific information, much of which was collected on the Thunder Basin National Grassland, shows 10,000 acres of colonies is the lower limit likely to adequately provide for the long-term persistence of the mountain plover population on the Thunder Basin National Grassland. [hellip] An additional allowance for temporary management down to 7,500 acres in special circumstances, as described in the proposed action, is unlikely to compromise species viability, given the expectation that prairie dog colony management will be directed toward the 10,000-acre target within a reasonable time after prairie dog control occurs (DEIS at 61).
"The overall finding that a minimum of 7,500 to 10,000 acres of prairie dog colonies would be adequate to provide for viability is based on the following quantitative and qualitative evidence" (DEIS at 62). The DEIS provided the following "quantitative evidence" to support its finding:

Based on the mountain plover survey data available for the national grassland, an estimated average density of 0.8 to 2.5 birds per 100 acre could be expected on prairie dog colonies, with few to no birds occurring outside prairie dog colonies (Duchart et al. 2018) [sic]. At 10,000 acres of colonies, this expected bird density yields approximately 80 to 250 birds; at 7,500 acres of colonies, this yields approximately 60 to 190 birds.

Concepts from conservation biology suggest these estimates may be sufficient to sustain a viable population of plover (Lehmkuhl 1984). In addition, because mountain plover is a migratory bird with limited fidelity to specific breeding grounds, individual birds that mix at wintering grounds are likely to contribute to the genetic health of the Thunder Basin Grassland population (Oyler-McCance et al. 2008). (DEIS at 62)

The Forest Service has misinterpreted Lehmkuhl (1984) who found that short-term conservation, not long-term persistence, of a species requires an "effective population size"4 of at least 50 individuals. This translates into the need for a real population of 150 birds for short-term conservation. Conservation biology concepts are clear that to hope to support the long-term viability of species, 10 x 150 individuals, meaning at least 1,500 mountain plovers, are required to meet the minimum population threshold based on Lehmkuhl (1984). And other researchers have revised the effective population size minimum up (see Lynch and Lande 1998).

Either 7,500 or 10,000 acres of prairie dog colonies are vastly insufficient to maintain mountain plover viability in the plan area. Though mountain plovers have been spotted on the Grassland since surveys began in 1993, it's not surprising that they were on a generally declining trend up to 2015 (2015 Strategy at 20, Figure 5). Fortunately, with 128,282 acres of potential prairie dog habitat found by the habitat modeling information presented in the 2015 Strategy, TBNG has the inherent capacity to provide for the persistence of a mountain plover population.

In another point regarding the DEIS excerpt above, it is true that Oyler-McCance et al. (2008) postulated that gene flow among plovers may be facilitated at plover wintering areas. However, the species does demonstrate strong breeding ground fidelity (Oyler-McCance et al. 2008).

While the DEIS implies the study was conducted at TBNG, no Wyoming plover populations were included the research.
(b) Bare ground and short-stature vegetation conditions
Shaffer et al. (2016: 1) described the following structural conditions mountain plovers require, Mountain Plovers have been reported to use habitats with 2-38 centimeters (cm) [0.8-

15.0 in] average vegetation height, 14-87 percent grass cover, 2-14 percent forb cover,

4-55 percent shrub cover, 9-72 percent bare ground, 2 percent litter cover, and 4-6 cm [1.6-2.4 in] litter depth.

Each action alternative proposes to change the current MA 3.63 designation to MA 3.67 to be called "Rangelands with Short-stature Vegetation Emphasis." According to the DEIS (at 61), "Short-stature vegetation typically reaches heights of less than 6 inches (15 centimeters), either due to species composition or due to natural or managed disturbance of taller vegetation." The DEIS (at 62) also states, "Short-stature vegetation and bare ground are emphasized in management area 3.67 or 3.63 due to the suitability of soils and existing plant communities and the historic occupation by prairie dogs."

Yet, embedded throughout the Proposed Action, DEIS, and BE are contradictions regarding the management of sparsely vegetated and bare ground conditions required by mountain plovers. Early in the DEIS (at ii),

Action alternatives developed for this plan amendment project would generally decrease the target acreages of habitat for species that use or rely on short-stature vegetation, including prairie dogs. Actions associated with implementation of the plan amendment would have short-term impacts to those species, but are not expected to lead to a loss of viability in the planning area or range-wide.

As stated above, though not always clear, the vegetation analysis in the DEIS ultimately, but wrongly, concludes that "the bare ground state" is outside of the NRV [natural range of variation] for grassland ecosystem conditions. The analysis also infers that bare ground conditions require "recovery." Managing for an artificially low prairie dog population and against natural prairie dog densities is detrimental to plovers.

There are no plan desired conditions to guide or standards that requires the restoration or maintenance of vegetation below 6 inches with patches of bare ground[mdash]in ecological condition that Forest Service management must provide for mountain plovers on the Grassland. "Density control" would entail primarily killing prairie dogs "with the intent to reduce the number of live prairie dogs within a prairie dog colony or some portion of a colony without reducing the total area of the colony," as defined Appendix A under the Proposed Action (Appendix A at A-45). The following Proposed Action guideline provides the following direction:

Density control (for example, using rodenticides, translocation, or collapsing of burrows) may be used to maintain desired vegetation conditions within a prairie dog colony.

Desired vegetation structure and composition may vary by ecological site or colony. Where density control occurs, pretreatment data must be collected, and monitoring data must be collected for a minimum of two years after treatment.

What is the "pretreatment data" that will be collected? This must be specified. What is the adaptive management response that such monitoring will trigger? Would such monitoring be incorporated into the monitoring plan? Appendix B outlines management approaches and describes how potential monitoring might occur. But, without having the force of being a plan standard or being incorporated into the monitoring plan, monitoring lethal density control is not required, and it cannot be assumed that it will occur.
(c) Plague mitigation
A mountain plover population can decline significantly in response to plague epizootics in prairie dogs (Dinsmore and Smith 2010). And this has been found at TBNG (BE at 145-146), stating,

Duchardt et al. (2018) found a decrease in the number of mountain plover as the total area of prairie dog colonies decreased after a 2017 outbreak of sylvatic plague. mountain plovers declined by a factor of approximately 15 in 2018 from pre-plague encounter rates in 2016 and 2017; typical encounter rates at observation points were 40-50 observations in 2016 and 2017, but decreased to only three birds in 2018 (Duchardt, C., unpublished data). This strong population link with total prairie dog colony area is consistent with previous studies in Colorado and Montana (Augustine et al. 2008, Augustine and Skagen 2014).

The DEIS (at 62) states,

The mountain plover population on the national grassland has persisted through two prior landscape-scale sylvatic plague epizootics and regular rodenticide use since 2001. Observed plover abundance has contracted and expanded with fluctuations in total prairie dog colony area, yet plover have remained present on the landscape.

We disagree with the Forest Service's inference in the DEIS excerpt above that mountain plover persistence is assured even in the face of regular plague outbreaks. Plague can kill 100% of the prairie dogs in a colony during an epizootic (see Cully et al. 2010).

We recognize the Forest Service faces a dilemma and difficult challenge in preventing widespread plague epizootics in prairie dog colonies that can reduce mountain plover abundance. Plague management must be a mandated aspect of the TBNG management plan to maintain sufficient prairie dog colony areal extent to support a viable population of mountain plovers. Yet, mountain plovers are sensitive to one of the most comment tools to contain plague: deltamethrin "dusting" (Dinsmore 2013), and the BE points this out (BE at 147, 148, 149, 151).

However, plague mitigation, including the use of deltamethrin (at least in the near-term), must be part of a holistic plague management program in the TBNG management plan. While there are tradeoffs, the risk of not preventing plague epizootics in prairie dogs is the loss of an entire ecosystem, not just mountain plovers. The 2015 Strategy emphasized the importance of plague management and included at least one standard in the amendment that required plague mitigation. The Proposed Action includes only a guideline to enable plague prevention but should include a standard that mandates plague prevention.

Sylvatic plague abatement measures offer some of the most important protections to ensure that the diverse wildlife species found within the prairie dog ecosystem can be strategically maintained. While much progress has been made, there is currently no singular strategy that offers comprehensive assurances that colonies will not succumb to sylvatic plague. For the foreseeable future, a diverse and well-timed sylvatic plague management

strategy will be key to maintaining prairie dog colonies in strategic conservation areas, where they can play their role as a keystone species. The use of several plague abatement tools, with careful consideration of timing both in delivery and for longer-term annual diversification will likely offer the best plague management (Poch[eacute] et al. 2017; Tripp et al. 2017; Tripp et al. 2018; Eads et al. 2018; Eads et al. 2019; Roth 2019). This includes the use of oral insecticides and vaccination, which would not have the same deleterious impacts to mountain plovers.
(d) Fire as a tool for restoring and maintaining mountain plover habitat
Page 61 of the DEIS states, "Short-stature vegetation may also be achieved through natural or managed disturbance of taller vegetation through activities such as livestock grazing, prairie dog colonization, mowing, and wildfire or prescribed fire." Current plan standard 23, below, has been removed from the Proposed Action:

Prescribe burn selected large flats (a section or more in size) to evaluate the effectiveness of burns in attracting and inventorying mountain plover. Prescribed burns should be timed to provide large blackened areas in the spring.

The Planning Rule requires standards and guidelines that maintain or restore "fire adapted systems," and fire is a natural disturbance process of the short- and mid-grass prairie ecosystems. The DEIS states that the removal of the standard "would not eliminate or reduce applicability of prescribed fire as a tool for management." With the loss of the prescribed fire standard and the indication that the TBNG will incorporate input from a local stakeholder group, we believe prescribed fire is unlikely to occur on the Grassland. We are doubtful that, without a plan standard, prescribed fire or the allowance of natural wildfires to burn will be used as tools to maintain and restore mountain plover habitat.
(e) Land uses and management outside the plan area
The DEIS offers the following as evidence that the Proposed Action would provide the minimum amount of prairie dog colony acres necessary to maintain plover viability:

Adjacent private, State, and other Federal lands across the landscape, including lands enrolled in Candidate Conservation Agreements with Assurances, likely contain significant area of prairie dog colonies, contributing to the resilience of both prairie dog and mountain plover populations on the national grassland. While Forest Service personnel cannot rely on adjacent lands to provide for the viability of the mountain plover population on the national grassland, plover on adjacent lands will be additive to the plover population on NFS lands. (DEIS at 62)

The Forest Service can provide no assurance that land management and activities occurring off the Grassland will help contribute to mountain plover viability on the Grassland, and, as it concedes, cannot rely on adjacent land to ensure the viability of mountain plovers on the public lands under its jurisdiction.
(3) Burrowing owl
Burrowing owls are commonly found nesting in burrows in black-tailed prairie dog (BTPD) colonies (Desmond 2000). Because of this correlation, the prairie dog conservation measures for associated species such as burrowing owl within this plan amendment are of upmost importance to ensure the preservation of black-tailed prairie dog colonies for burrowing owls. And with these conservation measures must also come better monitor in burrowing owl and prairie dog populations.

While there have been several studies on the association of burrowing owls with BTPDs, much of the science has centered on the importance of prairie dog burrows serving as nesting locations. Burrowing owls are considered endangered in Canada and a species of special concern in many western and midwestern states in the United States (Shef?eld 1997). In Desmond et al. (2000), researchers monitored burrowing owl populations and prairie dog densities in 17 BTPD colonies in Nebraska, between 1990 and 1996. All prairie dog colonies had been lethally controlled. The researchers observed a 63% decline in nesting pairs of burrowing owls and significant declines in burrow densities. Results indicated a time lag in owl response to changes in active burrow densities. However, later in the study when prairie dog colonies had increased, researchers noted the owl population responded positively. They concluded that active burrows may become more important as burrow density declines. The researchers also monitored fledging success of burrowing owls for 398 nesting attempts over 5 years (1989-93) for a larger set of colonies that included the 17 used in the owl and prairie dog monitoring. The conclusions showed differences in mean fledging success among the colonies each year and explained most of variation in fledging success was among the nesting owls. Badger predation may have played a role in these differences. Badger predation on owl nests was lower when densities of active prairie dog burrows were high (Desmond et al. 2000).

VII. National Environmental Policy Act compliance

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 decisionmaking 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 U.S.C. [sect][sect] 4321, 4332(2)(C); 40 C.F.R. [sect][sect] 1501.2, 1502.25). The key element of this analysis is to evaluate the direct, indirect, and cumulative impacts[mdash]also referred to as effects[mdash]of several alternatives, including the proposed action, to determine whether an alternative with more conservation potential is available (See C.F.R. [sect][sect] 1502.16(a)-(b), 1502.25(c), 1508.7, 1508.8, 1508.16, 1508.27(b)(7)).

A. Effects to rangeland vegetation and livestock grazing

The state-and-transition modeling the DEIS 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, at least in part, meant to be managed for biodiversity (36 CFR 219.8). Fuhlendorf et al. (2012 at 579), state,

The full suite of ecosystem services valued by society will only benefit by management for heterogeneity, which implies that there is no one goal for management and that landscape-level planning is crucial. Explicitly incorporating heterogeneity into state-and- transition models is an important advancement not yet achieved [hellip]

As discussed in Section IV.B.2.d, the site descriptions and modeling do not incorporate prairie dog activity as a characteristic of the NRV, which is wrong. The analysis is also very confusing.

The fact that the key data for analysis is incomplete (MLRA 58B) should nullify the results of the analysis (DEIS at 49). The model assumes non-native bovines are within the NRV for a pre- settlement time period, which does not make sense. It is impossible to understand how the model would have come up with production values based on pre-settlement conditions. It is not clear how Table 9 was derived.

The DEIS (at 74) states, "The methods described below are not used for the effects analysis but may be used as part of rangeland monitoring." The DEIS (at 75) then describes on of these methods that is apparently not going to be used analyzing effects, stating,

The methods described below are not used for the effects analysis but may be used as part of rangeland monitoring." Another monitoring and assessment tool developed for use by land managers and technical specialists is in the guide "Interpreting Indicators of Rangeland Health" (USDA Natural Resources Conservation Service 2005). This tool includes 17 indicators of rangeland health and requires a good understanding of ecological processes, vegetation, and soils for each site to which it is applied.

Then, the cumulative effects segment of the Proposed Action states, "Overall, the proposed action would have reduced impacts to rangeland vegetation and overall departure of rangeland health per the 17 indicators of rangeland health when compared to the no-action alternative" (DEIS at 88). These 17 indicators are not listed or described anywhere in the DEIS.

The effects of the alternatives on the grassland ecosystem must be completely redone. This analysis in the DEIS is not valid.

B. Effects to at-risk species
The DEIS has not taken a sufficiently hard look at the direct, indirect, and cumulative effects of the proposed amendment on the human environment as well as means to mitigate adverse environmental impacts, including ecological impacts (40 C.F.R. [sect][sect] 1502.16, 1508.25(c)). The DEIS and BE effects analysis has not detailed how specific proposed plan components affect the ecological conditions needed by at-risk species. Stated another way, the effects analysis needs to be more than a subjective, qualitative, and comparative analysis[mdash]it requires in-depth analyses of significant issues (40 CFR [sect]1501.7(a)(2)), such as species viability requirements.

The Forest Service defined the proposed amendment's purpose and need unreasonably narrowly, and in turn, failed to evaluate impacts to at-risk species at the appropriate scale. The following statement in the DEIS (at 111) raises a problem:

The analysis area includes the full Thunder Basin National Grassland. For many sensitive species, the analysis of direct, indirect, and cumulative effects focuses within proposed management area 3.67, as described by the proposed action. This area is referred to as the "proposed action area." It is large enough to be representative of the effects of natural events (fire, drought, etc.) and management activities that occur on the planning unit, across the landscape. In addition, the area is sufficiently large enough to evaluate the habitat for all species addressed.

Limiting the effects analysis of proposed management actions to Management Area 3.63/3.67 is not appropriate. Management actions in combination with other threats to as-risk species will occur outside of the Management Area and will affect species outside of this area. Not only must the DEIS take a hard look at effects across the entire plan area, it must assess effects across the broader landscape in accordance with the Planning Rule (36 CFR 219.8(a)(1)).

Cumulative effects can include all factors "beyond the authority of the Forest Service" (36 CFR [sect] 219.9(b)(2)), including activities of state and local entities that impact wildlife and biodiversity in the region.

The DEIS has not put forward a defensible method for assessing effects to at-risk species. The DEIS is therefore flawed and not sufficient to support a determination that the plan is providing the ecological conditions necessary to maintain a viable population of each species of concern. The DEIS violates 36 CFR 219.5(a)(2)(i) because the process fails to consider the environmental effects of the proposal. We demonstrate below that the analysis did not sufficiently evaluate and disclose the effects of the plan in providing conditions necessary for the at-risk species.

The NRV was actually not used in the development of plan direction, which has implications for the analysis within the EIS that must be disclosed.

The DEIS does not evaluate the effects of the plan components on all the conditions necessary for the persistence of potential SCC.

The effects analysis for the potential SCC is flawed and not sufficient to support a determination that the plan is providing the ecological conditions necessary to maintain a viable population of each species of concern. The DEIS violates 36 CFR 219.5(a)(2)(i) because the process fails to consider the environmental effects of the proposal.
1. The Draft Environmental Impact Statement fails to take a hard look at impacts of the proposed amendment to the black-footed ferret in violation of NEPA.
The effects analysis for the ferret is inadequate and confusing. It is not clear at what spatial scale the analysis is looking. The ferret analysis in the BE, which is identical to the Draft Biological Assessment, discusses a cumulative effects analysis but then doesn't seem to have conducted such an analysis. The BE also states,

In addition to analyzing effects to black-footed ferrets, this analysis compares the responsiveness of each alternative to the requirements for black-footed ferret reintroduction established by the Wyoming Game and Fish Department. Neither the proposed action nor the prairie dog emphasis alternative include any management components that would preclude reintroduction (Table 6). 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. (BE at 30)

It is not completely clear whether the analysis mentioned in this paragraph, and included in the same table (Table 6) that reports the BE's effects determination, is part of the NEPA effects analysis or completely separate. These appear to be independent of each other. Yet, if the analysis of the alternatives using the Wyoming Game and Fish Department ferret reintroduction matrix is intended to be part of the NEPA analysis, it is flawed and not in compliance with NEPA because it does not assess the effects of the plan components on the ferret.
a) Arbitrary and capricious scale of analysis
The BE does not explicitly identify the geographic scale of analysis. The DEIS specifies the analysis area for sensitive species assessments is the MA 3.67. However, the BE confusingly infers that the geographic scale for the ferret analysis may be the State of Wyoming. The BE states,

Proposed actions included in the alternatives, such as reductions in management area size, reductions in the total extent of prairie dog colonies, changes in the distribution or size of prairie dog colonies, changes in the availability of lethal prairie dog control tools, and changes in opportunities for recreational shooting, would have No Effect on black- footed ferret because only experimental populations of black footed ferret exist in the state of Wyoming, proposed actions would not affect extirpated endangered black footed ferret (USFWS 2013). (Be at 29)

Because it has been determined by the USFWS (USFWS 2013), the likelihood of identifying wild ferrets in Wyoming, outside of those resulting from reintroductions is minimal, implementation of the Thunder Basin National Grassland 2020 Plan Amendment, would have No Effect on the extirpated, non-experimental populations of black-footed, [sic] with consideration of direct, indirect and cumulative effects combined. (Be at 29)

At the same time, the effects determinations for the alternatives simply state,

No Effect - The species does not occur on the Thunder Basin National Grassland at this time. Because only experimental populations of black-footed ferret exist in the state of

Wyoming, actions would not affect extirpated endangered black-footed ferret. (BE at 32, for example)

Is this intended to cover both the Grassland as the plan unit and Wyoming? Regardless, the proposed amendment will have impacts to the ferret at the species-scale, i.e., rangewide, not merely in the plan unit or regionally.

As discussed above (Section III.C.), the Forest Service has unreasonably narrowed the purpose and need to exclude alternatives that would permit recovery of black-footed ferrets. As discussed in more detail in other sections, the best available science indicates that the recovery and delisting of black-footed ferrets depends on TBNG being tapped as one of the ten required reintroduction sites that supports 100 breeding adult ferrets. In other words, if the plan is amended excluding ecosystem and species-specific plan components (or to eliminate existing components) that would provide for the ecological conditions necessary to support the successful reintroduction of a population of 100 breeding adult black-footed ferrets, recovery of the species as a whole is likely precluded. 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[mdash]not the impacts in light of Wyoming's ferret reintroduction matrix, and especially not the "impacts" to an extirpated ferret population.

Moreover, 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[mdash]and their specific, respective plan components[mdash]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[mdash]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 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.
b) Lack of direct and indirect effects analysis
The paragraph cited above from the BE notes that the direct, indirect, and cumulative effects are combined. Yet, this does not seem to be the case. 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[mdash]to which TBNG's capacity to support 100 breeding adult ferrets is critical according to the best available science.

Moreover, the proposed amendment will have effects on the species in Wyoming. An objective of the Wyoming Ferret Plan is to have "at least one [ferret] population within black-tailed prairie dog (C. ludovicianus) colonies" (WGFD 2018 at 8). This objective has not been achieved. The Forest Service has an opportunity to manage TBNG as a recovery site and substantially advance national black-footed ferret recovery.
c) Lack of cumulative effects analysis
The BE (at 29) states, "Cumulative impacts include the incremental impacts of future State, or private activities (i.e., excluding federal activities), that are reasonably certain to occur within the action area of the Federal action subject to consultation." First, the Forest Service has unlawfully and arbitrarily and capriciously eliminated federal activities from its cumulative impacts analysis. The Counsel on Environmental Quality's NEPA regulations expressly include actions of the federal government:

The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 C.F.R. [sect]1508.7)

Therefore, reasonably foreseeable actions of federal agencies, for example possible changes in

U.S. Fish and Wildlife Service's allocation of captive-bred ferrets, must be evaluated in light of the proposed changes to the TBNG plan.

Regarding an analysis, the BE merely states,

Existing and proposed activities on non-federal lands in the planning area that have the potential to cumulatively affect the species include but are not limited to the following:

*
* Non-Federal oil and gas and related energy development
* Water depletions from irrigation diversions and dams
* Livestock grazing on private lands

* Existing and proposed wind farms
* Subdivision development
* Recreation
* Coal mine operations
* Transmission lines
* Seismic exploration
* Municipal dump expansions
* Use of rodenticides including anticoagulants

(BE at 29)

The BE then concludes, "Implementation of the plan amendment would not change any potential effects to the black-footed ferret that may result from current or projected future non-Federal actions" (BE at 29). This seems to be the sum-total of the cumulative effects analysis. This is inadequate.

The cumulative effects of past human actions, particularly repeated prairie dog poisoning throughout 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. The Draft Environmental Impact Statement and Biological Evaluation fail to take a sufficiently hard look at the effects of the proposed amendment on black-tailed prairie dog viability
The DEIS 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." 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. We demonstrate in Section C.1.B.1 that BTPDs 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 DEIS portrays them to be. The DEIS and BE analyses made no attempt to conduct a viability analysis that quantifies the effects of the proposed plan components in the alternatives.
a) Wrong geographic scale of analysis
We are not completely clear regarding the exact land area the assessment has carved out as its unit of analysis. Is it the proposed MA 3.67, as the DEIS indicates on page 111? Is it the entire Grassland?

The 10,000-acre prairie dog colony area cap/target prescribed in Alternative 3 is grassland-wide not just within the proposed MA 3.67. It may be that the limited scope of analysis to the proposed MA 3.67 has resulted in this mistake. It is not appropriate for the analysis to be circumscribed to the proposed MA 3.67; all of the action alternatives are proposing to change management throughout the Grassland.

However, we contend that the proposed MA 3.67 and the National Forest System 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" (DEIS 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 rational 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 182). 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 consider adaptive management. 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 230,000 acres in 2007 (BE at 163) and the uptick in rodenticide use to kill prairie dogs in the region referenced in the DEIS.

b) Direct and indirect effects

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.

c) Cumulative effects

The effects analyses did not take a hard look at the cumulative impacts of prairie dog poisoning and shooting and a lack of plague mitigation that has occurred historically and is projected to occur in the future across the Grassland and the broader landscape. Each action alternative, to varying degrees, will lead to an increase in prairie dog poisoning and shooting. Not including standards to assure plague mitigation may enable plague epizootics to cycle unchecked through the Grassland to a point where prairie dog populations cannot recover.

d) Arbitrary effects determination

The effects determination for each action alternative reads,

With all proposed activities combined, along with resource protection measures and plan components, the alternative 2 [and 3 and 4], "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," since the effects are expected be localized. Despite the impacts of proposed actions, it is expected that sufficient distribution of the species will be maintained on the grassland and throughout its range. In addition, components for this plan amendment were developed with the intent of maintaining ecological conditions on the grassland. (BE at 152, 153)

What does "since effects are expected to be localized mean"? The spatial scale is unclear. "Localized" could mean the entire Grassland or the entire proposed MA 3.67. Cumulative localized impacts could put at risk the viability of the mountain plover on TBNG. Our re- assessment demonstrates that adverse impacts to the prairie dog from the alternatives, especially Alternatives 2 and 3, are likely to be sufficiently significant to jeopardize the species' viability on the Grassland.

3. The Draft Environmental Impact Statement and Biological Evaluation fail to take a sufficiently hard look at the effects of the proposed amendment on mountain plover viability

The DEIS makes an arbitrary determination regarding the effects of the proposed amendment on mountain plover viability in the plan area. The DEIS incorporates much of the best available scientific information into the analyses of impacts of the proposed amendment on mountain plover. However, if the Forest Service had taken a true hard look at the amendment alternatives through the lens of this science, we believe the agency would have made the determination that all action alternatives are likely to adversely affect mountain plover viability. Below, we assess additional implications of the action alternatives and find the impacts of the plan components more severe than the DEIS portrays them to be.

a) Wrong geographic scale of analysis

We are not completely clear regarding the exact land area the assessment has carved out as its unit of analysis.

Is it the proposed MA 3.67, as the DEIS indicates on page 111? Is it the entire Grassland? The way the BE breaks out direct and indirect effects indicates the analysis area is the proposed 3.67 area. For example, the effects assessment for Alternative 3 states the following,

Direct effects to mountain plover would include removal or degradation of localized available habitat within MA 3.67 from proposed prairie dog boundary changes.

Management Area size would decrease by 22,000 acres (43%) and thereby decrease available patch size, contiguity, structure and quality. This removal would reduce the potential habitat mountain plovers use for foraging and nesting. (BE at 153)

Then the BE (at 153) states,

Indirect effects would include accidental poisoning from rodenticides, direct mortality from recreational shooting and other density control (drought management) and naturally occurring events, such as sylvatic plague. Recreational shooting is proposed but without a seasonal restriction, including BMZ and any identified satellite acres, which will lessen protections to prairie dogs and associated species. Density control is limited, when a colony reaches below 10,000 acres in 3.67 and satellite colonies, with no more than 50% of any colony to be treated.

The 10,000-acre prairie dog colony area cap/target prescribed in Alternative 3 is grassland-wide not just within the proposed MA 3.67. It may be that the limited scope of analysis to the proposed MA 3.67 has resulted in this mistake. It is not appropriate for the analysis to be circumscribed to the proposed MA 3.67; all of the action alternatives are proposing the change management throughout the Grassland.

However, we contend that the proposed MA 3.67 and the National Forest System 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" (DEIS at 93) 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 154).

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 consider adaptive management. 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 230,000 acres in 2007 (BE at 163) and the uptick in rodenticide use to kill prairie dogs in the region referenced in the DEIS.
b) Direct and indirect effects
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.

We agree with the characterization that "range management" has had cumulative impacts on mountain plovers due to commercial livestock operations managing grasslands for vegetative homogenization and avoidance of bare ground. However, 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 more of non-native livestock- dominated system will have direct and indirect impacts. The impacts stem not just from repeated poisoning and shooting of prairie dogs to keep total colony area artificially limited in extent but also how the remaining occupied colony area will be manipulated through management.

Desired conditions for the Broken Hills and Cellars Rosecrans geographic areas, which overlap the proposed MA 3.67, for Alternatives 2, 3, and 4 all include, "Ecological site descriptions are used to portray ecological processes and dynamics" (see Appendix A at A-30). And each action alternative includes in a guideline, "In an ecological site, vegetation should be managed to maintain a range of plant community phases within the existing state or to move toward a state that will meet desired conditions for that site" (see Appendix A at A-31).

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 effects analyses for Alternatives 1, 2, and 3 all notes, "This alternative allows the use of rodenticides, recreational shooting of prairie dogs and density control when prairie dog populations reach levels of concern." (BE at 148, 149, 150). The presence of prairie dogs at their target levels is apparently the proxy for mountain plover habitat, 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.

The BE mischaracterizes prescriptions for density control for Alternative 2, stating, "Density control is also limited, when a colony reaches below 7,500 acres in 3.67" (BE at 152). This is not true, the relevant standard reads, "When the acreage of colonies within Management Area

3.67 is less than 7,500 acres, lethal control tools will not be used except in the following situations:" [hellip] "Density Control" (Appendix A at A-39). The BE also mischaracterizes how density control in Alternative 3 is prescribed, state, "Density control is limited, when a colony reaches below 10,000 acres in 3.67 and satellite colonies, with no more than 50% of any colony to be treated. The standard reads, "When the total area of prairie dog colonies across the Grassland is less than 10,000 acres, lethal control is prohibited, except in the following situations:" [hellip]"Density control" (Appendix A at A-47). In light of these significant errors, the impacts of density control on mountain plover viability must be reanalyzed.

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 Forest Service must assess the impacts of artificial colony manipulation of the structure, configuration, and distribution of prairie dog colonies.

The Forest Service must also analyze the effects of not including mandatory plague mitigation in a standard. What would be the impact on mountain plovers if no mitigation occurs and plague keeps prairie dog colony area at below target levels? This high probability scenario must be assessed.
c) Cumulative effects
The effects analyses did not take a hard look at the cumulative impacts of prairie dog poisoning and shooting and a lack of plague mitigation that has occurred historically and is projected to occur in the future across the Grassland and the broader landscape. Each action alternative, to varying degrees, will lead to an increase in prairie dog poisoning and shooting. Not including standards to assure plague mitigation may enable plague epizootics to cycle unchecked through the Grassland to a point where prairie dog populations cannot recover.
d) Arbitrary effects determination
The effects determination for each action alternative reads,

With all proposed activities combined, along with resource protection measures and plan components, the alternative 2 [and 3 and 4], "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," since the effects are expected be localized. Despite the impacts of proposed actions, it is expected that sufficient distribution of the species will be maintained on the grassland and throughout its range. In addition, components for this plan amendment were developed with the intent of maintaining ecological conditions on the grassland. (BE at 152, 153)

What does "since effects are expected to be localized mean"? The spatial scale is unclear. "Localized" could mean the entire Grassland or the entire proposed MA 3.67. Cumulative localized impacts could put at risk the viability of the mountain plover on TBNG. Our re- assessment demonstrates that adverse impacts to the mountain plover from the alternatives, especially Alternatives 2 and 3, are likely to be sufficiently significant to jeopardize the species' viability on the Grassland.

VIII. Endangered Species Act

The Forest Service is obligated to comply with Section 7(a)(1) of the ESA, which mandates that federal agencies implement programs to conserve (i.e., help recover) threatened and endangered species[mdash]in this case, the federally endangered black-footed ferret. The proposed amendment signals the Forest Service's willingness to abandon a decades-long commitment to contribute to ferret recovery on TBNG. Implementing any of the proposed action alternatives would be a dramatic shift away from consistent management direction that enabled TBNG to serve as a ferret recovery site. We discussed this extensively in our scoping comments, and our assertions regarding this issue still hold (see Defenders et al. 2019 at 26-34). Merely "supporting ecological conditions that do not preclude reintroduction of the black-footed ferret" falls short of meeting the Section 7(a)(1) mandate.

It is imperative that the TBNG serve as one of these sites to be able to achieve the recovery objective of 10 populations with 100 or more breeding adult black-footed ferrets. Too few suitable sites, with sufficient ecological capacity, exist for TBNG not offer a home to a viable population of ferrets. As we have emphasized above, the Forest Service was once committed to managing national grasslands, in addition to Buffalo Gap, as ferret recovery sites and recognized this being a "significant contribution" to ferret recovery (See Section VII.A.1.c above). The Forest Service is now proposing to eliminate this contribution. We encourage the Forest Service to reaffirm its commitment to be a leader in ferret recovery. That TBNG would become a ferret recovery site has long been an expectation of Forest Service personnel involved in the species' recovery. This, in turn, requires a management plan that provides a prescriptive framework for reaching this goal. Though we believe the current management plan need not be changed, this should be integral to the purpose and need of the DEIS if the Forest Service is intent on moving forward with the proposed amendment.

The Forest Service is required under the ESA to promote recovery of federally threatened and endangered species. Congress enacted the ESA to provide "a program for the conservation of [hellip] endangered species and threatened species" (16 U.S.C. [sect] 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 U.S.C. [sect] 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 U.S.C. [sect] 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 U.S.C. [sect] 1532(3)).

To reiterate, ferrets depend on prairie dogs and the TBNG is one of the few places in the ferret's historic range that has the capacity to support prairie dog colony complexes with an abundance of prairie dogs likely sufficient to support 100 breeding adult ferrets. Key ferret recovery criteria from the BFF Recovery Plan include the following:

Establish free-ranging black-footed ferrets totaling at least 3,000 breeding adults, 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, and at least 5 populations within colonies of Gunnison's and white-tailed prairie dogs. (BFF Recovery Plan at 6)

Maintain a total of approximately 494,000 ac (200,000 ha) of prairie dog occupied habitat at reintroduction sites by planning and implementing actions to manage plague and conserve prairie dog populations (specific actions are described in Part II of this plan). (BFF Recovery Plan at 6)

The BFF Recovery Plan imparted a sense of urgency regarding the need to release ferrets into the wild:

Timely establishment of wild black-footed ferret populations is critical to minimize deleterious effects resulting from too many generations of captive breeding. These effects may include reduced reproductive fitness, physical abnormalities, behavioral abnormalities, adaptation to the captive environment, and loss of natural selection. (BFF Recovery Plan at 36)

Despite the recent mass prairie dog die-off from sylvatic plague, the Grassland retains the capacity to support 100 breeding adult ferrets. The 2017 count of 48,000 acres of active prairie dog colonies demonstrates this capacity, though it may take a few years for the population to recover. The Forest Service must retain a management plan that provides the ecological conditions necessary to contribute to the recovery of the species for the agency to fulfill its responsibilities under Section 7(a)(1) of the ESA.

The 2002 TBNG LRMP, 2009 prairie dog management amendment to the LRMP (Amendment #3), and 2015 Strategy were all designed to maintain sufficient prairie dog habitat for ferrets while addressing landowner concerns about prairie dogs encroaching on the private lands.

Based on the best available science at the time, which has now been updated based on new findings from Conata Basin research (See Section VII.A.2.b in these comments), the 2015 Strategy (at 12) stated, It is anticipated that 18,000-acres will be sufficient habitat to allow ferrets to persist through a plague epizootic and recover naturally along with the prairie dog populations, particularly since a minimum of 10,621-acres of prairie dogs at a moderate density are needed to support a self-sustaining population of ferrets (Jachowski et al. 2011).

Again, the 10,621-acre minimum has recently been found to be too small. The 2015 Strategy (at

6) stated, "Fragmentation of habitat and reduction in prairie dog colonies could preclude any future reintroductions of the federally endangered black-footed ferret on the TBNG." Yet, increasing habitat fragmentation and reducing prairie dog colony size down from targets in the current plan is precisely what the proposed amendment will do.

Footnotes:

1United States Department of Interior, U.S. Fish and Wildlife Service. 2017. Letter to Mr. Brian Ferebee (Regional Forester, U.S. Forest Service, Rocky Mountain Region) from Ms. Noreen E. Walsh (Regional Director, U.S. Fish and Wildlife Service, Mountain-Prairie Region). May 30.

2 Black-footed Ferret Reintroduction Site Prioritization Matrix. https://www.fs.usda.gov/nfs/11558/www/nepa/110862_FSPLT3_5013106.pdf.

3 Despite our financial investments to rebuild prairie dog populations after the 2009 plague outbreak being undermined by the Forest Service's recantation of the prairie dog shooting ban and refusal to allow plague mitigation during the recent outbreak, we remained committed to the stakeholder process. Despite being informed by the Forest Supervisor that we could no longer discuss black-footed ferret reintroduction during what was supposed to be a collaborative working group to address concerns regarding prairie dog management on the TBNG, we attended the meetings and offered suggestions. We continue to invest in research projects on the TBNG that might help address prairie dog management concerns. We continue to believe that the voices of all

stakeholders at TBNG matter and there is a solution where humans can exist in harmony with the wildlife living on the landscape.

4 Explained and defined by Waples (2002) "effective population size" in the following way: "In finite populations (i.e., in all biological populations), random genetic drift leads to changes in allele frequency and loss of genetic variability. In "ideal" populations (Fisher 1930; Wright 1931)[mdash]those with random mating, an equal sex ratio, discrete (nonoverlapping) generations, and random variation in reproductive success[mdash]genetic drift occurs as a rate described by an inverse function of population size (N). Because real populations almost never satisfy the conditions of an "ideal" population, (Wright (1931, 1938) developed the concept of "effective population size" (Ne), which describes the size of an ideal population under consideration. Departures from the "ideal" conditions generally cause Ne to be less than N, and often a good deal less.

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Defenders of Wildlife
Prairie Dog Coalition of the Humane Society of the United States World Wildlife Fund

Suggestions for Management Area 3.63

Outlined below are draft ideas for improvements to Thunder Basin National Grassland Management Area 3.63 management, accompanied by Figure 1 and Table 1. We presented these suggestions to the Forest Service on several occasions during the July - December 2019 Working Group meetings.

1. Retain the MA 3.63 as Black-footed Ferret Reintroduction Habitat.
2. Adjust the current MA 3.63 boundary (Figure 1). Make slight alterations to the current MA 3.63 boundary based on naturally occurring geographic features to reduce prairie dog expansion from the 3.63 area to nearby private lands. Specifically, move the MA

3.63 boundary as shown in Figure 1:

*
*
* Along Frog Creek;
* Along a portion of the Cheyenne River;
* Into the MA 3.63 adjacent to the Sears residence; and
* To exclude all lands within the private residence 1-mile buffer

1. Current MA 3.63 = 50,891 acres of federal land with maximum potential of 29,560 acres prairie dogs.
2. Proposed MA 3.63 = 48,127 acre of federal land with maximum potential of 27,744 acres prairie dogs.
3. Subtract [frac14] mile buffers along private land boundaries (4,945 acres, maximum potential of 2,366 acres prairie dogs) = 43,182 acres of federal land with maximum potential of 25,478 acres prairie dogs.

This is a 15 percent reduction in MA 3.63 size but addresses main areas of boundary conflict and improves boundary management. Addressing boundary management conflicts will likely improve social tolerance of prairie dogs in the MA 3.63.

1. Maintain the existing 1-mile buffer zone around residences, establish a [frac14] mile buffer zone within MA 3.63 adjacent to private lands, and consider working with Wyoming Game, Fish and Parks to create a 1-mile buffer zone along the outside perimeter of the MA 3.63 (Figure 1). The goal of the buffer zones is to reduce or prevent prairie dog expansion to adjacent private lands where not desired.

* Priority: Manage prairie dogs within 1-mile of identified residences adjacent to MA 3.63. Using the maximum extent of prairie dog occupancy on the Grassland, this would total a maximum of 1,873 acres of prairie dog colonies on federal land (Table 1).
* Second priority: Manage prairie dogs inside the proposed MA 3.63 within [frac14] mile of private land; this would total a maximum of 2,366 acres of prairie dog colonies on federal land (Table 1).
* Third priority: Manage prairie dogs inside a 1-mile buffer around the outside of the proposed MA 3.63; excluding 1-mile residence buffers, this would total a maximum of 5,175 acres of prairie dog colonies on federal land (Table 1).

Note: If prairie dogs are removed annually, reoccupancy would not approach the maximum acres occupied in the past. A reasonable estimate of annual reoccupancy could be estimated at 10% of these maximum numbers, or 941 acres - see Table 1 below.

1. Actively restore and protect from sylvatic plague, recreational shooting, and poison a minimum of 18,000 acres of active prairie dog colonies within MA 3.63. To support at least 100 breeding adult black-footed ferrets, more than 15,000 acres are needed (U.S. Fish and Wildlife Service 2013). The most recent science from Conata Basin, South Dakota suggests 20,495 to 47,931 acres (average of 33,323 acres; see Livieri 2014, 2015, 2016, 2017, 2018, 2019) of active prairie dog colonies are needed to host 100 breeding adults. These prairie dog acres may be distributed in several subcomplexes that each follow the 1.5-km rule.

Restoring and maintaining prairie dog colonies in the MA 3.63 will allow the Forest Service to meet its obligations under the National Forest Management Act and the Endangered Species Act to provide habitat for species that the Forest Service has identified for special management consideration. The Forest Service Manual regulation directs the agency to:

* "Conduct activities and programs to assist in the identification and recovery of threatened and endangered plant and animal species." (Section 2670.12 - U.S. Department of Agriculture Directives; Departmental Regulation 9500-4);
* "Manage National Forest System habitats and activities for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the Endangered Species Act are no longer necessary." (Section 2670.21 - Threatened and Endangered Species);
* "Develop and implement management objectives for populations and/or habitat of sensitive species." (Section 2670.22 - Sensitive Species); and
* ". . . 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." (Section 2670.11 - Endangered Species Act, Section 2).

We recognize that the Forest Service multiple use mandate includes maintaining wildlife habitat, livestock grazing, recreation, mining, etc. Additionally, we believe solutions exists where humans can exist in harmony with the wildlife living on TBNG. Given the fluctuating wildlife populations, vegetation, and climatic conditions in the MA 3.63 and the concerns of stakeholders over Forest Service management of prairie dogs, the Forest Service could start with a goal of restoring and maintaining a complex of prairie dog colonies, such as 10,000 acres, and phase in additional prairie dog colony complexes within the MA 3.63 over time to ultimately restore a minimum of 18,000 acres of connected prairie dog colonies.

Specifically, we would like to see the following protections maintained or enacted within the MA 3.63:

* Maintain the prohibition on lethal (i.e., poisoning and shooting) control in the 3.63 area;

* Proactively and strategically mitigate sylvatic plague annually within the MA 3.63; and
* Maintain the ability to use of non-lethal tools (e.g., translocation, vegetative buffers, etc.) to mitigate boundary conflicts and reduce the amount of lethal control needed in the buffers.

1. Engage in conflict reduction in the MA 3.63

* Consolidate federal land by swapping out the state land sections in Figure 1 below.
* Seek additional grazing opportunities for permittees within the MA 3.63.

Map.Figure in attachment: Suggested Management Area 3.63 boundary adjustments and prairie dog management on Wyoming's Thunder Basin National Grassland

Table 1 in attachment: Estimated cost of maintaining buffer zones in and adjacent to the proposed MA 3.63 on the Thunder Basin National Grassland

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Threatened, Endangered and Sensitive Plants and Animals.