Thunder Basin 2020 Plan Amendment

Biological Evaluation of Threatened, Endangered, and Regional Forester Sensitive Animal Species and Preliminary List of Potential Species of Conservation Concern Report

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for:
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Introduction

This analysis evaluates and discloses the potential environmental consequences for terrestrial and aquatic animal species that may result from amending the Thunder Basin National Grassland (TBNG) land and resource management plan (grassland plan). There are two parts to this analysis, both of which examine the effects of four action alternatives and the no action alternative on wildlife resources. The first part is the biological evaluation (BE) of animal species, and the second part is the potential animal species of conservation concern report.

The purpose of the BE is to present the analysis and determination of effects of the alternatives on federally listed species (endangered, threatened, and proposed) and Forest Service sensitive species (FSM 2670.31-2670.32). The BE conforms to legal requirements set forth under section 7 of the Endangered Species Act (19 U.S.C. 1536 (c), 50 CFR 402.12 (f) and 402.14). Section 7(a)(1) of the Endangered Species Act requires Federal agencies to use their authorities to further the conservation of listed species. Forest Service policy requires that a review of programs and activities, through an effects analysis document (referred to in current Forest Service policy as a BE), be conducted to determine their potential effect on threatened and endangered species, species proposed for listing, and Regional Forester-designated sensitive species (RFSS; FSM 2670.3). In addition to this BE, a biological assessment (BA) must be prepared for Federal actions that impact federally listed species to evaluate the potential effects of the action on these species and critical habitats. Please refer to the BA that has been prepared for this plan amendment for further analysis and information.

The potential animal species of conservation concern report examines impacts to potential species of conservation concern. A species of conservation concern is “a species, other than federally recognized threatened, endangered, proposed, or candidate species, that is known to occur in the plan area and for which the regional forester has determined that the best available scientific information indicates substantial concern about the species’ capability to persist over the long-term in the plan area” (36 CFR 219.9 (c)). This potential species of conservation concern report conforms to the requirements for analysis of potential species of conservation concern in forest plan amendments, as directed in Forest Service land management planning regulations (36 CFR 219.9; 81 FR 90726).

Summary of Effects

Table E-1 provides a brief summary of the effects determinations for those species that were reviewed for analysis including federally listed species, sensitive species, and potential species of conservation concern. Please see “Effects Analysis – Threatened and Endangered Species,” “Effects Analysis – Forest Service Sensitive Species,” and “Effects Analysis – Potential Species of Conservation Concern” sections for full analyses.

Table E-1. Summary of effects for all alternatives for endangered species, Forest Service sensitive species, and potential species of conservation concern

Class	Common Name	Status	Determination for All Alternatives
Amphibian	Northern leopard frog	Sensitive	No impact
Bird	Bald eagle	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Bird	Brewer's sparrow	Sensitive; Potential SCC	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
Bird	Burrowing owl	Sensitive; Potential SCC	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
Bird	California gull	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Bird	Chestnut-collared longspur	Sensitive; Potential SCC	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
Bird	Dickcissel	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Bird	Ferruginous hawk	Sensitive; Potential SCC	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
Bird	Flammulated owl	Sensitive	No impact
Bird	Golden eagle	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Bird	Grasshopper sparrow	Sensitive; Potential SCC	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
Bird	Greater sage-grouse	Sensitive; Potential SCC	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
Bird	Lewis's woodpecker	Sensitive	No impact
Bird	Loggerhead shrike	Sensitive	No impact
Bird	Long-billed curlew	Sensitive; Potential SCC	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

Class	Common Name	Status	Determination for All Alternatives
Bird	McCown's longspur	Sensitive; Potential SCC	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
Bird	Merlin	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Bird	Mountain plover	Sensitive; Potential SCC	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
Bird	Northern goshawk	Sensitive	No impact
Bird	Northern harrier	Sensitive; Potential SCC	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
Bird	Olive-sided flycatcher	Sensitive	No impact
Bird	Peregrine falcon	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Bird	Ring-billed gull	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Bird	Sagebrush sparrow	Sensitive; Potential SCC	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
Bird	Sage thrasher	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Bird	Short-eared owl	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Bird	Swainson's hawk	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Bird	Upland sandpiper	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Fish	Finescale dace	Sensitive	No impact
Fish	Flathead chub	Sensitive	No impact
Fish	Mountain sucker	Sensitive	No impact
Fish	Plains minnow	Sensitive	No impact
Fish	Plains topminnow	Sensitive	No impact
Fish	Sturgeon chub	Sensitive	No impact
Invertebrate	Monarch butterfly	Sensitive	No impact
Invertebrate	Ottoe skipper	Sensitive	No impact
Invertebrate	Regal fritillary	Sensitive	No impact
Invertebrate	Western bumblebee	Sensitive	No impact
Mammal	Black-footed ferret	Endangered	No impact

Class	Common Name	Status	Determination for All Alternatives
Mammal	Black-tailed prairie dog	Sensitive; Potential SCC	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
Mammal	Fringed myotis	Sensitive	No impact
Mammal	Hoary bat	Sensitive	No impact
Mammal	Northern long-eared bat	Threatened	No impact
Mammal	Rocky Mountain bighorn sheep	Sensitive	No impact
Mammal	Swift fox	Sensitive; Potential SCC	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
Mammal	Thirteen-lined ground squirrel	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Mammal	Townsend's big-eared bat	Sensitive	No impact
Reptile	Plains hog-nosed snake	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment
Reptile	Prairie rattlesnake	Potential SCC	No substantial adverse impacts or substantially lessened protections as a result of the plan amendment

*Sensitive = Forest Service sensitive species; Potential SCC = Potential species of conservation concern

Regulatory Framework

The Forest Service is legally required to comply with a number of Federal laws, regulations, and policies regarding wildlife, including the National Forest Management Act of 1976, as amended, and its 2012 implementing regulations; the 2002 grassland plan; Forest Service Manual 2600, "Wildlife, Fish, and Sensitive Plant Habitat Management"; the National Environmental Policy Act of 1969 (NEPA), as amended; the Endangered Species Act of 1973, as amended; the Bald and Golden Eagle Protection Act of 1940, as amended; the Migratory Bird Treaty Act of 1918, as amended; and Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds." Other guidance and direction resides in recovery plans, conservation strategies, and management plans for wildlife species, including the TBNG Black-Tailed Prairie Dog Conservation Assessment and Management Strategy (2009, revised in 2015), the Wyoming Black-footed Ferret Management Plan (WGFD 2018), the Black-footed Ferret Recovery Plan (USFWS 2013), the Species Status Assessment Report for the Black-footed Ferret (USFWS 2019) and the U.S. Fish and Wildlife Service 5 Year Review for the Black-footed Ferret 2020 Update (USFWS 2020a).

Law, Regulation, and Policy

- USDA Departmental Regulation 9500-4 (2008) states the policies of the Department with respect to management of fish and wildlife and their habitats and prescribes specific actions to implement the policies. It provides further direction to the Forest Service regarding assisting in the recovery of threatened and endangered species, avoiding actions that may further jeopardize these species or cause a species to become threatened or endangered, consulting with the

Departments of Interior and Commerce on actions that may affect threatened and endangered terrestrial and aquatic species, and managing habitats to conserve and recover these species.

- The National Forest Management Act (1976) governs the development of land and resource management plans for national forests and national grasslands. The Forest Service has developed NFMA implementing regulations (1982, 2012) to further specify direction for forest planning under the National Forest Management Act. These Forest Service regulations govern planning requirements for animal species, including the provision of a diversity of plant and animal communities (16 U.S.C. § 1604(g)(3)(B)). For example, regarding management of species of conservation concern, the current planning regulations, known as "the 2012 planning rule," define a viable population as one that "continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future events" (36 CFR section 219.19 [2012]).
- The 2002 grassland plan provides desired conditions, objectives, standards, and guidelines that direct management activities on the TBNG. Current direction that is most relevant to wildlife resource management is available in the grassland plan. Proposed changes to plan direction for each action alternative are provided in appendix A of the final environmental impact statement (EIS).
- The Forest Service Manual provides Forest Service-specific policy to guide management and planning per the various Federal statutes that affect Forest Service activity. Forest Service Manual 2600 contains policy regarding wildlife, fish, and sensitive plant habitat management. According to the manual, a review of programs and activities through an effects analysis document (referred to in current Forest Service policy as a Biological Evaluation, or BE) must be conducted to determine the potential effect on threatened and endangered species, species proposed for listing, and Regional Forester-designated sensitive species (FSM 2670.3). The objectives of BEs are (1) to ensure Forest Service actions do not contribute to loss of viability of any native or desired nonnative plant or animal species or contribute to trends toward Federal listing of any species; (2) to comply with the requirements of the Endangered Species Act that actions of Federal agencies not jeopardize or adversely modify critical habitat of federally listed species; and (3) to provide a process and standard to ensure threatened, endangered, proposed, and sensitive species receive full consideration in the decision-making process (FSM 2672.41). Forest Service Manual direction provides additional guidance for proposed and listed threatened and endangered species. It requires that the Forest Service identify and prescribe measures to prevent adverse modifications or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species (FSM 2670.31 (6)). The analysis contained in this document constitutes the BE, as required for the plan amendment by Forest Service policy.
- The Endangered Species Act 16 U.S.C. §1531 et seq. (1973) requires the Forest Service to manage for the recovery of threatened and endangered species and the ecosystems upon which they depend. The Forest Service is also required to consult with the U.S. Fish and Wildlife Service if a proposed activity may affect the population or habitat of a listed species. A separate draft Biological Assessment (BA) was developed for all alternatives consistent with the draft EIS; a final BA has been developed for the preferred alternative, consistent with the FEIS and Draft ROD and as required for consultation with the U.S. Fish and Wildlife Service.
- The Bald and Golden Eagle Protection Act, originally passed in 1940, prohibits the take, possession, sale, purchase, barter, offer to sell, purchase, or barter, transport, export, or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by

permit (16 U.S.C 668(a); 50 CFR 22). “Take” is defined as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb” a bald or golden eagle. The term “disturb” under the Bald and Golden Eagle Protection Act means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. The U.S. Fish and Wildlife Service recently revised the regulations for eagle non-purposeful take permits and eagle nest take permits (Federal Register 81:91494-91553; 16 December 2016) under the Bald and Golden Eagle Protection Act (50 CFR 22.26). The regulations provide for individual and programmatic permits that are consistent with the goal of stable or increasing eagle breeding populations. Analyses of effects to bald eagle and golden eagle are included in the potential SCC report below, and continued compliance with the Bald and Golden Eagle Protection Act has been ensured in the revision of plan components.

- The Migratory Bird Treaty Act established an international framework for the protection and conservation of migratory birds. This act makes it illegal, unless permitted by regulations, to “pursue, hunt, take, capture, purchase, deliver for shipment, ship, cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird.” To comply with the act, Thunder Basin National Grassland staff have completed analyses of effects to migratory birds that are Forest Service sensitive species and potential species of conservation concern. These species serve as proxies for analysis of effects to other migratory bird species. Approaches to identify and minimize take have been incorporated into revised plan components.

Other Guidance

- Specific to this project, other guidance documents are referenced and considered as part of the plan amendment process, including the 2015 TBNG Black-tailed Prairie Dog Conservation Assessment and Management Strategy, the 2013 Black-footed Ferret Recovery Plan, and the 2018 Wyoming Black-footed Ferret Management Plan. The TBNG Black-tailed Prairie Dog Conservation Assessment and Management Strategy was formally adopted as management direction through a 2009 amendment to the grassland plan. This strategy was updated in 2015 and provides specific direction for prairie dog management on the grassland. As part of this amendment process, content in the strategy that serves as plan direction will be amended and brought into the grassland plan itself. At the end of the amendment process, the grassland plan will no longer reference a Black-tailed Prairie Dog Conservation Assessment and Management Strategy. The Black-footed Ferret Recovery Plan and the Wyoming Black-footed Ferret Management Plan provide habitat and reintroduction requirements for black-footed ferret that have been considered as part of the alternative development and analysis process for this plan amendment project.

Public Comments and Issues Addressed in This Analysis

Issues are points of concern about effects that may occur as a result of implementing the proposed action. Issues are generated by the public and are in response to the proposed action; others are identified by the interdisciplinary team based on local and specific scientific knowledge and may be used to disclose and compare effects between actions. Issues identified during scoping can either be addressed by developing alternatives to the proposed action or by adjusting the proposed action to resolve conflicts [36 CFR 220.7 (b)(2)(i)].

Based on a review of public scoping comments and concerns, the interdisciplinary team developed three action alternatives as well as a no-action alternative that were analyzed in detail in the draft EIS. During the 90-day comment period on the draft EIS, the Forest Service received about 275 comment letters, with about 50 unique and substantive comments. Although no new issues were raised, commenters provided detailed suggestions on how to improve the analysis and recommendations for new alternatives. The Forest Service developed alternative 5, the preferred alternative, in response to those comments. The action alternatives include a modified version of the proposed action with the addition of seasonal shooting restrictions and the addition of plan components related to drought and density management; a Grassland-Wide Alternative in which all prairie dog acres on the grassland count toward a desired range for prairie dog colony acres; a Prairie Dog Emphasis Alternative that would retain much of the management described in the current grassland plan and prairie dog management strategy, but would allow more flexibility in management, especially with regard to boundary management; and the Preferred Alternative, which combines aspects of the action alternatives into the management alternative that the agency thinks can be most successfully implemented.

Action alternatives developed for this plan amendment project would generally decrease the acreage objectives 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. Because no habitat is proposed for conversion to other land uses, the habitat would be available to species with different habitat requirements and may be made available again as short-stature vegetation if management actions change in the long-term. Implementation of a plan amendment is expected to have short and long-term neutral or positive effects on rangeland resources, livestock grazing, and socioeconomic issues. Effects analyses were limited to issues raised internally or during the public scoping period or to analysis required by law, regulation, or policy. See Table E-2 for more information.

Table E-2. Comparison of effects of alternatives related to the issues identified for analysis

Issue	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Grassland-wide	Alternative 4 Prairie Dog Emphasis	Alternative 5 Preferred Alternative
Ensure viability of sensitive species and potential species of conservation concern	Manages for greatest extent of prairie dog colonies (33,000 acres) and provides adequate extent of habitat so that management “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” for all at-risk species analyzed.	Manages for a lower acreage of prairie dog colonies (10,000 acres) than no action, but provides adequate extent of habitat so that management “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” for all at-risk species analyzed.	Manages for a lower acreage of prairie dog colonies (10,000 to 15,000 acres) than no action, but provides adequate extent so that management “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” for all at-risk species analyzed.	Manages for a slightly lower acreage of prairie dog colonies (27,000 acres) than no action and a greater acreage than the proposed action and grassland-wide alternatives. Provides adequate extent of habitat so that management “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” for all at-risk species analyzed.	Manages for a lower acreage of prairie dog colonies (10,000 acres) than no action, but provides adequate extent of habitat so that management “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” for all at-risk species analyzed.
Contributions to black-footed ferret recovery	Management area 3.63 is managed for 18,000 acres or more of prairie dog colonies, expected to be enough acreage to support at least 100 breeding adult ferrets. Boundary management has had limited success, and lack of social acceptance for reintroduction and recurrence of sylvatic plague have prevented reintroduction efforts since 2002.	Management area 3.67 is managed for 10,000 acres of prairie dog colonies, expected to be enough acreage to support at least 30 breeding adult ferrets. Lower prairie dog colony acreage objectives and explicit boundary management are intended to intended to meet minimum requirements for reintroduction in Wyoming.	The grassland is managed for 10,000 to 15,000 acres of prairie dog colonies, expected to be enough acreage to support at least 100 breeding adult ferrets. However, the colonies may not be in close enough proximity to provide ideal reintroduction areas. Use of anticoagulants is not consistent with reintroduction area management. Lower prairie dog colony acreage objectives and explicit boundary management are intended to meet minimum requirements for reintroduction in Wyoming.	Management area 3.63 is managed for 18,000 acres or more of prairie dog colonies, expected to be enough acreage to support at least 100 adult ferrets. Explicit boundary management may decrease conflicts even while maintaining higher prairie dog colony acreage objectives.	Management area 3.63 is managed for 18,000 acres or more of prairie dog colonies, expected to be enough acreage to support at least 100 breeding adult ferrets. Boundary management has had limited success, and lack of social acceptance for reintroduction and recurrence of sylvatic plague have prevented reintroduction efforts since 2002.

The following issue statements do not represent conclusions. They are public concerns that need to be addressed by alternatives and analyzed in the environmental impact statement. See the environmental impact statement for more information. This report analyses issue statements as they relate to wildlife directly, indirectly or both.

1. Viability of sensitive species and potential species of conservation concern
    a. Managed reductions in prairie dog colony size, distribution, or density could decrease the ability of prairie dogs and associated species to persist on the national grassland.
    b. Extreme fluctuations in prairie dog colony extent due to drought, plague, and other environmental disturbances or stressors may occur despite management efforts and could decrease the ability of prairie dogs and associated species to persist on the national grassland.
    c. Effects of climate change on the grassland ecosystem could impact the ability of prairie dogs and associated species to persist on the national grassland.
2. Black-footed ferret recovery
    a. Managed reductions in prairie dog colony size, distribution, or density could reduce the availability of habitat for black-footed ferret reintroduction, the ability to reintroduce black-footed ferrets on the national grassland, and the likelihood of achieving range-wide recovery criteria described in the U.S. Fish and Wildlife Service 2013 recovery plan.
    b. Extreme fluctuations in prairie dog colony extent due to drought, plague, and other environmental disturbances or stressors may occur despite management efforts and could impact the availability of habitat for black-footed ferret reintroduction, the ability to reintroduce black-footed ferrets on the national grassland, and the likelihood of achieving range-wide recovery criteria described in the U.S. Fish and Wildlife Service 2013 recovery plan.
    c. Social issues surrounding black-footed ferret recovery efforts could decrease the likelihood or success of future reintroduction.
3. Forage for permitted livestock
    a. Management actions that increase or decrease prairie dog colony size, distribution, or density could change forage availability for livestock production on NFS land.
    b. Encroachment of prairie dogs onto private and State lands could impact forage availability for livestock production on private and State land.
4. Economic concerns
    a. Changes to forage availability could impact income and jobs associated with ranching activities.
    b. Encroachment of prairie dogs onto private lands could decrease land values and impact facilities.
5. Health and Safety Concerns
    a. Existence of plague among wildlife populations on the Thunder Basin National Grassland could pose a risk to human health.
    b. Burrows in prairie dog colonies could create safety hazards for permittees, workers, visitors, and livestock on NFS land and where encroachment has occurred on state and private lands.

6. Recreational Shooting
    a. Prohibitions on shooting may eliminate a tool for controlling prairie dog populations.
    b. Prohibitions on shooting could reduce recreational opportunities and associated economic benefits for surrounding communities.
    c. Allowing shooting within management areas 3.63 and 3.67 may disrupt prairie dog reproduction and dispersal dynamics and may cause direct take of associated and protected species.
7. Federal land boundary management
    a. A boundary management zone of ¼ mile may not be adequate to prevent encroachment onto private and State lands.
8. Use of rodenticides
    a. Rodenticides used to kill prairie dogs could poison and kill other, non-target wildlife species.
    b. Restrictions on rodenticide use could make control of prairie dogs ineffective.
9. Cost of implementing the plan amendment
    a. Costs associated with staff time, supplies, and other resources could limit the ability to implement the plan effectively.
10. Failure to implement current management plan
    a. More aggressive implementation of the current plan could reduce conflicts and the need for a plan amendment.
11. Laws, regulations, and policies
    a. Proposed changes to prairie dog management could conflict with requirements of the National Forest Management Act and 2012 Planning Rule, National Environmental Policy Act, and Endangered Species Act, particularly with regard to rangeland management and management of at-risk species.
    b. Forest Service may not be fulfilling its role regarding recovery of species listed under the Endangered Species Act.
    c. Forest Service may not have legal authority to manage national grasslands for multiple uses.
    d. Forest Service may not be appropriately addressing detrimental environmental impacts from prairie dog occupancy, including soil erosion.
12. Candidate conservation agreements
    a. Candidate conservation agreements and candidate conservation agreements with assurances could reduce the acres of prairie dog colonies needed on Federal land to provide habitat for associated species across the landscape.
13. Greater sage-grouse habitat
    a. Occupancy of greater sage-grouse habitat management areas by both prairie dogs and greater sage-grouse could create management conflicts.

14. Collaborative stakeholder group
    a. If the collaborative stakeholder group is poorly organized, unbalanced in membership, or cannot produce consensus decisions, the group may be ineffective and recommendations may not represent diverse interests.

Project Information

Location

The Thunder Basin National Grassland is located in the Powder River Basin of northeastern Wyoming, in portions of Campbell, Converse, Crook, Niobrara, and Weston Counties. Within the Thunder Basin administrative boundary are approximately 553,000 acres of Federal land managed by the U.S. Forest Service, intermingled with more than 1 million acres of private and State lands. These lands generally lie between Douglas, Wyoming to the south, Newcastle, Wyoming to the east, the Montana border to the north, and Wright, Wyoming to the west. Federal lands on the national grassland are managed by U.S. Forest Service staff within an administrative hierarchy that includes the Rocky Mountain Region, based in Lakewood, CO; the Medicine Bow-Routt National Forests and Thunder Basin National Grassland, based in Laramie, WY; and the Douglas Ranger District, based in Douglas, WY.

Purpose and Need

In recent years, dramatic changes in prairie dog populations and increasing conflicts have indicated the need to change the grassland plan to allow Federal land managers to be more responsive to a variety of environmental and social conditions.

The purpose of this proposed plan amendment is to:

- 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.

Specifically, an amendment is needed to:

- revise management direction in Management Area 3.63 – Black-Footed Ferret Reintroduction Habitat,
- adjust the boundaries of management area 3.63 to be more conducive to prairie dog management; and
- 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.

Alternatives

Challenges related to prairie dog management and the potential reintroduction of black-footed ferret have existed since completion of the 2002 grassland plan. These challenges have continued through prairie dog population cycles of expansion and decline and through several planning efforts. 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.

In early 2019, the responsible official considered the changed environmental and social conditions, including the extent of mapped prairie dog colonies over time; requests for management and control from adjacent landowners; and requests for change from local, State, and Federal government agencies and determined there is a need to change prairie dog management direction in the grassland plan.

As a result, the Thunder Basin proposes a plan amendment and the action alternatives developed for this plan amendment project would generally decrease the objective for acres of habitat provided 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. Because no habitat is proposed for conversion to other land uses, the habitat would be available to species with different habitat requirements and may be made available again as short-stature vegetation if management actions change in the long-term. Implementation of a plan amendment is expected to have short and long-term neutral or positive effects on rangeland resources, livestock grazing, and socioeconomic issues. Effects analyses were limited to issues raised internally or during the public scoping and comment periods or to analysis required by law, regulation, or policy.

In April 2019, Forest Service staff released a scoping document that described a proposed action for prairie dog management, including proposed changes to grassland plan direction. The proposed action was modified following the scoping process as part of the iterative nature of the National Environmental Policy Act and grassland planning process and was analyzed in full in the draft environmental impact statement. Following public comment on the draft environmental impact statement, the Forest Service developed Alternative 5, the Preferred Alternative. Although it is more similar to the Proposed Action than other alternatives, the Preferred Alternative incorporates components from other alternatives analyzed in the draft. See Table E-3 for a comparison of alternatives and design elements.

The major components of the preferred alternative include:

- Change existing Management Area 3.63 – Black-Footed Ferret Reintroduction Habitat to a new Management Area 3.67 –Short-Stature Vegetation Emphasis.
- Change the boundaries for management area 3.67 to make the area approximately 42,000 acres in size; use natural barriers to minimize prairie dog movement and to reduce conflicts in management.
- Eliminate requirement to use the Black-tailed Prairie Dog Conservation Assessment and Management Strategy and add necessary plan components to the grassland plan.
- Establish a minimum ¼-mile boundary management zone along boundaries with private or State property in management area 3.67.
- Adopt use of the Natural Resources Conservation Service’s ecological site descriptions to describe plant communities, evaluate current and desired conditions, and maintain or improve native vegetation and wildlife habitat.

- Establish a prairie dog colony acreage objective of 10,000 acres in management area 3.67 to support viable populations of prairie dogs and associated species, such as mountain plover, burrowing owl, and swift fox, and to not preclude reintroduction of black-footed ferret.

Table E-3. Comparison of the major management elements of the alternatives

Major Management Elements	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Grassland-wide	Alternative 4 Prairie Dog Emphasis	Alternative 5 Preferred Alternative
Management area 3.63 or 3.67	Management Area 3.63 – Black-Footed Ferret Reintroduction Habitat is approximately 51,000 acres in size, and the Cheyenne River Zoological Special Interest Area is approximately 5,900 acres.	Management Area 3.63 – Black-Footed Ferret Reintroduction Habitat would be changed to Management Area 3.67 – Rangelands with Short-Stature Vegetation Emphasis. Management area size would change from approximately 51,000 to approximately 35,000 acres. Cheyenne River Zoological Special Interest Area would be redrawn to follow the Cheyenne River along the southeastern border of management area 3.67. Special interest area management direction would be updated to reflect emphasis on riparian habitat. Special interest area size would change from approximately 5,900 to approximately 3,800 acres.	Management Area 3.63 – Black-Footed Ferret Reintroduction Habitat would be changed to Management Area 3.67 – Rangelands with Short-Stature Vegetation Emphasis. Management area size would change from approximately 51,000 to approximately 29,000 acres. Cheyenne River Zoological Special Interest Area would be redrawn to follow the Cheyenne River along the southeastern border of management area 3.67 and Antelope Creek along the southwestern border of management area 3.67. Special interest area management direction would be updated to reflect emphasis on riparian habitat. Special interest area size would change from approximately 5,900 to approximately 5,700 acres.	Management Area 3.63 – Black-Footed Ferret Reintroduction Habitat would be changed to Management Area 3.67 – Prairie Dog Emphasis Area. Management area 3.67 and Cheyenne River Zoological Special Interest Area boundaries would remain the same as current.	Management Area 3.63 – Black-Footed Ferret Reintroduction Habitat would be changed to Management Area 3.67 – Short-Stature Vegetation Emphasis. Management area size would change from approximately 51,000 to approximately 42,000 acres. Cheyenne River Special Interest Area would be redrawn to follow the Cheyenne River and Antelope Creek along the southeastern border of management area 3.67 and renamed Cheyenne River-Antelope Creek Zoological Special Interest Area. Special interest area management direction would be updated to reflect emphasis on riparian habitat. Special interest area size would change from approximately 5,900 to approximately 5,300 acres.

Major Management Elements	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Grassland-wide	Alternative 4 Prairie Dog Emphasis	Alternative 5 Preferred Alternative
Prairie dog colony acre objective and distribution	Prairie dog colonies and acreage objectives managed based on 2015 management strategy categories: Category 1: 18,000 acres Category 2: 9,000 acres Category 3: 6,000 acres	Prairie dog colonies would be managed toward an objective of 10,000 acres within management area 3.67. No complexes would be required or designated in standards or guidelines, but desired conditions for management area 3.67 would describe that within management area 3.67, colonies within approximately 4.5 miles (7 kilometers) of other colonies are maintained, when possible, to develop colony complexes.	Prairie dog colonies across the grassland would be managed within a range of 10,000 to 15,000 acres. Colonies located anywhere on national grassland would count toward acre range. One 1,500-acre complex would be required and managed for in management area 3.67, and a guideline would direct management for colonies of 200 to 500 acres to provide optimal nesting habitat for mountain plover.	Prairie dog colonies and acreage objectives managed based on 2015 management strategy categories: Category 1 would remain the same—18,000-acre objective. Category 2 areas would be modified, but would keep the 9,000-acre total objective. Category 3 acreage objectives would be removed. Management area 3.67 would be managed for two 4,500-acre complexes.	Prairie dog colonies would be managed toward an acreage objective of 10,000 acres within management area 3.67.
Boundary management zone	No boundary management zone, but may allow rodenticide use if colony is within ½ mile of boundary, under certain circumstances.	¼-mile boundary management zone in management area 3.67. A temporary ¾-mile boundary management zone may be granted under special circumstances. Rodenticide use allowed in boundary management zone regardless of colony acres.	¼-mile grassland-wide. A temporary 1-mile boundary management zone may be granted under special circumstances. Rodenticide use allowed in boundary management zone regardless of colony acres.	¼-mile boundary management zone for category 1; 1/8-mile boundary management zone for category 2. Rodenticide use allowed in boundary management zone regardless of colony acres.	¼-mile boundary management zone in management area 3.67. A temporary ¾-mile boundary management zone may be granted under special circumstances. Rodenticide use allowed in boundary management zone regardless of colony acres.

Major Management Elements	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Grassland-wide	Alternative 4 Prairie Dog Emphasis	Alternative 5 Preferred Alternative
Thresholds for rodenticide use	Many conditions required for use of rodenticide.	If the district ranger determines lethal control in management area 3.67 is warranted, and colony acres are below the 10,000-acre objective, satellite acres can be identified. If management area 3.67 acres and satellite acres total more than 7,500, interior rodenticide use in management area 3.67 can be allowed down to a 7,500-acre minimum. Rodenticides may be used to maintain satellite colonies at designated size.	When acreage is below 10,000 acres grassland-wide, rodenticide use allowed only in boundary management zone or for density control.	Unlike the current strategy, when acreage objectives are met, by category, lethal control would be allowed within that category to return to objective acres.	Rodenticide use and other control tools would be allowed in management area 3.67 when colony acreage is above 7,500 acres. Control tools would be allowed outside of management area 3.67 at any time. Priority for control would be for colonies within 1 mile of a residence, colonies impacting facilities, and the boundary management zone. Other control activities would be prioritized annually.
Approved rodenticides	All forms of zinc phosphide approved for use (October 1-December 31), with many conditions. Only allowed in category 1 area within ½ mile of boundary if acreage objective met and nonlethal options tried. Otherwise conditional based on decision screens.	All forms of zinc phosphide approved for use (allowed only October 1-January 31). Management area 3.67 must have at least 7,500 acres of colonies (within management area 3.67 or in designated satellite colonies) for use outside the boundary management zone, unless used for density control. Anticoagulants and fumigants prohibited.	All forms of zinc phosphide approved for use (allowed only October 1-January 31). Must have at least 10,000 acres of colonies for use the outside boundary management zone, unless used for density control. Anticoagulants and fumigants allowed in the boundary management zone only after three applications of zinc phosphide.	All forms of zinc phosphide approved for use (allowed only October 1-January 31). Must meet acreage objectives in category 1 and 2 areas before using outside the boundary management zone. Anticoagulants and fumigants prohibited.	All forms of zinc phosphide approved for use (allowed only October 1-January 31). Management area 3.67 must have at least 7,500 acres of colonies. Fumigants approved for use (allowed only October 1-January 31) in boundary management zone, residence 1-mile buffer, and within ¼ mile of non-Federal land, only after two applications of zinc phosphide.

Major Management Elements	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Grassland-wide	Alternative 4 Prairie Dog Emphasis	Alternative 5 Preferred Alternative
Recreational shooting	Year-round shooting prohibition in management area 3.63 and category 1; conditional restrictions in category 2 areas.	Seasonal restriction (no shooting February 1 to August 15) in management area 3.67, including the boundary management zone and any designated satellite acres. No restrictions on rest of grassland.	No restrictions for prairie dog conservation unless developed as part of complex management plan.	Year-round shooting prohibition in management area 3.67 and category 1. Year-round prohibition in category 2 until acreage objective met, then seasonal restrictions (no shooting February 1 to August 15) in category 2.	Seasonal restriction (no shooting February 1 to August 15) in management area 3.67, including the boundary management zone. No restrictions on rest of grassland.
Drought plan	No specific management changes under drought conditions.	To mitigate prairie dog colony expansion during drought conditions, control tools may be used in active prairie dog colonies to work toward a revised objective of 7,500 acres in management area 3.67 and satellite colonies combined.	To mitigate prairie dog colony expansion during drought conditions, control tools may be used in active prairie dog colonies to work toward an objective of 10,000 acres.	No specific management changes under drought conditions.	To mitigate prairie dog colony expansion during extended drought conditions, control tools may be used to work toward a temporary revised acreage objective of 7,500 acres in management area 3.67.
Plague management	Plague-mitigation tools may be used in active prairie dog colonies.	Plague-mitigation tools may be used in active prairie dog colonies.	Plague-mitigation tools may be used in active prairie dog colonies.	Plague-mitigation tools may be used in active prairie dog colonies.	A plague management plan will be developed, and an integrated approach to plague management (e.g., using tools such as deltamethrin and fipronil) will be implemented annually in management area 3.67. Plague mitigation may also be implemented outside of management area 3.67.

Major Management Elements	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3 Grassland-wide	Alternative 4 Prairie Dog Emphasis	Alternative 5 Preferred Alternative
Density control	No density control described, but nonlethal density control could be approved.	Density control (for example, using rodenticide, translocation, collapsing burrows) may be used to maintain desired vegetation conditions. Desired vegetation structure and composition may vary by ecological site or colony. When below 7,500 acres in management area 3.67 and satellite colonies, treat no more than 50 percent of any colony. Where density control occurs, pretreatment data must be collected and monitoring data must be collected for a minimum of 2 years after treatment.	Density control (for example, using rodenticide, translocation, collapsing burrows) may be used to maintain desired vegetation conditions. Desired vegetation structure and composition may vary by ecological site or colony. When below 10,000 acres, treat no more than 50 percent of any colony. Where density control occurs, pretreatment data must be collected and monitoring data must be collected for a minimum of 2 years after treatment.	No density control described, but nonlethal density control could be approved.	Experimental density control activities may be authorized in colonies (a) outside of management area 3.67 or (b) in management area 3.67 if colony acreages are above 7,500. If scientific information is developed and indicates that density control achieves vegetation or dispersal objectives and maintains habitat for associated species, then density control may be authorized in management area 3.67 when acreages are below 7,500. Colonies treated for density control would count toward acreage objective.
Strategy and collaborative working group	The 2015 Prairie Dog Conservation Assessment and Management Strategy would remain in effect, with a collaborative stakeholder group in place.	The grassland plan would no longer refer to a separate prairie dog management strategy and the strategy would be rescinded. A collaborative stakeholder group would provide management recommendations to Forest Service staff.	The grassland plan would no longer refer to a separate prairie dog management strategy and the strategy would be rescinded. A collaborative stakeholder group would provide management recommendations to Forest Service staff.	Components of the 2015 Prairie Dog Conservation Assessment and Management Strategy would be integrated into the grassland plan, and the strategy would be rescinded. A collaborative stakeholder group would provide management recommendations to Forest Service staff.	The grassland plan would no longer refer to a separate prairie dog management strategy and the strategy would be rescinded. A collaborative stakeholder group would provide management recommendations to Forest Service staff.

Methods

Analysis Area

The analysis area includes the full Thunder Basin National Grassland administrative boundary. 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. The area is sufficiently large enough to evaluate the habitat for all species addressed. In addition, for many species, the analysis of direct, indirect, and cumulative effects focuses within proposed management area 3.67 for each alternative because this is where many of the proposed activities will occur.

Resource Indicators and Measures

A useful way to evaluate impact significance within the context of NEPA is to use resource indicators to characterize the status of resource elements and monitor their response to potential stressors introduced by the alternatives. Below are the resource indicators and measures used for this analysis (Table E-4).

Table E-4. Resource indicators and measures to evaluate effects of the proposed plan amendment

Resource Element	Resource Indicator	Measure (Quantify if possible)	Used to address Purpose and Need or key issue?	Source
Ecological Conditions: Wildlife Habitat Availability	Quantitative: Changes in species habitat. Specifically changes in patch size, contiguity, structure and quality, which affect overall species persistence and viability	Acres of habitat impacted or altered by proposed activities	Yes – when data was available	FSM 2670
Ecological Conditions: Wildlife Habitat Suitability	Qualitative: Discussion of species' response to proposed activities based on best available information and science	Anticipated level of risk for injury or mortality of individuals	Yes – when data was available	FSM 2670

Species of Conservation Concern (SCC)

In preparation for the proposed amendment to the grassland plan, wildlife biologists from the Medicine Bow-Routt National Forests and Thunder Basin National Grassland (TBNG) and the Forest Service Enterprise Program prepared species evaluations for 47 wildlife and plant species. The 47 species all have factors of rarity and are native and known to occur on the grassland, meeting the minimum criteria established for SCC in the 2012 Planning Rule (36 CFR 219) and are intended to serve as a preliminary list of potential species of conservation concern. The species evaluations provide background information and current scientific literature regarding the condition of each species and its habitat on the TBNG (USDA Forest Service 2019). The evaluations do not constitute an effects analysis, but assisted in the analysis of substantial adverse impacts or substantially lessened protections for the preliminary list of potential species of conservation concern during NEPA analyses. The analyses for these species are found in the following sections of this report.

The TBNG does not yet have any formally identified SCC, but the Responsible Official (Forest Supervisor) will apply the requirements of the 2012 Planning Rule with respect to the preliminary list of potential SCC and other at-risk species during the development of the plan amendment. In order to meet these requirements, the Responsible Official (Forest Supervisor) may instruct necessary additions or changes to plan components to ensure that the plan amendment provides 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 potential SCC. Until the Forest Supervisor provides further direction, the Regional Forester sensitive species and the preliminary list of potential species of conservation concern will be analyzed for future proposed projects. Once a final list is determined, the Thunder Basin will adopt a final Species of Conservation Concern list and the Regional Forester sensitive species list, along with the preliminary list of potential species of conservation concern will no longer be used.

The SCC Filtering Process

Wildlife biologists used a series of analysis filters to determine which animal species should be considered as potential species of conservation concern for the proposed plan amendment. The Forest Service Handbook outlines a set of species lists and categories from which biologists should draw to identify species to consider for potential SCC. This set includes: the Regional Forester's Sensitive Species list; species lists created by other Federal agencies like the U.S. Department of the Interior Bureau of Land Management or Fish and Wildlife Service; species listed by states, tribes, or local agencies; and species categorized by universities, non-governmental organizations, or private organizations (FSH 1909.12_20, 12.52d). Wildlife biologists identified 82 animal species that are native and known to occur on the Thunder Basin (documented in an official observation record) and that appear on one or more at-risk species lists. Next, a third filter was applied to eliminate species that would demonstrably not be affected by the plan amendment. The majority of animals, including all fish, mollusks, crustaceans, amphibians, and bats, were eliminated from evaluation *a priori* because their lack of dependence on prairie dogs or habitats affected by prairie dog management was evident. After the filtering process, 31 animal species (24 birds, 4 mammals, 2 reptiles, and 1 insect) and 16 plant species were carried forward for evaluation. See "Potential Species of Conservation Concern Species Evaluations – Thunder Basin National Grassland" for further information.

Framework for Analysis of Species Persistence

The 2012 Planning Rule requires forest and grassland plans to incorporate plan components that "maintain or restore": (1) "the ecological integrity of terrestrial and aquatic ecosystems and watersheds in the plan area"; and (2) "the diversity of ecosystems and habitat types throughout the plan area" (36 CFR 219.9(a)).

Under 36 CFR 219.9(b)(1), the responsible official must determine whether the plan components required by 36 CFR 219.9(a) 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."

The 2012 Planning Rule sets forth three possible outcomes of the responsible official's analysis of plan components with respect to species of conservation concern. Additionally, a fourth outcome may arise when the planning unit has developed a set of ecosystem based plan components it thinks will provide for species persistence, but also provides supplementary species-specific plan components if the responsible official determines the ecosystem plan components alone are unlikely to provide for persistence of at-risk species in the plan area.

1. The responsible official may find that the plan components required by 36 CFR 219.9(a) are sufficient to provide the ecological conditions necessary to maintain a viable population of each species of conservation concern within the planning area. 36 CFR 219.9(b)(1).

   Note: The proposed plan amendment will not result in an official designation of SCC on the TBNG by the Rocky Mountain Region Regional Forester. Because the plan amendment will not fully revise the grassland plan, the existing grassland plan will continue to be guided by the older planning rule under which it was originally written. This means that the Regional Forester’s Sensitive Species list will remain in place for the TBNG, and environmental analysis of the proposed plan amendment will analyze effects to sensitive species.
2. The responsible official may determine that the plan components required by 36 CFR 219.9(a) are insufficient to provide the ecological conditions necessary to maintain a viable population of each species of conservation concern within the planning area, and that “additional, species-specific plan components, including standards or guidelines, must be included in the plan to provide such ecological conditions in the plan area.” 36 CFR 219.9(b)(1).
3. The responsible official may determine “that it is beyond the authority of the Forest Service or not within the inherent capability of the plan area to maintain or restore the ecological conditions to maintain a viable population of a species of conservation concern in the plan area.” If the responsible official makes this determination, it shall: (1) document the basis for the determination; and (2) “[i]nclude plan components, including standards and guidelines, to maintain or restore ecological conditions within the plan area to contribute to maintaining a viable population of the species within its range,” in coordination with other Federal, State, Tribal, and private land managers.

Species Viability and Persistence

Determinations regarding effects to sensitive species and potential species of conservation concern are dependent on several definitions laid out in Forest Service planning regulations and the Forest Service Manual. For sensitive species, the 1982 Planning Rule applies and a determination is made about the species’ viability in the planning area or possible trends toward Federal listing.

Regional Forester Sensitive Species and the 1982 Planning Rule

Specific direction concerning viability is provided in the 1982 NFMA implementing regulations at 36 CFR 219.19:

"Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one, which has the estimated numbers, and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area".

Various sections of the Forest Service Manual address viability, particularly FSM 2620 and 2670, which include policy statements such as the following:

"Management of habitat provides for the maintenance of viable populations of existing native and desired non-native wildlife, fish, and plant species, generally well-distributed throughout their current geographic range" (FSM 2622.01(2)). Maintain viable populations of all native and desired non-native wildlife, fish and plant species in habitats distributed throughout their geographic range on National Forest System lands (FSM 2670.22(2)).

Species of Conservation Concern and the 2012 Planning Rule

For potential species of conservation concern in an amendment to a plan written under planning regulations previous to the 2012 Planning Rule, a finding is made regarding substantial adverse impacts and substantially lessened protections. For this analysis, we have defined substantial adverse impacts and substantially lessened protections in terms of species viability. Therefore, the meaning of viability was critical to determining effects on both sensitive species and potential species of conservation concern in this analysis.

The 2012 Planning Rule defines a "viable population" as "[a] population of a species that continues to persist over the long term with sufficient distribution to be resilient and adaptable to stressors and likely future environments."

The Forest Service Handbook 1909.12, section 23.13c (1)(b) notes that the preamble to the proposed Planning Rule addresses the meaning of the word "population" for planning purposes, explaining: "the individuals of a species of conservation concern that exist in the plan area will be considered to be members of one population of that species".

The Forest Service Handbook further defines the words and phrases "***persist over the long-term***," "***sufficient distribution***," "***resilient***," and "***adaptable***," used in the Planning Rule's definition of "***viable population***," as follows:

- The words "***persist over the long-term***" means the species continues to exist in the plan area over a sufficiently long period that encompasses multiple generations of the species, the time interval between major disturbance events, the time interval to develop all successional stages of major habitat types, or the time interval needed for the overall ecosystem to respond to management. Understand that confidence in the evaluations of persistence decreases rapidly as the timeframe of projections increases and that the responsible official will change plan components using plan amendments and plan revisions when the responsible official decides plan components need to be changed because of changed conditions (FSH 1909.12 section 23.13c (1)(c)).
- Whether there is "***sufficient distribution***" of a species should be considered in the context of the species' natural history and historical distribution and on the potential distribution of the habitat within the plan area. Recognize that habitat and population distribution are dynamic over time. Sufficient distribution also implies a distribution that permits individuals to interact within the plan area within the constraints of the species' natural history. Sufficient distribution implies that ecological conditions are provided to support redundancy in numbers such that losing one or some without replacement will still support a viable population. It should not be expected that management of National Forest System lands would provide broadly or evenly distributed habitat throughout a plan area for all species. Furthermore, as long as there is enough habitat in the plan area to maintain a viable population, there is no requirement that habitat to maintain all known individuals or the maximum possible number of individuals of a species must be available in the plan area (FSH 1909.12, section 23.13c(1)(d)).

- The word "***resilient***" suggests that when disturbance events or stressors result in the local disappearance of individuals or extirpation from an area, recolonization of suitable habitat may occur in the future to facilitate long-term persistence in the plan area (FSH 1909.12 section 23.13c(1)(e)).
- The word "***adaptable***" means that the species is able to adjust to new conditions. Ecological conditions to support the species are distributed in a way that the species may be represented in a variety of locally adapted ecotypes for increased likelihood of persistence in unknown future environments (FSH 1909.12 section 23.13c (1)(f)).

For many species, essential ecological conditions may be provided for through ecosystem level (also known as coarse-filter) plan components that include desired conditions for specific vegetation types. These ecosystem level plan components may be adequate to ensure persistence of most species and maintain viable populations within the plan area. For other species, species-specific (also known as fine-filter plan) components that are more specialized (timing restrictions, etc.) may be required to ensure persistence and viability (see discussion below on ecosystem and species-specific filter process.).

In brief, substantial concern about the species' capability to persist over the long term in the plan area, is evidenced by one or more of the following criteria:

- habitat is limited or rare within the plan area
- current management activities are negatively impacting habitat within the plan area
- available monitoring indicates a decline in population, range, or both within the plan area

Protective Measures and Plan Components

Historically, there were few laws to protect and manage for wildlife species, and as a result, wildlife and habitat were reduced considerably as the nation developed in the 1800s and early 1900s. Species such as the passenger pigeon and Eastern elk were brought to extinction (USFWS 2020b). Fish, mollusk and plant species have also experienced the impact of human actions (USFWS 2020b). Some species were brought to near extinction over the past 2 centuries due to habitat loss, prey loss or excessive hunting and trapping for open markets, such as bison, white-tailed deer, wild turkeys, mink and black-footed ferrets to name a few. Hunting and trapping, specifically, were a largely unregulated activity until the late 1800's, when it was brought to question whether wildlife populations could continue at healthy levels without adequate checks and balances.

Conservation needs became more apparent by the early 1900s, and important laws guiding these efforts included the Lacey Act of 1900, Migratory Bird Treaty Act of 1918, the Migratory Bird Hunting and Conservation Stamp Act of 1934, the Federal Aid in Wildlife Restoration Act of 1937, the Convention on Nature Protection and Wild Life Preservation in the Western Hemisphere of 1940, and the Federal Aid in Sport Fish Restoration Act of 1950. Subsequent decades brought the Endangered Species Act of 1973, Clean Water Act of 1972 and other legislation to further reduce impacts to species and their habitat. Seasonal restrictions, protection buffers, hunting tags and limitations on activities (trapping, density control) are examples of methods to protect, conserve and manage for wildlife.

Plan components were developed for each of the action alternatives. Current direction that is most relevant to wildlife resource management is available in the grassland plan, posted to the project web site (https://www.fs.usda.gov/project/?project=55479). Proposed changes in plan direction for each action alternative are provided in appendix A of the environmental impact statement. Plan components that apply to wildlife species in this analysis are also listed in each species section.

Some of the plan components developed for the plan amendment are protective measures intended to reduce impacts to wildlife species or their habitat. Protective measures considered include seasonal restrictions, protection buffers that limit activities in a specific area around wildlife sites (dens, nests, roosts, etc.), and limiting the overall intensity of activities on Federal lands that may impact wildlife species such as the use of rodenticides including zinc phosphide, fumigants, and anticoagulants; insecticides; and herbicides or other density control methods, along with recreational shooting.

Seasonal Restrictions

Plan components for this amendment include seasonal restrictions on specific activities in order to reduce impacts to wildlife species directly and indirectly impacted by the alternatives proposed. A wide range of seasonal restrictions were considered, based on reviewing the breeding and life cycle of sensitive and PSCC wildlife species that occur on the TBNG and with the species' range. Public comments and literature provided were also considered. Ultimately, the seasonal restrictions selected for each species were determined to best represent the species needs specifically as they occur on the TBNG, but also to indirectly benefit other wildlife species where information was lacking, as a result. Resources used to determine the seasonal restrictions included information pulled from the Information for Planning and Consultation (IPAC) list (USFWS 2020c) and current seasonal restrictions in the Thunder Basin National Grassland Oil and Gas Stipulations – Appendix D (USDA 2001). Additional information was pulled from Cornell University's Lab of Ornithology – Birds of North America (BNA 2020) and the Wyoming Game and Fish Department's Wildlife Action Plan Species Accounts (WGFD 2017) where information was lacking from IPAC and current stipulations. All seasonal restrictions listed from these sources are general seasons; breeding seasons vary based on occurrence throughout the range. See Table E-5 for more information.

Table E-5. Summary of known seasonal restriction information that informed plan component development

Species	WGFD Species Accounts Breeding Season	BNA Breeding Season	IPAC Breeding Season for Wyoming	TBNG Oil and Gas Stipulations – Timing Limitation (TL) or No Surface Occupancy (NSO) – most restrictive listed
Bald eagle (PSCC)	January to mid-July	December to August (Wyoming)	December 1 to August 31	NSO - No surface occupancy or use is allowed within 1.0 mile (line of sight) of bald eagle nests and winter roosts.
Black-footed ferret (Endangered) and prairie dog (Sensitive, PSCC)	Late February to late August	Not Applicable	IPAC does not recognize the black-footed ferret on the TBNG	TL - Surface use is prohibited from March 1 through August 31 within 0.125 mile (line of sight) of prairie dog colonies occupied or thought to be occupied by black-footed ferrets.
Brewer's sparrow (Sensitive, PSCC)	Mid-March to early August	Mid-April to late July	May 15 to August 10	No stipulations listed.
Burrowing owl (Sensitive, PSCC)	Early March to late July	Mid-March to late August	Breeds March 15 to August 31	NSO - No surface occupancy or use is allowed within 0.25 mile (line-of-sight) of burrowing owl nests.
California gull (PSCC)	Not recognized	May to late July	IPAC does not recognize species on the TBNG	No stipulations listed.
Chestnut-collared longspur (PSCC)	Mid-April to August	May to mid-August	Breeds May 1 to August 10	No stipulations listed.
Dickcissel (PSCC)	Mid-April to September	May to late August	IPAC does not recognize species on the TBNG	No stipulations listed.
Ferruginous hawk (Sensitive, PSCC)	Early March to September	Mid-March to mid-August	March 15 to August 15	TL - Surface use is prohibited from March 1 through July 31 within 0.5 miles (line of sight) of active nest
Golden eagle (PSCC)	Early February to mid-August	Late March to late August	Breeds January 1 to August 31	TL - Surface use is prohibited from February 1 through July 31 within 0.5 miles (line of sight) of active nest

Species	WGFD Species Accounts Breeding Season	BNA Breeding Season	IPAC Breeding Season for Wyoming	TBNG Oil and Gas Stipulations – Timing Limitation (TL) or No Surface Occupancy (NSO) – most restrictive listed
Grasshopper sparrow (Sensitive, PSCC)	Early May to August	Early June to late August	IPAC does not recognize species on the TBNG	No stipulations listed.
Greater sage grouse (Sensitive, PSCC)	Early March to July	Early March to late September	IPAC does not recognize species on the TBNG	TL - Surface use is prohibited from March 1 through June 15 within 2 miles (line of sight) of a sage grouse display ground, and noise from production facilities must not exceed 49 decibels (10 dBA above background noise) at the display ground.
Long-billed curlew (Sensitive, PSCC)	Mid-April to late July	Early April to late July	Breeds April 1 to July 31	No stipulations listed.
McCown's longspur (Sensitive, PSCC)	Mid-March to September	May to mid-August	Breeds May 1 to August 15	No stipulations listed.
Merlin (PSCC)	February to mid-August	Early March to late August	IPAC does not recognize species on the TBNG	TL - Surface use is prohibited from April 1 through August 15 within 0.5 miles (line of sight) of nest
Mountain plover* (Sensitive, PSCC)	Late March to late July	Mid-April to mid-August	Breeds Apr 15 to August 15	TL - Surface use is prohibited from March 15 through July 31 within 0.25 miles (line of sight) of a mountain plover nests or nest aggregation areas. **The Plan Amendment proposes to revise timing restrictions in this stipulation for mountain plover, consistent with other revised plan components.*
Northern harrier (Sensitive, PSCC)	Not recognized	Early April to early September	IPAC does not recognize species on the TBNG	No stipulations listed.

Species	WGFD Species Accounts Breeding Season	BNA Breeding Season	IPAC Breeding Season for Wyoming	TBNG Oil and Gas Stipulations – Timing Limitation (TL) or No Surface Occupancy (NSO) – most restrictive listed
Peregrine falcon (PSCC)	Late March to late July	Late March to late July	IPAC does not recognize species on the TBNG	No stipulations listed.
Plains hog-nosed Snake (PSCC)	April to October	Not Applicable	IPAC does not recognize species on the TBNG	No stipulations listed.
Prairie rattlesnake (PSCC)	April to October	Not Applicable	IPAC does not recognize species on the TBNG	No stipulations listed.
Ring-billed gull (PSCC)	Not recognized	Late April to mid-August	IPAC does not recognize species on the TBNG	No stipulations listed.
Sage thrasher (PSCC)	Mid-March to early August	Mid-April to early August	Breeds April 15 to August 10	No stipulations listed.
Sagebrush sparrow (Sensitive, PSCC)	Mid-March to late July	Mid-March to late July	IPAC does not recognize species on the TBNG	No stipulations listed.
Swainson's hawk (PSCC)	Mid-April to mid-August	Early April to late July	IPAC does not recognize species on the TBNG	TL - Surface use is prohibited from March 1 through July 31 within 0.5 miles (line of sight) of active nest
Swift fox (Sensitive, PSCC)	December to October	Not Applicable	IPAC does not recognize species on the TBNG	TL - Surface use is prohibited from March 1 through August 31 within 0.25 mile (line of sight) of swift fox dens.
Thirteen-lined ground squirrel (PSCC)	Not recognized	Not Applicable	IPAC does not recognize species on the TBNG	No stipulations listed.
Upland sandpiper (PSCC)	May to August	Early May to late June	IPAC does not recognize species on the TBNG	No stipulations listed.

Protection Buffers

Protections buffers are used to lessen the impacts of human activity on wildlife and their habitat. Providing an avoidance distance around habitat or a wildlife site can reduce or minimize disturbance potential (Richardson et al. 1997). These buffers are often developed by an understanding of the minimum habitat needed to perform life functions, including courtship, breeding, nesting, roosting, estivation, hibernation, and denning.

Large areas of habitat can be protected by buffers as well. For example, riparian and connectivity buffers can provide a landscape approach to protecting important habitat for wildlife species (Hannon et al. 2002). In other instances, grassland and forest types can be further protected by buffers to ensure that important habitat is retained for wildlife species (Pearson and Manuwal 2001, WGFD 2017). An example applicable to the TBNG is greater-sage grouse conservation efforts. The state of Wyoming manages greater sage-grouse populations by core areas, to ensure protection measures are centered at minimizing man-made development that results in a loss of habitat. Core areas were delineated across the state by the Wyoming Game and Fish Department to identify and manage populations that make up the largest percentage (80%) of birds, the most productive leks, and the highest quality habitat. Core area protection measures are intended to limit man-made developmental disturbance, such as oil and gas well pad construction or other development, which alters and/or removes suitable habitat for long periods of time.

Plan components for this amendment include protection buffers or avoidance from specific activities in order to reduce impacts to wildlife species directly and indirectly impacted by the alternatives proposed. Public comments and literature provided were also considered. Ultimately, the buffers selected for many species were determined to best represent the species needs specifically as they occur on the TBNG, but also to indirectly benefit other wildlife species as a result. Resources used to determine buffer distances were pulled from the Thunder Basin National Grassland Oil and Gas Stipulations – Appendix D (USDA 2001). Other measures included avoidance of prairie dog burrows if other wildlife species were observed utilizing a burrow (burrowing owls, for example) during density control activities or during prairie dog inventory and mapping efforts. Maintaining prairie dog habitat in the form acreage objectives for prairie dog colonies were also incorporated into the action alternatives to support viable populations of prairie dogs and associated species, such as mountain plover, burrowing owl, and swift fox, and to not preclude reintroduction of black-footed ferret.

Limiting the Intensity of Activities on Federal Lands

Limiting the duration and intensity of activities on Federal lands has been a method to ensure that resources are maintained or conserved. In addition, by limiting such actions, the risk of impacting wildlife species or their habitat can be reduced or eliminated. Plan components for this amendment incorporate protection measures that are intended to reduce the impact to wildlife species. Some of the activities that would be limited include the following:

Prairie Dog Density Control – 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. Objectives for density control are site-specific and include influencing colony growth and dispersal, preventing undesirable vegetation state changes, and promoting forage availability.

Federal and state agencies have a role to manage for prairie dogs. Federal agencies, including the Forest Service (USFS), the Bureau of Land Management (BLM), the National Park Service (NPS), and the US Fish and Wildlife Service (USFWS) have managed for prairie dogs in varying degrees over the past century. The Forest Service, specifically, manages land under the Multiple-Use-Sustained Yield Act of 1960 [MUSY, 16 United States Code (U.S.C.) 528 et seq.] and the National Forest Management Act (NFMA, 16 U.S.C. 1600 et seq.) for the primary uses of timber production, grazing, watershed preservation, and fish and wildlife habitat (Roemer and Forrest 1996). National grasslands are included under the National Forest System [16 U.S.C. 1609 (a)] and must apply all rules and regulations pertaining to the National Forest System as well [36 Code of Federal Regulations (CFR) 213.3].

In addition, the Forest Service animal damage management policy is to conduct animal damage management activities when necessary to accomplish multiple-use objectives. Wildlife is controlled when it is considered that:

1. The animal threatens public health or safety
2. Causes or threatens to cause damage to threatened or endangered animals or plants, other wildlife, permitted livestock, or other resources, on National Forest System lands or private property (USFS 1991).

However, there is a balance to managing for multiple resources, specifically wildlife and fish habitat. Under the NFMA regulations, it is the responsibility of the Forest Service to manage for habitat it shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. The 2012 Planning Rule further outlines the responsibility to do so.

Plan components for this amendment reflect the need to balance resources and are intended to support the management of multiple resources and objectives. Cooperative engagement, public comments and literature provided were also considered throughout the planning process. Ultimately, control methods would be site-specific and include influencing colony growth and dispersal, preventing undesirable vegetation state changes and promoting forage availability, along with maintaining viability of wildlife species that rely on prairie dog habitat. Control methods are also intended to limit the expansion of a prairie dog colony from National Forest System lands onto non-National Forest System lands.

Limiting Prairie Dog Control Tools: The use of rodenticides is being considered as part of the amendment with limitations on use and types. Zinc phosphide and fumigants would be considered, but only under certain circumstances; when prairie dog colonies reach a certain acreage and within designated areas only, such as boundary management zones. The use of anticoagulants would be prohibited in all alternatives except for the Grassland-wide Alternative (Alternative 3). Vegetation barriers, translocation of prairie dog coteries and mechanical treatment such as blading and collapsing burrows is also considered in this amendment in order to maintain desired acreages. In this plan, recreational shooting is not considered a control tool.

The Preferred Alternative, Proposed Action, and Grassland-wide Alternative contain direction for the implementation of prairie dog density control. Intentions of density control would occur in response to specific requests and not by using a trigger based response on density of burrows or density of prairie dogs in a colony. Site-specific evaluation of the objectives of any treatment would occur, and a monitoring protocol would be developed. The objectives of density control could be related to vegetation management, prairie dog dispersal and colony movement, or forage availability.

Mitigating the transmission of sylvatic plague is not a potential objective of density control. If scientific information were to become available indicating that density control mitigates transmission of sylvatic plague, such an objective would not be precluded from motivating future density control projects. Based on currently available information, the effectiveness of density control for meeting any of these objectives is not well known. While site-specific objectives and a monitoring protocol would have to be developed for density control under certain conditions, as described in the proposed plan direction, it should be noted that in colonies where non-density control types of prairie dog control would be already authorized, constraints on the spatial pattern of rodenticide application would not apply, and density control objectives and monitoring protocols would not be required to be able to poison portions of a colony. Under the Preferred Alternative, density control would be exploratory to gain more information on its effects until scientific information became available that indicated that density control could achieve site-specific objectives and maintain habitat required for species associated with prairie dog colonies. If such information became available, density control would be allowed in Management Area 3.67 if total colony area was less than 7,500 acres. Until more information regarding density control became available, we would partner with researchers and use an experimental design where possible to explore the effects of density control, and density control would not occur on sites occupied by species associated with prairie dog colonies. Throughout implementation of the Preferred Alternative, no more than 50 percent of the area of any colony would be treated during an application of density control, and density control would occur no more frequently than every other year. Pre- and post-treatment monitoring of vegetation and prairie dog activity would be a critical element in every application of density control.

Lastly, the plan amendment will not restrict use of tools for plague management or prairie dog control that may be developed in the future. For example, a new plague vaccine or rodenticide could be approved by the Environmental Protection Agency and the Wyoming Department of Agriculture, a new method for deterring or relocating prairie dogs may be developed, or science may become available indicating that density control activities will achieve site-specific objectives and maintain habitat requirements for species associated with prairie dog colonies. When a new tool becomes available, the responsible official may initiate a National Environmental Policy Act “Section 18” review or a supplemental information report (Forest Service Handbook 1909.15, chapter 10, section 18.1) to determine if use of the tool requires additional analysis or a new decision. If the responsible official determines no new analysis is required and use of the tool is consistent and within the scope of the decision document for this project, then the tool may be used. If the tool does require additional analysis or a new decision, the analysis can be streamlined by tiering to this final environmental impact statement.

Anticoagulants – Chlorophacinone and diphacinone are anticoagulant rodenticides registered for the control of several rodent pests including various species of rats, mice, voles, squirrels, rabbits, muskrat, chipmunks, gophers, and prairie dogs. Based on Forest Service direction, the current risk assessments focused on the control of the black-tailed prairie dog (*Cynomys ludovicianus*) using Rozol and Kaput-D prairie dog baits.

Anticoagulant rodenticides disrupt normal blood-clotting mechanisms and induce capillary damage (Pelfrene 1991). Death results from hemorrhage. Anticoagulants are typically grouped into first-generation and second-generation compounds. Second-generation anticoagulants tend to be more acutely toxic. They generally provide a lethal dose after a single feeding, although death is usually delayed 5 to 10 days as animals continue feeding. First-generation compounds are less acutely toxic and more rapidly metabolized, excreted, or both. Generally they must be ingested for several days to provide a dose lethal to most individuals (Erickson and Urban 2004). Diphacinone and chlorophacinone may kill some animals in a single feeding, but multiple feedings are generally needed for sufficient population control (Timm 1994). Anticoagulant rodenticides are typically placed down the burrow, limiting consumption by species that may consume the rodenticide, whereas zinc phosphide is placed outside of the burrow allowing easier access for birds to consume.

When consumed, anticoagulants concentrate in the muscle tissue of prairie dogs and can be consumed by raptors and other mammals with secondary poisoning more likely than zinc phosphide. Zinc phosphide concentrates in the stomach tissue of prairie dogs of which is not readily consumed by raptors and mammals thereby limiting secondary poisoning of carcass consumption.

Secondary poisoning can occur in a variety of carnivorous mammals and birds. Primary exposure occurs when the anticoagulant (Rozol, for example) is ingested by non-target species that feed on grain. Species that ingest animals that consume Rozol (secondary exposure) are also at risk of being poisoned, especially predators and scavengers that may feed on poisoned prairie dogs and selectively feed on internal tissue.

The risk of secondary poisoning is lower for zinc phosphide because it does not accumulate in the tissues of the target animals. The primary source of zinc phosphide to a carnivorous or scavenging animals is the digestive tract of the target animal, where un-reacted zinc phosphide may remain. Zinc phosphide has a strong emetic action and frequently causes regurgitation. Additional information concluding that secondary poisoning is reduced because mammalian predators appear to be less susceptible to zinc phosphide than other species can be found at:

U.S. Environmental Protection Agency. 1998c. Reregistration eligibility decision (RED) for zinc phosphide. EPA 738-R-98-006, July 1998. 226 pages. Available online at https://archive.epa.gov/pesticides/reregistration/web/pdf/0026red.pdf)

Limiting the Use of Anticoagulants: A great deal of consideration was given to the use of anticoagulants. Anticoagulants pose a high risk to many wildlife species, from either primary or secondary exposure (Tosh et al. 2011). Since there are equally effective tools for density control, the need to use anticoagulants is not necessary. Anticoagulants are prohibited in all alternatives except for the Grassland-wide Alternative (Alternative 3). In addition, anticoagulants in Alternative 3 may be used only in boundary management zones and only after three consecutive applications of zinc phosphide prove ineffective. Anticoagulant rodenticides may be used only if applied by a Forest-Service-approved contractor (through direct contract or agreement) or Forest Service staff to ensure compliance with label restrictions that include extensive post-application monitoring requirements.

The Preferred Alternative, specifically, was designed to incorporate a multitude of resource objectives, but to also ensure that wildlife species and their habitat were able to persist over the long term and remain viable.

Plague - Sylvatic plague (*Yersinia pestis*) was first detected on the Thunder Basin National Grassland in the mid-1990s and the first landscape-scale plague epizootic among the black-tailed prairie dog population began in 2001. Since that time, plague has likely been continuously active in prairie dog colonies on the TBNG. Two subsequent landscape-scale epizootics began in 2005 and 2017. Plague directly impact prairie dogs populations and total colony collapse can occur. As a result, these episodes can indirectly impact those species that rely on the habitat that prairie dogs provide (Hartley et al. 2009).

Plague dynamics in prairie dog colonies are not well understood, especially the mechanisms for enzootic and epizootic phases of plague in a location after it first enters a colony (Eads et al. 2018). Recent information indicates that plague may be associated with climate change and erratic weather patterns. Eads and Hoogland (2017), reviewed 23 years of research on Gunnison's prairie dog (*Cynomys gunnisoni*, 1989–1994), Utah prairie dog (*Cynomys parvidens*, 1996–2005), and white-tailed prairie dog (*Cynomys leucurus,* 2006–2012) and found that at some colonies, epizootics of plague, which can kill an entire colony, was more likely to occur during or shortly after periods of reduced precipitation. During drier conditions, prairie dogs tend to have a compromised body condition and weakened defenses against fleas, which allows the fleas to increase in abundance on the body of a prairie dog. However, as drier conditions continue, the fleas ultimately die off with the prairie dog unless another host is located. With climate change projections of increased frequencies of drought occurrence, these changes may impact prairie dogs and associated wildlife species that depend on prairie dog habitat.

Plague can also erupt during periods of wet conditions. Parmenter and others (1999) reviewed cases of plague in humans over a 50-year period in New Mexico. The number of plague cases appeared to be higher in years of wet winter-springs. Moister conditions tend to promote overall flea survival and reproduction initially, increasing the potential for plague transmission. In this example, it further shows the need to monitor weather patterns and precipitation data to understand the potential of transmission to humans or another host species.

Plan components for this amendment reflect the need to address the likely event of plague in the future. The plan amendment incorporates plague management tools as a way to minimize the transmission of plague and help reduce the likelihood of epizootics. Tools include using insecticides to control vector flea populations and vaccines to inoculate prairie dogs and other susceptible species (Poché et al. 2017). Deltamethrin has been shown to be an effective tool in treating prairie dogs by reducing flea infestations up to 50-80% in some cases and minimizing the potential of plague (Maestas and Britten 2019, Roth 2019). Fipronil has been shown to be around 94% effective in treating fleas on small mammals (Roth 2019). In addition, both deltamethrin and fipronil appear to exhibit residual effects for 10-12 months (Eads et al. 2019). Sylvatic plague vaccines (SPV) have proven to be somewhat effective in reducing the potential for plague transmission, however, results can vary from populations and age cohorts (Rocke et al. 2015, 2017, Salkeld 2017). Oral vaccinations in the form of bait also prove to be somewhat effective (Tripp et al. 2014, 2016, 2017). In more recent studies, Rocke et al. (2017) and Tripp et al. (2016, 2017), found that SPV applications for 3 consecutive years resulted in a minimal increase in prairie dog survival. Researchers may continue to refine and reformulate SPV that could result in higher levels of prairie dog survival during a plague epizootic. Until SPV has demonstrated robust survival of prairie dogs in the wild, use of SPV may not be a single tool to rely on for treating ferrets. The use of insecticide dusting (i.e., deltamethrin) to manage plague should be considered and continued, along with other potentially viable tools (e.g., fipronil grain).

Lastly, activities such as collapsing burrows on abandoned or poisoned colonies would be approved to restore vegetation and minimize re-occupation by prairie dogs in unwanted areas under the plan's management objectives for the national grassland.

Limiting Plague Mitigation Tools: Plague mitigation tools (e.g., deltamethrin, fipronil, plague vaccine) would be used in management area 3.67 on an annual basis to reduce impacts from sylvatic plague, mitigate the transmission, decrease the likelihood of major plague events, and help promote conservation of 10,000 acres of colonies.

Plague poses a risk to human health. In addition, commenters expressed concerns that burrows in prairie dog colonies could create safety hazards for permittees, workers, visitors, and livestock on NFS land and where encroachment has occurred on state and private lands. The plan amendment addresses these concerns by decreasing the acreage objective for prairie dog colonies on NFS lands from 33,000 to 10,000 acres, designating boundary management zones, allowing for lethal control within ¼ mile of Federal lands across the grassland, and prioritizing control within 1 mile of residences anywhere on the grassland. To balance multiple resource needs, an acreage objective of 10,000 acres of prairie dog colonies in management area 3.67 was determined to best represent the species needs specifically as they occur on the TBNG for the black-footed ferret, but also to indirectly benefit other wildlife species as a result.

Fipronil is considered toxic to birds and fish species, and as a result, there could be indirect impacts to species, like ferruginous hawks that forage and burrowing owls that forage and nest in treated areas (Gibbons et al. 2015). Deltamethrin is considered to be less toxic to birds, however, it can kill insects around areas of use. In addition, Deltamethrin has been shown to reduce mountain plover nest survival, possibly due to reduced insect food availability, which can result in greater energy expenditure for foraging (Dinsmore 2013). The reduction in potential foraging opportunities and nest survival may impact mountain plover where deltamethrin is used. Martin et al. (1998) studied indirect effects of deltamethrin on the reproductive success of chestnut-collared longspur and did not find significant differences between sprayed and unsprayed sites in clutch size or nestling survival, but did find that egg viability was significantly reduced in sprayed plots. The reduction in potential foraging opportunities, impacts to nest survival and impacts to egg viability may impact species associated with prairie dog habitat where deltamethrin is used. As a result, plan components were developed to restrict the use of plague mitigation tools in prairie dog colonies where it may pose a risk to species associated with prairie dog habitat and reduce potential impacts.

This decision will not restrict use of tools for plague management or prairie dog control that may be developed in the future. For example, a new plague vaccine or rodenticide could be approved by the Environmental Protection Agency and the Wyoming Department of Agriculture, a new method for deterring or relocating prairie dogs may be developed, or science may become available indicating that density control activities will achieve site-specific objectives and maintain habitat requirements for species associated with prairie dog colonies. When a new tool becomes available, the responsible official may initiate a National Environmental Policy Act “Section 18” review or a supplemental information report (Forest Service Handbook 1909.15, chapter 10, section 18.1) to determine if use of the tool requires additional analysis or a new decision. If the responsible official determines no new analysis is required and use of the tool is consistent and within the scope of the decision document for this project, then the tool may be used. If the tool does require additional analysis or a new decision, the analysis can be streamlined by tiering to this final environmental impact statement.

Recreational Shooting – The project area has been popular for recreational shooting of prairie dogs and recreational shooting occurs in many areas throughout the country where prairie dogs exist (Gigliotti 2001). Some agencies encourage recreational shooting to assist with control efforts (Vosburgh 1996). If allowed to continue as an unregulated activity, then the potential to impact population levels of certain species like the prairie dog and those associated with prairie dog habitat could occur. In addition, lead ammunition ingestion can indirectly impact other species like raptors and carnivores (Hoffman et al. 1985). Recreational shooting is not considered a tool for controlling prairie dogs; however, plan components developed for this amendment reflect the need to limit recreational shooting in areas to ensure that populations of prairie dogs and associated species are not potentially impacted.

Limiting Recreational Shooting: The restrictions for recreational shooting would be put in place to protect at-risk species associated with prairie dogs, including golden eagles, burrowing owls, and mountain plover, from human disturbance, accidental or purposeful shooting, or secondary poisoning through ingestion of lead bullets. The restriction will also provide protections for other species that may be incidentally in the area or nearby that are not associated with prairie dog habitat. Recreational shooting was also brought up as a public concern. The plan amendment addresses these concerns by requiring a seasonal shooting restriction for recreational shooting of prairie dogs in management area 3.67 from February 1 to August 15 of each year but allowing year-round recreational shooting of prairie dogs elsewhere on the grassland. The seasonal shooting restriction would not allow shooting during the summer months most popular for recreational shooting but would allow shooting in the fall during big game seasons when many hunters are on the grassland and when most migratory birds have left the grassland.

Assumptions for Analysis

The Thunder Basin National Grassland, in cooperation with partners, conducts inventorying and mapping of prairie dog colonies on an annual basis. For this analysis, data from 2019 were used as a baseline. Data from 2019 document 2,438 acres of prairie dog colonies. Assumptions related to other activities on the grassland, such as grazing, and other stressors, such as weather and climate, are described in the cumulative effects analysis for each species.

Affected Environment

Existing Condition

The Thunder Basin National Grassland spans an ecotone between mixed-grass prairie, shortgrass steppe, and sagebrush steppe with topography of flat plains, steep but low hills, and occasional badlands (Haufler et al. 2008). Within this ecotone, the vegetation communities consist primarily of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and a mixed-grass prairie of the wheatgrass-needlegrass association (USDA Forest Service 2015). This transitional landscape is inhabited by a wide variety of wildlife species, including several species dependent on prairie dog colonies for habitat to some extent.

Grazing - Livestock grazing occurs across the TBNG throughout the year. Across the Thunder Basin National Grassland, each grazing allotment has an allotment management plan for livestock grazing management. Authorized use and grazing management adjustments are discussed each spring at the allotment level as Forest Service personnel and grazing association staff work cooperatively to develop the annual operating instructions or allotment worksheets to identify the authorized number of cattle and the grazing schedule for that year. The degree to which grazing patterns on the TBNG impact wildlife species varies.

Fire History - Most fires on the TBNG occur in July and August, after the wetter late-spring months. These fires burn primarily in grass and sagebrush fuel types, with some fires occurring in ponderosa pine stands on ridgetops. Fires in grass and sagebrush are generally flashy and wind-driven. Ignition usually occurs during dry thunderstorm events, as a result of human activity, or due to sparks created by the railroad. The TBNG and nearby state and private lands have experienced an average of 22 fire starts per year since 2001, burning an average of approximately 3,050 acres per year. The maximum acreage burned on the TBNG in any one year since 2001 was 4,259, in 2010. In addition to wildfires, the Forest Service conducted an average of approximately 356 acres of prescribed burning in grassland habitat between 2009 and 2015 to improve habitat for black-tailed prairie dog and mountain plover (*Charadrius montanus*); the Forest Service has not implemented prescribed burns since 2015.

Prairie Dogs and Associated Habitat - The extent of prairie dog colonies on the TBNG fluctuates from year-to-year as a result of management activities, epizootic outbreaks of sylvatic plague (caused by the bacterium *Yersinia pestis*), and natural growth and shrinking caused by population pressure and resource availability within colonies. The Forest Service has monitored colony area on the TBNG annually since 2001 (Table E-6 and Figure E-1) to maintain up to date information on prairie dog colony extent as well as a proxy for availability of short-statured vegetation habitat for associated species. Across the grassland, prairie dog colonies have historically occurred most extensively in management area 3.63, which encompasses approximately 50,900 contiguous acres and is managed to facilitate the growth of large colony complexes for the reintroduction of the endangered black-footed ferret, an obligate prairie dog predator (USDA Forest Service 2015). Prairie dogs on the Thunder Basin National Grassland have experienced three landscape-scale plague epizootics since annual mapping began, which began in 2001, 2005 and 2017. Recent growth and decline of prairie dog colonies on the grassland has fluctuated greatly (Table E-6 and Figure E-1). The Forest Service understands 2017 and 2018 to represent the maximum and minimum area of prairie dog colony extent on the TBNG since the Forest Service has managed it; measured colony extent on NFS lands during those years was more than 48,000 acres in 2017 and less than 700 acres in 2018 (note that 2017 and 2018 surveys focused on Management Area 3.63 and did not capture the full extent or colonies across the grassland).

Table E-6. Extent of black-tailed prairie dog colonies on the Thunder Basin National Grassland and adjacent lands

Year	Total recorded in acres in Management Area 3.63[a,b,c]	Total recorded acres on the TBNG[a,b,c]	Total recorded acres on the TBNG and adjacent lands[a,b]
2001	12,014	18,758	22,451
2002	2,856	3,869	4,394
2003	945	4,251	5,643
2004	2,875	7,579	9,237
2005	6,168	12,876	15,427
2006	1,080	4,496	5,100
2007	1,568	2,884	3,304
2008	2,121	3,311	3,932
2009	1,876	2,822	2,947
2010	3,538	4,624	4,947
2011	5,886	9,195	9,868
2012	10,970	16,437	17,791
2013	15,382	22,979	23,259
2014	16,040	24,896	26,439
2015	18,316	28,943	29,397
2016	25,075	30,969	36,463
2017	31,521[d]	48,346[d]	76,155[d]
2018	250	625	1,154
2019	1,065	2,438	3,578

[a] Surveys are not comprehensive and do not represent the true extent of active black-tailed prairie dog colonies in any given year; numbers are approximate.

[b] Data for 2001-2015 was collected in surveys conducted by Forest Service personnel. Data for 2016-2019 was collected in surveys conducted by the Thunder Basin Grassland Prairie Ecosystem Association (TBGPEA). Surveyed locations and total area surveyed are not consistent from year-to-year. The TBGPEA surveys cover far more state and private land than the Forest Service surveys, but the Forest Service surveys were not entirely limited to National Forest System land. The TBGPEA surveys cover roughly the vicinity of Management Area 3.63.

[c] All calculations based on 2019 surface ownership and management unit boundaries.

[d] This is combined 2016 and 2017 data. The plague event happened in 2017. Mapping efforts for 2017 measured the extent of empty burrows even after plague mortality in some colonies in order to gauge the full extent of colonies immediately before the plague event.

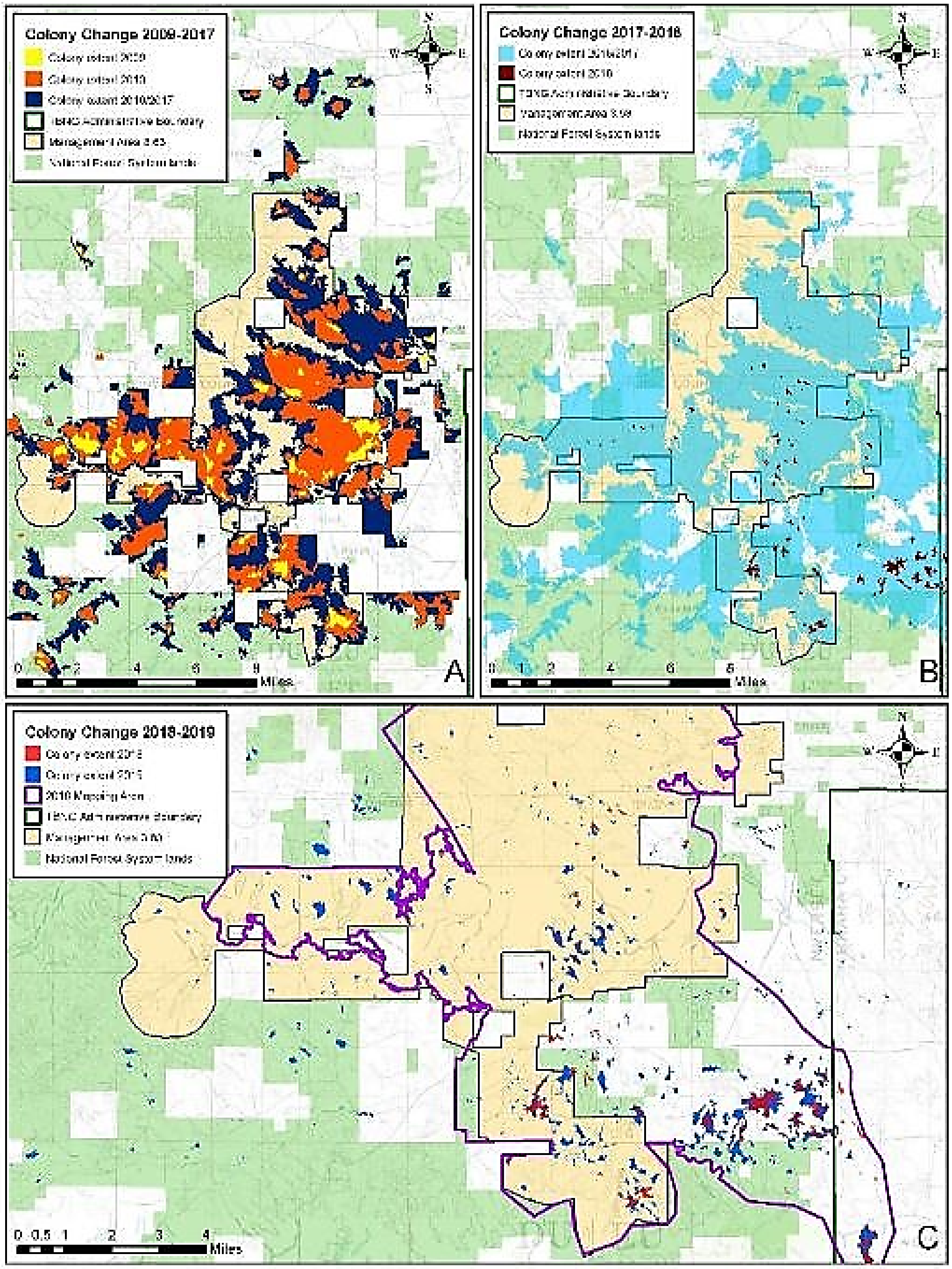

Figure E-1. Black-tailed prairie dog colony change in management area 3.63 and vicinity from 2009 to 2019. Panel A shows the growth of colonies from 2009 to 2017. Colony extent is shown for the years 2009, 2013, and 2016/2017 (including National Forest System lands only). Panel B shows the decline of colony extent after the landscape-scale plague epizootic in 2017. Colony extent is shown for the years 2016/2017 and 2018 (including National Forest System and adjacent state and private lands). In Panels A and B, survey data for the years 2016 and 2017 are combined to show the maximum extent of colonies prior to the plague outbreak in 2017; the colony surveyors were not able to fully map active colonies in 2017 prior to the plague outbreak. Panel C shows the change in prairie dog colony extent between 2018 and 2019 (including National Forest System and adjacent state and private lands). In Panel C, the purple line encloses the area targeted for colony mapping surveys in 2018, indicating that areas with colonies mapped in 2019 outside of the purple outline may not have been surveyed in 2018. Observation data are from the local survey dataset maintained by the Douglas Ranger District and the Thunder Basin Grassland Prairie Ecosystem Association. Note that management area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Desired Condition

Desired conditions are to manage for a viable population of black-tailed prairie dogs while providing ecological conditions for all native and desired non-native wildlife species on the TBNG.

Effects Analysis – Threatened and Endangered Species

This section presents the analysis and determination of effects of all alternatives associated with the 2020 Thunder Basin Plan Amendment on federally listed species (endangered, threatened, and proposed) to meet NEPA requirements.

A BA was also prepared to document the effects of the selected alternative (Preferred Alternative – Alternative 5) for the Thunder Basin National Grassland 2020 Plan Amendment. See the Biological Assessment in the Project Record for more information.

Table E-7 describes the listing status for each federally listed species, habitat presence in the project area, and whether the species was carried forward for analysis. Federally listed species addressed in this report are from the most recent list received from the U.S. Fish and Wildlife Service (U.S. Fish and Wildlife Service; June 2019, September 2019 and March 2020), along with the Region 2 Threatened, Endangered, Proposed and Sensitive (TEPS) Species List.

Species in Table E-7 that do not occur in the planning unit, no indirect effects are expected outside the TBNG planning area, or for which the analysis area is outside of the species' range were eliminated from further analysis. Species for which habitat is present or species that are known or suspected to occur in the planning area were carried forward for analysis. There is no designated Critical Habitat for any federally listed species on the Thunder Basin National Grassland and the project will not affect downstream Critical Habitat due to depletions.

Table E-7. U.S. Fish and Wildlife Service Threatened, Endangered and Proposed Species List for the Thunder Basin National Grassland. Species Concurrence from IPAC: Final data pull March 27, 2020. Wyoming Ecological Services Field Office, Cheyenne, Wyoming.

Common Name	Status	Recognized on FWS IPAC List for the Thunder Basin?	Recognized on the Region 2 TEP List?	Known or Suspected To Be Present?	Suitable Habitat Present?	Designated Critical Habitat Present Or Could Be Affected?	Rationale to carry forward for analysis or not
Black-footed ferret (*Mustela nigripes*)	Endangered; Experimental Population, Non-essential	No	Yes	No	Yes	No	Species will be carried forward for analysis due to dependency on prairie dogs, even though the species does not occur on the planning unit.
Least tern (*Sternula antillarum*) Interior pop	Endangered	No	Yes	No	No	No	No analysis needed based on: Analysis area is outside the species' range or the species does not occur on the planning unit and the project does not affect downstream water depletions.
Piping plover *(Charadrius melodus)* No. Great Plains pop	Endangered	No	Yes	No	No	No	No analysis needed based on: Analysis area is outside the species' range or the species does not occur on the planning unit and the project does not affect downstream water depletions.
Whooping crane (*Grus americana*)	Endangered	No	Yes	No	No	No	No analysis needed based on: Analysis area is outside the species' range or the species does not occur on the planning unit and the project does not affect downstream water depletions. In addition, there is no Critical Habitat on the TBNG for this species and the project will not affect downstream Critical Habitat due to depletions.
Northern long-eared bat (*Myotis septentrionalis*)	Threatened	Yes	Yes	Yes	Yes	No	Species will be carried forward for analysis due to habitat present in the planning area or is known to occur in the planning area.

Black-footed Ferret (*Mustela nigripes*)

Introduction

Reintroduction of the black-footed ferret was raised as an issue during the public scoping period. In addition, the 2012 Planning Rule states the plan must include ecosystem plan components that maintain or restore the ecological integrity and diversity of ecosystems. The responsible official shall determine whether the ecosystem plan components provide the ecological conditions necessary to contribute to the recovery of federally listed threatened and endangered species, within the plan area. If the responsible official determines the ecosystem plan components are insufficient to provide such ecological conditions, additional, species-specific plan components, including standards or guidelines, must be included in the plan to provide such ecological conditions in the plan area.

Black-footed ferrets are not known or expected to inhabit the Thunder Basin National Grassland. Neither wild ferrets, nor any individuals from a non-essential experimental population are present, and no critical habitat is designated. As of 2017, two populations of ferrets have been re-established in Wyoming: the Shirley Basin/Medicine Bow Reintroduction Site and the Meeteetse Reintroduction Site. Both of these populations contribute toward the recommendations and state-specific population targets for Wyoming set forth by the U.S. Fish and Wildlife Service in the 2013 Recovery Plan (USFWS 2013, WGFD 2018). In addition, site-specific management plans have been created outlining the Department's strategies and goals specific to each reintroduction site (WGFD 2018). Neither of these sites is within or adjacent to the project area, and the protected status of those black-footed ferrets are considered non-essential experimental populations.

The black-footed ferret was listed as endangered in 1967 under the Endangered Species Preservation Act of 1966, a precursor to the current Endangered Species Act of 1973 (32 FR 4001, March 1967). On March 6, 2013, the U.S. Fish and Wildlife Service issued a letter designating 'block clearance' for the State of Wyoming in response to a request from the Wyoming Game and Fish Department (USFWS 2019a). This letter provides acknowledgement that the likelihood of identifying wild ferrets in Wyoming, outside of those resulting from reintroductions, is distinctly minimal. In 2015, the U.S. Fish and Wildlife Service proposed to designate all of the State of Wyoming as a special area for the re-establishment of black-footed ferret populations under section 10(j) of the Endangered Species Act. This designation provides the greatest flexibility to manage black-footed ferrets while addressing landowner concerns regarding Endangered Species Act regulations. The goal of this proposed action was to help facilitate new reintroductions of this endangered species.

The "10 J Rule" became final in October of 2015 (USFWS 2019a). The U.S. Fish and Wildlife Service, in coordination with the State of Wyoming and other partners, committed to reestablishing additional populations of the black-footed ferret into prairie dog occupied habitat in Wyoming and classify any reestablished population as a non-essential experimental population under section 10(j). This final rule establishes the non-essential experimental population area and provides for allowable legal (non-purposeful) incidental taking of the black-footed ferret within the defined non-essential experimental population area.

The best available data indicate the reintroduction of black-footed ferrets to Wyoming is biologically feasible and will promote conservation and recovery of the species. This non-essential experimental population area and two previously designated, more localized non-essential experimental populations in Wyoming collectively cover the entire state and provide consistent management flexibility state-wide.

As part of the final 10(j) rule, the U.S. Fish and Wildlife Service also formally passed leadership of ferret reintroduction to the Wyoming Game and Fish Department, which has played a lead role in reintroduction efforts in the State since ferrets were rediscovered outside of Meeteetse in 1981. The Wyoming Game and Fish Department finalized a black-footed ferret management plan in 2018 based on the U.S. Fish and Wildlife Service black-footed ferret recovery plan, which includes the following delisting population objectives for Wyoming (USFWS 2013):

1. Maintain a minimum of 341 breeding adults distributed among 5 or more populations statewide
2. Maintain a minimum of 30 breeding adults in each population, with at least 2 populations containing a minimum of 100 breeding adults
3. Establish at least 2 populations within white-tailed prairie dog colonies AND at least 1 population within black-tailed prairie dog colonies, with remaining populations distributed among colonies of either prairie dog species

Both the black-footed ferret recovery plan and the Wyoming black-footed ferret management plan estimate 70,000 acres of prairie dog colonies will be needed in black-tailed prairie dog and white-tailed prairie dog habitat across the state to meet Wyoming's portion of the range-wide habitat goal for black-footed ferret delisting. The black-tailed prairie dog occurs on the Thunder Basin National Grassland, however the white-tailed prairie dog does not and its range lies west of the grassland. According to the 10(j) rule, a minimum of 1,500 acres of black-tailed prairie dog colonies is required for a reintroduction site (80 FR 66824); the recovery plan also states approximately 4,500 acres of colonies are expected to be necessary to support at least 30 breeding adult ferrets and more than 15,000 acres are likely needed to support at least 100 ferrets (USFWS 2013).

The Black-footed Ferret Working Group (led by the Wyoming Game and Fish Department), a group comprised of representatives from government agencies as well as non-governmental organizations, has developed the "Black-Footed Ferret Reintroduction Site Prioritization Matrix (Wyoming Game and Fish Department 2018) that allows members to collaboratively evaluate a number of different criteria related to the biological and social context for reintroduction in order to prioritize new areas for reintroduction. This matrix is recently developed, and no sites have been recommended to the working group to evaluate based on the matrix since its development. When sites are recommended as a potential reintroduction sites, only those sites that meet the six requirements for reintroduction would be evaluated further for prioritization based on 10 ranking criteria. Ranking criteria would then be used to prioritize sites for the purpose of selecting the highest priority site for new or additional reintroduction activities when multiple sites are considered; not all criteria need to be met for a site to be considered for reintroduction. It should be noted, the prioritization matrix was developed after the Shirley Basin and Meeteetse sites were established, so there was no evaluation of either of these sites with the requirements of the matrix.

In regard to species recovery, recovery plans are not regulatory documents, but are instead intended to provide guidance to the U.S. Fish and Wildlife Service, other Federal agencies, States, tribes and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. The recovery of a species may be achieved without all criteria being fully met. The proposed Thunder Basin National Grassland 2020 Plan Amendment was developed intentionally to provide plan components and management approaches that could create ecological conditions necessary for the reintroduction of black-footed ferrets. In addition, the purpose and need of the proposed plan amendment includes the following statements regarding improvement of the social context for the reintroduction of black-footed ferret:

- Purpose: Support ecological conditions that do not preclude reintroduction of the black-footed ferret

- Need: Revise management direction in Management Area 3.63 – Black-Footed Ferret Reintroduction Habitat

Lastly, the U.S. Fish and Wildlife Service Black-footed Ferret Recovery Program and members of the Black-footed Ferret Recovery Implementation Team prepared a Species Status Assessment Report for the Black-footed Ferret (*Mustela nigripes*) to the current status, future status, and overall viability of the species (USFWS 2019c). The purpose of the report was to provide a scientific foundation for the Service's 5-year status review of the listing status of the black-footed ferret under the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). It is important to note, the Species Status Assessment is not a decision document, but instead provides scientific information needed to support future decisions made by the Service under the Act. In addition, the Service will release a 5-year review finding after reviewing the assessment report and all relevant laws, regulations, policies, and conservation efforts. This find is expected to be announced and released independently of the report.

Environmental Consequences

Direct, Indirect and Cumulative Effects to Black-footed Ferret

All alternatives are expected to have *No Effect* on black-footed ferret.

The effects determination only addresses changes in management that would occur from the Amendment. Consultation regarding existing management conditions that would not be changed as a result of the Amendment has occurred prior using agency-approved methods, and these management conditions are not analyzed in this document.

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 non-essential experimental populations of black-footed ferret exist in the state of Wyoming, proposed actions would not affect extirpated endangered black-footed ferret (USFWS 2013).

Determination of Effects

Black-footed ferrets are not known or expected to inhabit the Thunder Basin National Grassland. Neither wild ferrets, nor any individuals from a non-essential experimental population are present. In addition, no critical habitat is designated. 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. Because it has been determined by the USFWS (USFWS 2013) that 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-essential experimental populations of black-footed, with consideration of direct, indirect and cumulative effects combined.

Northern Long-eared Bat (*Myotis septentrionalis*)

Introduction

The northern long-eared bat was listed under the Endangered Species Act as a threatened species in 2015 (80 FR 17974; April 2, 2015). The listing decision included an interim special rule under section 4(d) of the Endangered Species Act, which was finalized on January 14, 2016 (USFWS 2019b). This 4(d) rule provides flexibility to landowners, land managers, government agencies, and others as they conduct activities that may impact the northern long-eared bat and its habitat. As of June 1, 2018, Wyoming is included in the white-nose syndrome zone as defined in the 4(d) rule. Within the white-nose syndrome zone, incidental take (unintentional harm to bats incidental to otherwise lawful activities) is prohibited under the following circumstances: 1) if it occurs within a hibernaculum, 2) if it results from tree removal activities within 0.25 mile of a known hibernaculum, or 3) if it destroys a known, occupied maternity roost tree or other trees within 150 feet of a maternity roost tree during the pup season (June 1 through July 31). Further, Federal agencies are obligated to consult with the U.S. Fish and Wildlife Service on projects that may affect the northern long-eared bat.

Northern long-eared bats forage primarily in coniferous or deciduous forests. They are short-distance migrants, the distance between summer habitat and the hibernaculum typically being 56 km (35 mi) to 89 km (55 mi) or less (USFWS 2019b). The species predominantly overwinters in hibernacula that include caves and abandoned mines. Hibernacula used by northern long-eared bats are typically large, with large passages and entrances, relatively constant, cooler temperatures, and with high humidity and no air currents. They are typically found roosting in small crevices or cracks in cave or mine walls or ceilings, often with only the nose and ears visible, thus are easily overlooked during surveys. To a lesser extent, northern long-eared bats have been found overwintering in other types of habitat including abandoned railroad tunnels, more frequently in the northeast portion of the range.

During the summer, northern long-eared bats typically roost singly or in colonies underneath bark or in cavities or crevices of both live trees and snags. Males’ and non-reproductive females' summer roost sites may also include cooler locations, including caves and mines. Northern long-eared bats have also been observed roosting in colonies in human-made structures, such as buildings, barns, park pavilions, sheds, cabins, under eaves of buildings, behind window shutters, and in bat houses.

It was determined that the northern long-eared bat is in danger of extinction, predominantly due to the threat of white-nose syndrome, which is a disease caused by *Psuedogymnoascus (Geomyces) destructans*, a fungus that thrives in cold conditions. First observed in New York in 2006, white-nose syndrome has spread rapidly across the Northeast and into the Midwest and Southeast. White-nose syndrome has not been detected in Wyoming, but the fungus has. It is now found as far west as the state of Washington and positive detections in bats have occured. Throughout the range of white-nose syndrome, up to 99 percent of infected bats die from the disease. Although there is uncertainty about the spread of white-nose syndrome, it will most likely spread throughout the United States (USFWS 2019b).

The northern long-eared bat is also threatened by the loss and degradation of summer habitat caused by human development, and by collision with or barotrauma (injury to the lungs due to a change in air pressure) caused by wind turbines. Mine closures and vandalism of winter roosts and hibernacula also pose threats to this species (USFWS 2019b).

Environmental Consequences

Direct, Indirect and Cumulative Effects of All Alternatives to Northern Long-eared Bat

All alternatives are expected to have *No Effect* on northern long-eared bat.

The effects determination only addresses changes in management that would occur from the Amendment. Consultation regarding existing management conditions that would not be changed as a result of the Amendment has occurred prior using agency-approved methods, and these management conditions are not analyzed in this document.

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 northern long-eared bat because none of these actions would occur in northern long-eared bat habitat.

Other impacts include the incremental actions 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.

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

Determination of Effects

The proposed action would not introduce management activities in northern long-eared bat habitat, and would have *No Effect* on northern long-eared bat.

Effects Analysis – Forest Service Sensitive Species

The following information includes Region 2 sensitive species, or their habitats, that are located on Thunder Basin National Grassland adjacent to or downstream of the project and could potentially be impacted by proposed activities of the plan amendment. A pre-field review was conducted of available information to assemble occurrence records, describe habitat needs and ecological requirements needed to complete the analysis. Sources of information included Forest Service records and files, state databases, state wildlife agency information, and published research.

Sensitive species reviewed for this analysis were designated by the Regional Forester due to concerns over their population status, trend, habitat conditions, and population viability as evidenced by the following:

- significant current or predicted downward trends in population numbers or density
- significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution

These species (Table E-8) were then considered for analysis based on five criteria listed below. The criteria were used to identify species that would experience "no impact" from the implementation of the proposed action and could, therefore, be eliminated from detailed analysis. These numerical categories below are referred to in Table E-8:

1. Analysis area is outside the species' range.
2. Potential habitat for the species does not exist within the proposed action area.
3. The type or intensity of the activity in the proposed action is expected to have no impact/effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.
4. Individual animals may be: accidental, dispersing, migrating, happenstance, vagrant, nomadic or opportunistic visitors to the habitat(s) impacted by the proposal; however, no affiliation or dependence on these habitat(s) has been shown.
5. The associated conservation design of the proposed action eliminates any potential for negative impact on the species.

Table E-8. Forest Service sensitive species list for the Thunder Basin National Grassland and occurrence

Class	Common Name (*Latin Name*)	Habitat Features	Status on Regional Forester's Sensitive Species List	Habitat Present in the Analysis Area?	Rationale for Effects Analysis	Determination for All Alternatives
Amphibian	Northern leopard frog (*Lithobates pipiens*)	In or near permanent water features and riparian areas in the plains, foothills, and montane zones	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed.	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Bird	Brewer's sparrow (*Spizella breweri*)	Sagebrush obligate species	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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
Bird	Burrowing owl (*Athene cunicularia*)	Open terrain such as grasslands, prairies, shrub-steppe, and deserts, preferring well-draining or gently sloping areas with low vegetation and a high percentage of bare ground, where active and inactive prairie dog colonies exist, due to dependence on previously excavated by mammals to provide nesting and forage habitat.	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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
Bird	Chestnut-collared longspur (*Calcarius ornatus*)	Open tracts of shortgrass and mixed-grass prairie; may use prairie dog colonies as habitat	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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

Class	Common Name (*Latin Name*)	Habitat Features	Status on Regional Forester's Sensitive Species List	Habitat Present in the Analysis Area?	Rationale for Effects Analysis	Determination for All Alternatives
Bird	Ferruginous hawk (*Buteo regalis*)	Open lower-elevation grassland, shrub-steppe, and desert habitats and tends to avoid croplands, forests, and narrow canyons; in winter, concentrates in grasslands where prairie dog colonies exist	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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
Bird	Flammulated owl (*Psiloscops flammeolus*)	Open, dry, mature and old-growth conifer forest often found on south or east facing slopes, with an oak or aspen component, herbaceous or grass understory, and pockets of dense brushy understory	Suspected – no known observations on the TBNG.	Habitat is present on the TBNG, but not where activities are proposed.	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Bird	Grasshopper sparrow (*Ammodramus savannarum*)	Broad array of open grassland habitat types, including prairie dog colonies	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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
Bird	Greater sage-grouse (*Centrocercus urophasianus*)	Sagebrush obligate species that depends on large areas of contiguous sagebrush	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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

Class	Common Name (*Latin Name*)	Habitat Features	Status on Regional Forester's Sensitive Species List	Habitat Present in the Analysis Area?	Rationale for Effects Analysis	Determination for All Alternatives
Bird	Lewis's woodpecker (*Melanerpes lewis*)	Commonly found in forests dominated by Ponderosa Pine, open riparian woodland dominated by cottonwood	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed.	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Bird	Loggerhead shrike (*Lanius ludovicianus*)	Open habitats with short vegetation, especially hay fields and pastures	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed.	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Bird	Long-billed curlew (*Numenius americanus*)	Breading habitat comprised of sparsely-vegetated shortgrass or mixed-grass prairie environments, often dominated by Wire Grass and Mountain Timothy, with low vegetation (less than or equal to 10 to 30 cm) and topography that is flat or gently sloping; winter habitat comprised of coastal estuaries, mudflats, salt marshes, wetlands, flooded fields, agricultural fields and pastures, and a variety of manmade waterbodies	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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

Class	Common Name (*Latin Name*)	Habitat Features	Status on Regional Forester's Sensitive Species List	Habitat Present in the Analysis Area?	Rationale for Effects Analysis	Determination for All Alternatives
Bird	McCown's longspur (*Rhynchophanes mccownii*)	Large tracts of open, semi-arid, shortgrass prairie and heavily-grazed mixed-grass rangeland with low and sparse vegetation, extensive bare ground, and little ground litter, including prairie dog colonies	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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
Bird	Mountain plover (*Charadrius montanus*)	Open terrain such as grasslands, prairies, shrub-steppe, and deserts, preferring well-draining or gently sloping areas with low vegetation and a high percentage of bare ground, and in some parts of range, where active and inactive prairie dog colonies exist	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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
Bird	Northern goshawk (*Accipiter gentilis*)	Mature montane coniferous forests	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed.	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Bird	Northern harrier (*Circus hudsonius*)	Open wetlands, including marshy meadows; wet, lightly grazed pastures; old fields; freshwater and brackish marshes, and tundra; also dry uplands, including upland prairies, mesic grasslands, drained marshlands, croplands, cold desert shrub-steppe, and riparian woodland	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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

Class	Common Name (*Latin Name*)	Habitat Features	Status on Regional Forester's Sensitive Species List	Habitat Present in the Analysis Area?	Rationale for Effects Analysis	Determination for All Alternatives
Bird	Olive-sided flycatcher (*Contopus cooperi*)	Montane and northern coniferous forests	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed.	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Bird	Sagebrush sparrow (*Artemisiospiza nevadensis*)	Sagebrush-obligate species that breeds preferentially in arid shrub lands dominated by big sagebrush	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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
Fish	Finescale dace (*Phoxinus neogaeus*)	Slow or stagnant water with abundant vegetation or other cover	Suspected – no known observations on the TBNG.	Habitat is present on the TBNG, but not where activities are proposed.	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Fish	Flathead chub (*Platygobio gracilis)*	Main channels of sandy, turbid streams with small substrates, deep water, and woody debris	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact

Class	Common Name (*Latin Name*)	Habitat Features	Status on Regional Forester's Sensitive Species List	Habitat Present in the Analysis Area?	Rationale for Effects Analysis	Determination for All Alternatives
Fish	Mountain sucker (*Catostomus platyrhynchus*)	Clear, cold creeks and small to medium rivers with clear rubble, gravel or sand substrate; rarely found in lakes	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Fish	Plains minnow (*Hybognathus placitus*)	Large, turbid, prairie streams and rivers, slow water and side pool habitat	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Fish	Plains topminnow (*Fundulus sciadicus*)	Shallow, slow water in clear streams with heavy vegetation	Suspected – no known observations on the TBNG.	Habitat is present on the TBNG, but not where activities are proposed.	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Fish	Sturgeon chub (*Macrhybopsis gelida*)	Mainstem dwellers and are rarely found in tributary streams, associated with hard substrates and relatively shallow, high current velocity habitats	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact

Class	Common Name (*Latin Name*)	Habitat Features	Status on Regional Forester's Sensitive Species List	Habitat Present in the Analysis Area?	Rationale for Effects Analysis	Determination for All Alternatives
Insect	Monarch butterfly (*Danaus plexippus*)	Open habitats including fields, meadows, weedy areas, marshes, and roadsides	Suspected – no known observations on the TBNG.	Habitat is present on the TBNG, but not where activities are proposed.	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Insect	Ottoe skipper (*Hesperia ottoe*)	Native tall-grass prairie	Suspected – no known observations on the TBNG.	Habitat is present on the TBNG, but not where activities are proposed.	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Insect	Regal fritillary (*Speyeria idalia*)	Tall-grass prairie and other open sites including damp meadows, marshes, wet fields, and mountain pastures	Suspected – no known observations on the TBNG.	Habitat is present on the TBNG, but not where activities are proposed.	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Insect	Western bumblebee (*Bombus occidentalis*)	Bumble bees inhabit a wide variety of natural, agricultural, urban, and rural habitats, although species richness tends to peak in flower-rich meadows of forests and subalpine zones	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact

Class	Common Name (*Latin Name*)	Habitat Features	Status on Regional Forester's Sensitive Species List	Habitat Present in the Analysis Area?	Rationale for Effects Analysis	Determination for All Alternatives
Mammal	Black-tailed prairie dog (*Cynomys ludovicianus*)	Short-statured grassland and bare ground; flat areas with short vegetation and few visual barriers	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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
Mammal	Fringed myotis (*Myotis thysanodes*)	Forested habitats, both deciduous and coniferous; trees, snags, caves, rocks, cliffs; grasslands, deserts, and shrub lands	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Mammal	Hoary bat (*Lasiurus cinereus*)	Forested habitats, both deciduous and coniferous; trees, snags, caves, rocks, cliffs; grasslands, deserts, and shrub lands	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact
Mammal	Rocky Mountain bighorn sheep (*Ovis canadensis*)	High visibility habitats near rocky escape terrain that allow efficient foraging, enhanced detection of predators, and opportunities to evade them	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact

Class	Common Name (*Latin Name*)	Habitat Features	Status on Regional Forester's Sensitive Species List	Habitat Present in the Analysis Area?	Rationale for Effects Analysis	Determination for All Alternatives
Mammal	Swift fox (*Vulpes velox*)	Short-grass and mid-grass prairies with flat or gently sloping topography; utilizes previously excavated burrows by other mammals for denning habitat	Known - observations on the TBNG	Habitat is present on the TBNG and where activities are proposed.	Analysis required. Proposed activities may impact species, their habitat, or both.	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
Mammal	Townsend's big-eared bat (*Corynorhinus townsendii*)	Forested habitats and abandoned buildings; trees, snags, buildings, caves, rocks, cliffs and bridges; xeric to mesic upland habitats ranging from shrub lands to woodlands to montane forests	Known - observations on the TBNG	Habitat is present on the TBNG, but not where activities are proposed	No analysis needed based on: Criterion #3 - The type or intensity of the activity in the proposed action is expected to have no impact or effect on these species or their habitat or proposed activities do not take place in potential or occupied habitat.	No impact

Brewer’s Sparrow (*Spizella breweri*)

Introduction

Brewer’s sparrow is a small passerine bird. The species is a common inhabitant of the TBNG. Observations of this species have occurred across the TBNG. Brewer’s sparrow relies on dense sagebrush habitat for nesting, and sagebrush faces several existing threats on the TBNG. Primary threats to sagebrush include fragmentation and removal as a result of fire and energy development. Other threats include vegetation management projects that involve the planting of non-native species or species that outcompete sagebrush. Because of these threats, existing management direction implemented as part of a management plan for greater sage-grouse (*Centrocercus urophasianus*) contains strong protections for sagebrush habitat.

Sagebrush typically does not occur or occurs at very low densities in prairie dog colonies. However, where sagebrush occurs adjacent to the ecological sites and vegetation conditions preferred by prairie dogs, prairie dog colony expansion is an additional disturbance that can result in some removal of sagebrush due to increased herbivory. Because the plan amendment may change prairie dog management, small changes to the extent of available habitat for Brewer’s sparrow could result. The total observed extent of prairie dog colonies on the TBNG from all years totals less than eight percent of the area of sagebrush prioritized for protection under the greater sage-grouse management plan, and the extent of prairie dog colonies is typically much less than 6 percent of the priority habitat management area in any one year.

Range-wide Information, Distribution and Abundance

Brewer’s sparrow is a North American endemic that breeds in and around the Great Basin and winters in the Sonoran and Chihuahuan deserts of the southwestern United States, western Mexico (including the Baja California peninsula) and the Mexican Plateau (Rotenberry et al. 1999).

In 2003, the U.S. Department of the Interior Fish and Wildlife Service estimated the breeding population to be approximately 10,500 to 13,500 individuals in Colorado, Montana, and Wyoming. Brewer’s sparrow overwinters outside of Wyoming and its distribution during migration is unknown.

Life History and Habitat

Brewer’s sparrow is a sagebrush obligate species, breeding in prairie and foothill shrubland habitat, dominated by big sagebrush (*Artemisia tridentata* spp.). Several studies of sagebrush shrubland habitat components show that Brewer’s sparrows are positively correlated with sagebrush, shrub cover, above-average vegetation height, bare ground, and measures of horizontal habitat heterogeneity, and are negatively correlated with grass cover (Rotenberry and Wiens 1980, Larson and Bock 1984). The species expands into other habitat types during migration.

Brewer’s sparrow primarily nests in live big sagebrush, but will sometimes nest in other shrub species if available. Within a stand of sagebrush, birds will select to nest in taller, denser shrubs (Rotenberry et al. 1999). During the breeding and nesting season, each nesting pair occupies a territory that typically does not overlap adjacent territories. Territory sizes can vary from less than .5 acres to over 5 acres, depending on population density (Wiens et al. 1985, Rotenberry et al. 1999). This species feeds primarily on insects (Rotenberry et al. 1999). Brewer’s sparrow nests may serve as host nests for brown-headed cowbird (*Molothrus ater*), and Brewer’s sparrow will often abandon nest sites as a result (Holmes and Johnson 2005).

Population Trends and Threats

The U.S. Geological Survey North American Breeding Bird Survey provides population trend data for Brewer's sparrow ranging back to the mid-20th century. Estimates of recent trends from survey-wide and Wyoming-specific BBS data may have deficiencies and should be viewed with caution. Across the United States and Canada, Brewer's sparrow numbers experienced statistically significant annual declines of 1.01 percent from 1966 to 2015 and 4.17 percent from 2005 to 2015 (Sauer et al. 2017). In Wyoming, estimates of Brewer's sparrow populations have not changed significantly since 1968 (Sauer et al. 2017).

The fragmentation and removal of sagebrush habitat have served as the primary cause of Brewer's sparrow population declines. Oil and gas development, powerlines, roads, fences and the introduction of noxious weeds may negatively impact the extent and continuity of sagebrush habitat (Holmes and Johnson 2005). Wildland fire also impacts the ecological integrity of sagebrush habitat due to the relatively long recovery time of sagebrush vegetation structure on the landscape (Baker 2006). Climate change may increase the frequency and severity of wildland fire activity in sagebrush habitat (Paige and Ritter 1999).

Species Status in the Plan Area

Brewer's sparrow is common on the TBNG relative to other bird species. In a comparative study of bird habitat on and off prairie dog colonies on a section of the TBNG, researchers encountered several hundred Brewer's sparrows. In these surveys, conducted from 2015 to 2017, Brewer's sparrow had a relative abundance of 9.9 to 12.9 percent among all bird species observed, the third or fourth most abundant species in each of those years (Duchardt et al. 2016a, 2016b, 2017). Current observation data for Brewer's sparrow is insufficient to determine local population trends for the TBNG.

Environmental Consequences

Direct and Indirect Effects

All alternatives are considered to have similar, minimal impacts to this species. Brewer's sparrow do not depend on prairie dog colonies and prefer sagebrush vegetation for nesting and foraging habitat. Therefore, components of all alternatives, including allowing the recreational shooting of prairie dogs and expanded use of rodenticides for prairie dog control, would pose little risk to the species. The primary impact to this species would occur from allowing prairie dog expansion. Extreme growth of prairie dog colonies could cause a reduction in total available habitat. However, all observed historical prairie dog occupancy on the TBNG totals approximately 8 percent of greater sage-grouse priority habitat management areas on the TBNG, and not all of the priority habitat management area is suitable sagebrush habitat for Brewer's sparrow. Proposed acreage objectives for all action alternatives are far lower than this proportion and are intended to minimize prairie dog expansion into sagebrush. In addition, plan components developed for other species will indirectly benefit Brewer's sparrow by reducing or eliminating potential impacts.

Cumulative Effects

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on the TBNG, it could reduce the availability of foraging and nesting habitat (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will directly and indirectly benefit Brewer's sparrow by reducing or eliminating potential impacts (see Table E-9). In addition, the plan components listed below reduce the overall threats to the species by maintaining sagebrush dominated habitat.

Table E-9. Plan components that support Brewer's sparrow habitat availability and suitability

Threats	Habitat availability – Loss of exclusive breeding season habitat in sagebrush-dominated sites because of expansion of prairie dog colonies
No Action Alternative	*GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.
Proposed Action Alternative	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area targets in prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.
Grassland-wide Alternative	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area targets in prairie dog colonies. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.

Threats	Habitat availability – Loss of exclusive breeding season habitat in sagebrush-dominated sites because of expansion of prairie dog colonies
Prairie Dog Emphasis Alternative	GPA-FW-FWRP-ST-01 (PDE): GPA-FW-FWRP-ST-01 contains the area targets in prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is allowed when composite colony area is greater than the target. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.
Preferred Alternative	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-11 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the objective. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.

Determination of Effects

With all activities combined, along with resource protection measures and plan components, all alternatives have an effects determination of, "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 any negative impacts are expected to be localized. Despite possible impacts of the alternatives, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. In addition, plan components intended to maintain ecological conditions appropriate for sagebrush obligate species are in place in the grassland plan and are not proposed for amendment. These components are expected to provide for Brewer's sparrow habitat on the grassland.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species' habitat on the TBNG.

The rationale for effects determinations of all alternatives is based on the availability of foraging and nesting habitat in and adjacent to MA 3.67, along with sufficient distribution of habitat within the species' range. There are detections of Brewer's sparrow on the grassland; however, the species is understudied. Primary impacts of the alternatives include those activities that would allow prairie dogs to expand, thereby limiting Brewer's sparrow preferred habitat.

Rationale to support the effects determinations for all alternatives (unless otherwise noted) are listed as follows:

- Breeds and nests undisturbed sagebrush. Extreme growth of prairie dog colonies could cause a small reduction in total available habitat (all observed historical prairie dog occupancy is approximately 8% of greater sage-grouse core on the TBNG; acreage objectives are far lower than this proportion and not all core is suitable habitat).
- Brewer's sparrow do not forage in prairie dog colonies. Very minimal chance that individuals occupying prairie dog colonies could consume rodenticides and experience non-target poisoning from insecticides
- Brewer's sparrow do not occupy prairie dog colonies. Recreational shooting poses little risk.

Burrowing Owl (*Athene cunicularia*)

Introduction

The burrowing owl is a small grassland raptor that nests in underground burrows. The species is found across much of the Western Hemisphere in resident populations, but the western burrowing owl (*A. c. hypugaea*) subspecies that occurs in western North America is partially migratory. Western burrowing owl do not construct their own burrows for nesting and rely on fossorial mammals to create suitable breeding habitat. Where burrows are available, burrowing owls prefer flat areas with low vegetation to provide good lines of sight for predator detection. Burrowing owl populations have declined over the past century, in large part due to the loss of available burrows as the abundance of burrowing mammals decline, especially at the peripheries of the western burrowing owl range (Arrowood et al 2001). Because biotic and abiotic risk factors and land-use change have caused considerable declines in the burrowing mammal populations and remain as threats into the near future, the burrowing owl faces the potential for continued loss of habitat across its range.

On the TBNG, burrowing owl populations are correlated to the extent of black-tailed prairie dog colonies, which provide burrows for nesting, hunting, cover, and food storage. Prairie dog colonies on the grassland are subject to epizootic plague events and anthropogenic control, both of which can limit colony growth and cause large reductions in prairie dog activity. While burrowing owls are semi-colonial and can nest at relatively high densities in small prairie dog colonies, reductions in prairie dog colony areas across the landscape may result in declines in overall population numbers. The persistence of the population on the TBNG will depend largely on the management of prairie dog colony areas and relative size of those areas.

Range-wide Information, Distribution and Abundance

The burrowing owl is distributed throughout western North America, Mexico, southern South America, and parts of the Caribbean and northern South America. The species is a resident across the majority of its range, but individuals of the western burrowing owl subspecies that breed in Canada and the western United States migrate to Mexico, Guatemala, Honduras, and El Salvador in the winter. Western burrowing owls are residents in the southwestern United States, Texas, and northern Mexico. Range-wide population estimates are unavailable at this time.

Life History and Habitat

Burrowing owls can be found in open prairie, shrub-steppe, and desert ecosystems, preferring well-drained, bare ground with flat or gentle topography. The species will also use flat, treeless agricultural and urban landscapes. Burrowing owls require areas with high densities of underground burrows for nesting, escape cover, and caching of prey (Poulin et al. 2011). While the subspecies Florida burrowing owl excavates its own burrows, western burrowing owl does not and relies heavily on the presence of fossorial (i.e. burrowing) mammals (Plumpton and Lutz 1993, Poulin et al. 2005, Lantz et al. 2007, Conway 2018, Smallwood and Morrison 2018). Burrowing owl abundance is strongly related to burrow availability, and for western burrowing owl, populations of burrowing mammals in an area (Arrowood et al. 2001, Desmond and Savidge 1996, Ray et al. 2016). Buried artificial nesting boxes can also provide suitable, effective habitat to enhance conservation of the species in specific locations (Barclay 2008). Nesting in fields used for row-crop agriculture is generally uncommon because plowing tends to remove available burrows, but irrigation infrastructure and bare ground surrounding cultivated fields can often provide suitable habitat for burrowing mammals (Rosenberg and Haley 2004, Poulin et al. 2005). In addition to availability of burrows, habitat characteristics generally include loose, disturbed soils, which likely attract burrowing mammals at a higher rate, and short vegetation structure and bare ground for improved predator detection (MacCracken et al. 1985, Plumpton and Lutz 1993, Lantz et al. 2007, Thiele et al. 2013, Smallwood and Morrison 2018). Prey abundance and soil type are not strong determinants of habitat suitability for burrowing owls (MacCracken et al. 1985, Larson 2009, Ray et al. 2016). Burrowing owls typically hunt insects and small mammals, which may be sufficiently abundant across areas already containing available burrows (Thompson and Anderson 1988, Poulin et al. 2011, Ray et al. 2016). At the burrow-scale, nesting pairs generally prefer larger, longer burrows with taller mounds around the entrances, which can serve as perches for hunting. Pairs also prefer nest sites with a high local density of burrows, because they and their offspring use nearby burrows as satellite locations for cover, roosting, and hunting (Desmond and Savidge 1999, Poulin et al. 2005, Lantz et al. 2004, Lantz et al. 2007, Thiele 2012).

Across the western burrowing owl range, black-tailed prairie dog, yellow-bellied marmot (*Marmota flaviventris*), Richardson's ground squirrel (*Urocitellus richardsonii*), and American badger (*Taxidea taxus*) are the most common burrowing mammals. Black-tailed prairie dog is the primary burrow provider in 35 percent of the western burrowing owl range (Conway 2018). In Wyoming, Colorado, Nebraska, and South Dakota, burrowing owls are primarily found in prairie dog (*Cynomys spp.*) colonies, with a preference for active colonies, although this is not a life history requirement throughout the species range (Sidle et al. 2001, Lantz et al. 2007, VerCauteren et al. 2001). In areas of Oregon, badgers tend to provide habitat for the burrowing owl, and consequently, predation from badgers can occur (Green and Anthony 1989). Within the range of black-tailed prairie dog, burrowing owl abundance increases with colony size and total prairie dog colony area as a proportion of the landscape because of the increased density and total availability of burrows, though burrow density may decrease (along with burrowing owl occupancy) in very large colonies (Desmond et al. 1995, Desmond and Savidge 1996, Alverson and Dinsmore 2014, Ray et al. 2016, Bayless and Beier 2011). Colonial burrowing mammals such as prairie dogs and other ground squirrels provide an abundance of burrows, and they typically clip vegetation to enhance lines of sight for predator detection (Lantz et al. 2004, Lantz et al. 2007, Thiele et al. 2013). Burrowing owls often also benefit from eavesdropping on the warning calls of such mammals (Bryan and Wunder 2014, Henderson and Trulio 2019). Prairie dogs and burrowing owls share several predators, including red-tailed hawks (*Buteo jamaicensis*), badgers, coyotes (*Canis latrans*), and snakes (e.g., *Crotalus viridis, Pituophis catenifer*), and prairie dog warning calls in response to the presence of these predators elicit alert behaviors in burrowing owls that hear these calls (Bryan and Wunder 2014). Active prairie dog colonies offer the additional benefit of dilution of predation because prairie dogs serve as an abundant alternative prey base for predators (Desmond et al. 2000). While burrowing owls may use empty burrows in inactive prairie dog colonies after a colony has been reduced due to poisoning or disease, use of inactive colonies declines within a few years after the prairie dogs disappear (Desmond et al. 2000, Lantz et al. 2007). Western burrowing owls do not maintain their own burrows, and prairie dog burrows often collapse within three years after a colony becomes inactive (Lantz et al. 2007).

When selecting nest sites and territories, burrowing owls are somewhat adaptable to the conditions of the space where burrows are located. Burrowing owls are semi-colonial (Poulin et al. 2011). For example, Desmond and Savidge (1996) found that burrowing owls typically nest at higher densities on smaller prairie dog colonies, but nest in clusters within colonies larger than approximately 86 acres, though still at somewhat lower densities than in the smaller colonies. Burrowing owls can nest at densities, ranging up to an observed 0.17 pairs per acre in ground squirrel burrow complexes in central California (Smallwood and Morrison 2018). At the landscape scale, observed nesting densities have ranged up to approximately 0.01 nesting pairs per acre in an urban landscape in the Bay Area of California (Trulio and Chromczak 2003), approximately 0.03 pairs per acre in a nearly 9,000 acre, regularly mowed urban development site in Florida (Millsap and Bear 2000), and approximately 0.01 pairs per acre across over 37,000 acres of agricultural landscape in the Imperial Valley of southern California (DeSante et al. 2004; see also Rosenberg and Haley 2004).

Population Trends and Threats

Macías-Duarte and Conway (2015) and Conway (2018) analyzed U.S. Geological Survey North American Breeding Bird Survey burrowing owl observation data to show population trends in the breeding range for western burrowing owl. Similar data do not exist across the remainder of the burrowing owl range. The breeding population of western burrowing owl has declined significantly since the mid-1960s, when North American Breeding Bird Survey surveys commenced, with more pronounced declines prior to 1995 (Conway 2018). Range contractions are evident at the edges of the western burrowing owl breeding range, but populations have grown in the southern United States with increases in irrigation infrastructure for row-crop agriculture (Macías-Duarte and Conway 2015, Macías-Duarte et al. 2018). North American Breeding Bird Surveysample sizes for Wyoming are insufficient to reliably show trends (Korfanta et al. 2001, Sauer et al. 2017).

Key threats to this species include prairie dog control, sylvatic plague, rodenticides, predation, energy development and infrastructure, and climate change. The most likely cause of burrowing owl population declines is loss of available burrows. Western burrowing owl declines at the edges of the breeding range are likely a result of declines in the abundance of burrow providers, especially black-tailed prairie dogs, American badgers, and Richardson's ground squirrels (Conway 2018). The link between declines in burrowing mammal populations and declines in burrowing owl populations has also been observed at local and regional scales (Desmond et al. 2000, Murphy et al. 2001, Restani et al. 2001, Sheffield and Howery 2001). Declines in abundance of burrowing mammals is often the result of direct removal by farmers and ranchers because burrowing mammals may destabilize soil, denude vegetation, or compete for forage with livestock (Vermeire et al. 2004, Davidson et al. 2012). Such direct removal includes large-scale eradication campaigns, especially among prairie dog species (Forrest and Luchsinger 2006). The introduced disease sylvatic plague, caused by the bacterium *Yersinia pestis*, has also caused large-scale declines in many burrowing rodent populations (Cully and Williams 2001, Antolin et al. 2002). Habitat loss has played a major role in the decline of populations (Sheffield 1997). Land-use change from native prairie to row-crop agriculture has resulted in reduced availability of habitat for burrowing mammals, especially in the eastern and northeastern reaches of the western burrowing owl breeding range (Clayton and Schmutz 1999, Martell et al. 2001, Murphy et al. 2001). Because of the observed declines in the northern part of the breeding range, burrowing owl individuals and their habitat have received Federal protections in Canada since 1979 under the Species at Risk Act (COSEWIC 2017).

Species Status in the Plan Area

Several studies have examined burrowing owl abundance and habitat on the TBNG. Four studies explored habitat characteristics conducive to burrowing owl abundance and nest success on black-tailed prairie dog colonies on the TBNG (Sidle et al. 2001a, Sidle et al. 2001b, Lantz et al. 2007, Lantz and Conway 2009). Parker et al. (2019) explored potential trophic drivers of burrowing owl populations on the TBNG using Forest Service abundance data. Three additional studies regarding survey methods for burrowing owl included survey sites in the TBNG (Korfanta et al. 2001, Conway and Simon 2003, Conway et al. 2008).

Distribution, Abundance and Population Trend in the Plan Area

Burrowing owls typically occupy the TBNG between April and September for summer breeding, but individuals may also use the TBNG earlier or later as migratory habitat if they breed farther north (Lantz and Conway 2009, Pauli et al. 2011). Burrowing owls have been observed across the TBNG, but they tend to cluster in Management Area 3.63. The map in

shows the distribution of burrowing owl observations on the grassland. Observation records come from local Forest Service surveys, the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the citizen science birding database, eBird (https://eBird.org/; Sullivan et al. 2009). Records date back to 1979. Existing records are insufficient to show local population trends.

Habitat Requirements and Characteristics in the Plan Area

Burrowing owls use the TBNG for breeding habitat (Lantz and Conway 2009). Burrowing owls depend on and are most common on black-tailed prairie dog colonies on the TBNG (Figure E-2 and Figure E-3). Sidle et al. (2001), Lantz et al. (2007), and Lantz and Conway (2009) examined variables correlated to burrowing owl nest density and success on prairie dog colonies on TBNG. Burrowing owls generally select longer burrows in areas with higher burrow density and lower shrub cover that are closer to water (Lantz et al. 2007). Nest success increases with the length of the burrow, and nests initiated later in the spring are generally more successful than those initiated earlier (Lantz and Conway 2009). Burrowing owl nesting density has not been measured on the TBNG. Research from other parts of the range shows variability in burrowing owl nesting density in black-tailed prairie dog colonies, possibly resulting from colony size, burrow density, local plague or prairie dog management history, or other local ecosystem characteristics, such as vegetation composition and climate (Desmond and Savidge 1996, Alverson and Dinsmore 2014, Ray et al. 2016). On black-tailed prairie dog colonies in mixed-grass prairie, burrowing owl density has been observed to range up to 12.1 burrowing owls per acre on small prairie dog colonies, with average densities of 0.1 to 2.3 burrowing owls per acre on all colonies (Desmond and Savidge 1996).

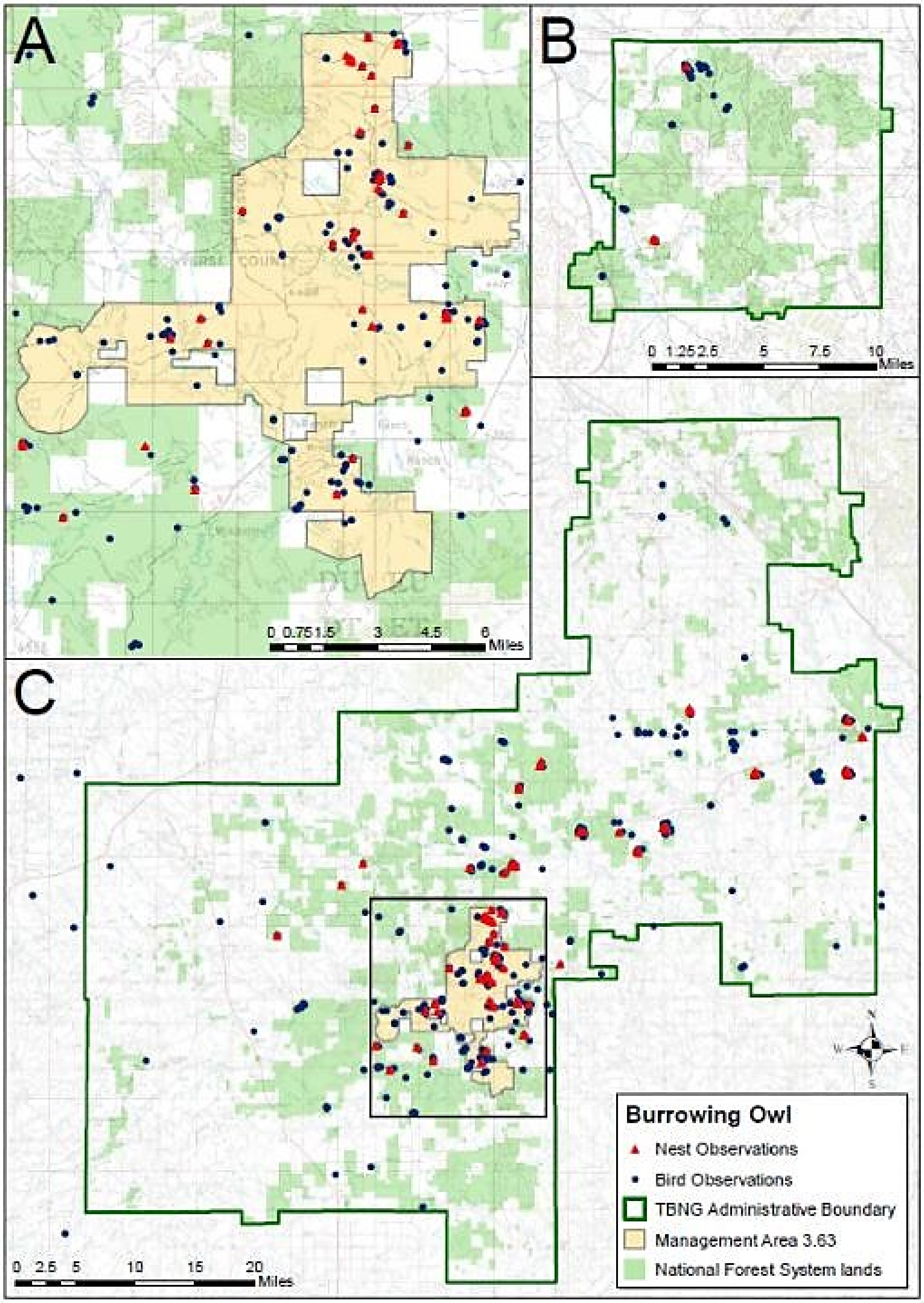

Figure E-2. Burrowing owl bird and nest observations on the Thunder Basin National Grassland and vicinity. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1981, 1982, 1984-1987, 1989, 1990, 1993, 2000-2006, and 2009-2018. Observation data are from the local survey dataset maintained by the Douglas Ranger District, the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of either species. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

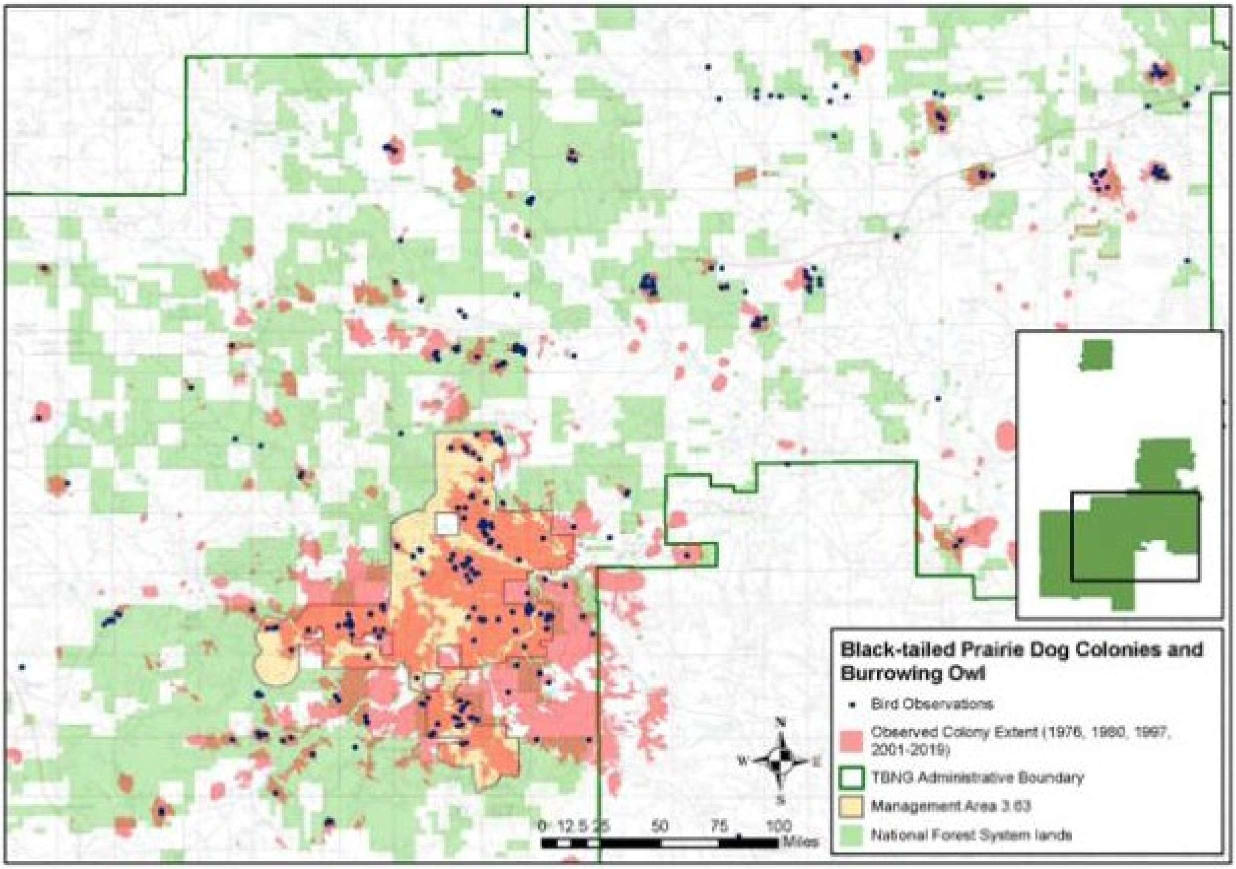

Figure E-3. Black-tailed prairie dog colony historical extent and burrowing owl observations on the Thunder Basin National Grassland and nearby lands.
Red polygons represent the total extent of all observed active black-tailed prairie dog colonies in 1976, 1980, 1997, and 2001-2019. Blue dots represent observations of burrowing owl. Burrowing owl observation data shown on the map were collected in 1982, 1985-1987, 1990, 1993, 2000-2006, 2010-2018. Burrowing owl observation data are from the local survey dataset maintained by the Douglas Ranger District, the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). The extent of the map is shown as a black box on the inset map. Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of either species in the plan area. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Environmental Consequences

Direct Effects–Habitat Availability

Direct effects to burrowing owl include impacts to habitat availability, including as a result of the acreage objectives for prairie dog colony extent, drought management, and impacts from sylvatic plague. Habitat availability for burrowing owl is largely correlated to the availability of prairie dog colonies on the TBNG. Direct effects to burrowing owls would include removal or degradation of habitat as a result of maintenance of a boundary management zone or any other prairie dog colony control activities, which reduce the potential habitat burrowing owls use for foraging and denning and could decrease available patch size, contiguity, structure and quality. Habitat would be most available under the No Action alternative (33,000 acre objective for prairie dog colony extent), followed by the Prairie Dog Emphasis Alternative (27,000 acre objective for prairie dog colony extent), the Grassland-wide Alternative (10,000-15,000 acre objective range for prairie dog colony extent, with a 10,000 acre drought objective) and then the Proposed Action (10,000 acre objective for prairie dog colony extent, with a 7,500 acre drought objective), proportional to acreage objectives described for each alternative. Under the Preferred

Alternative, Management area size would change from approximately 51,000 to approximately 42,000 acres with a 10,000-acre objective range for prairie dog colony extent. Because the burrowing owl relies largely on black-tailed prairie dogs to provide burrows for nesting habitat, any reduction in available habitat may impact individuals or clusters of burrowing owls; however, the acreage objectives in all alternatives are expected to allow for the species to maintain sufficient distribution across the grassland.

Sylvatic plague epizootics would continue to occur during implementation of any alternative, with limited management intervention available, and would cause contraction of prairie dog colonies and complexes and decrease the availability of burrows until prairie dog populations recover. Over the short-term, however, plague has been shown to have negligible effects on burrowing owl nesting success and population dynamics. In larger colonies, owls are more likely to return to the same nesting sites and may experience a lower rate of nest predation, along with higher rates of overall nesting success than in smaller colonies (Dechant et al. 2002, Conrey 2010, Alverson and Dinsmore 2014).

Indirect Effects–Habitat Suitability

Indirect effects would include accidental poisoning from rodenticides, mortality from recreational shooting, and effects of density control and sylvatic plague mitigation.

Burrowing owls can be susceptible to secondary poisoning by rodenticides, either by inadvertently ingesting the rodenticides while foraging for insects, or by scavenging near poisoned prairie dogs (Butts 1973). All alternatives would allow the continued use of zinc phosphide for prairie dog control, and the action alternatives are likely to use zinc phosphide more frequently than the no action alternative because of the inclusion of boundary management zones that are intended to remain clear of prairie dogs. Zinc phosphide poses a lower secondary poisoning risk to scavengers than other rodenticides because residues are not retained at consequential levels in carcasses (Bell and Dimmick 1975, Marsh 1987, Matschke et al. 1992). The Grassland-wide alternative would also allow for the use of anticoagulant rodenticides in the boundary management zone after three applications of zinc phosphide prove ineffective. Anticoagulant rodenticides remain potent within prairie dog carcasses for up to 2 weeks, causing risk to predators and scavengers such as burrowing owls if the carcasses are not removed from the environment (Ruder et al. 2011, Witmer et al. 2016). In addition to colony removal, the Proposed Action and Grassland-wide Alternatives allow for use of rodenticides for density control in colonies that contribute towards the acreage objectives for conservation, thus increasing potential exposure of burrowing owl. Under the Preferred Alternative (Alternative 5), zinc phosphide and fumigant use is allowed, however, anticoagulants are prohibited. For all alternatives, seasonal restrictions on rodenticide use limit exposure to burrowing owl during fall and winter months for those that migrate later in the season or are considered residential; and the presence of associated species must be considered prior to use of rodenticides outside of the boundary management zone.

Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives, but limits to recreational shooting exist in specific locations. Effects of recreational shooting include burrowing owls getting shot (Woodard 2002) and killed or ingesting lead while scavenging, leading to secondary poisoning. The No Action and Prairie Dog Emphasis Alternatives have the most limitations on recreational shooting and thus the greatest protections for burrowing owl from this activity, with a year-round shooting prohibition in MA 3.63 and in Category 2 areas. The Proposed Action offers the next highest level of protections, with a seasonal recreational shooting restriction in MA 3.67 from February 1 through August 15. The Grassland-wide Alternative does not include any recreational shooting restrictions. The Preferred Alternative also incorporates a seasonal restriction in MA 3.67 from February 1 through August 15.

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

Sylvatic plague appears to be the biggest indirect threat to prairie dogs and habitat of associated species like the burrowing owl. The 2017 plague event that occurred on Thunder Basin reduced active prairie dog colony acres from 75,000 acres to 1,100 over the course of one year. The unpredictable nature of plague and its mortality complicates efforts to manage for prairie dogs (Cully et al. 2006) and associated species as a result. Deltamethrin has been shown to be an effective tool in treating prairie dogs by reducing flea infestations up to 50-80% in some cases and minimizing the potential of plague (Maestas and Britten 2019, Roth 2019). In addition, fipronil has been shown to be around 94% effective in treating fleas on small mammals (Roth 2019). Both deltamethrin and fipronil appear to exhibit residual effects for 10-12 months (Eads et al. 2019). Fipronil is considered toxic to birds and fish species, and as a result, there could be indirect impacts to burrowing owls from foraging in treatment areas (Gibbons et al. 2015). Deltamethrin is considered to be less toxic to birds, however, it can kill insects around areas of use. This reduction in potential foraging could impact burrowing owls where deltamethrin is used. As a result, plan components were developed to restrict the use of plague mitigation tools in prairie dog colonies where it may pose a risk to burrowing owls.

Cumulative Effects

In addition to proposed activities in each alternative, other actions contribute to potential impacts to the burrowing owl.

Energy development and infrastructure – Coal-bed methane drilling operations have been shown to negatively impact burrowing owl nest site selection within approximately 0.5 miles of the well site (Carlisle et al. 2018). Coal-bed methane development is common on the TBNG, but is limited geographically to the location of coal seams, which lie generally to the west of Management Area 3.63 and other common prairie dog colony locations (USDA Forest Service 2012). The effects of other oil and gas drilling activities on burrowing owl have not been studied.

Climate change – Hotter temperatures and reduced precipitation tend to decrease burrowing owl nesting success on the TBNG and in other regions of the species' range (Lantz and Conway 2009, Cruz-McDonnell and Wolf 2016). Projected hotter temperatures under climate change scenarios in the Northern Great Plains region (Conant et al. 2018) may thus cause a decrease in Burrowing Owl nesting success. According to the U.S. Fish and Wildlife Service (2009), "Sylvatic plague remains a significant population stressor and the spread and effects of plague on the species [prairie dog] could be exacerbated by climate change in the future."

Predation – Several avian, mammalian, and reptilian species on the TBNG prey upon burrowing owl individuals or eggs (Bryan and Wunder 2014). For example, increases in swift fox populations may depress burrowing owl population growth, even as available habitat in prairie dog colonies expands (Parker et al. 2019). In addition, increases in landscape fragmentation, often caused on the TBNG by road building associated with oil and gas development, can facilitate predation (Clayton and Schmutz 1999). Predation can have a significant local impact on burrowing owl populations (Clayton and Schmutz 1999), but this has not been directly observed on the TBNG.

Plan Components

Plan components developed for burrowing owl and for other species will directly and indirectly reduce potential impacts (see Table E-10). In addition, the plan components listed below reduce the overall threats to the species by maintaining the availability of burrowing owl habitat on the grassland, along with sufficient distribution of habitat within the species' range.

Table E-10. Plan components that support burrowing owl habitat availability and suitability

Threats	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat Availability – Loss of exclusive breeding season habitat in prairie dog colonies because of decline in size or total area of prairie dog colonies	*Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 3.63, Standards and Guidelines, General, 1 (NA)*: Standard F.65b in Chapter 1 adopts the Black-tailed Prairie Dog Conservation Assessment and Management Strategy (Strategy), which contains the existing area targets for prairie dog colonies. Control of prairie dogs is generally not allowed under the Strategy if composite colony area is below targets. The Strategy also directs use of sylvatic plague mitigation tools to prevent collapse of prairie dog colonies during plague epizootics and translocation to support regrowth of prairie dog colonies that have been impacted by plague. General standard 1 for MA 3.63 supports the composite colony area targets contained in the	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. This colony area target is intended to provide for a healthy, resilient prairie dog colony ecosystem within a mosaic of other vegetation types on the grassland. This healthy prairie dog colony ecosystem will provide ecological conditions necessary for the persistence of the population of burrowing owl on the Grassland. *GPA-FW-ADM-GL-07 (PA)*: GPA-FW-ADM-GL-07 stipulates that habitat value for associated species, including burrowing owl, will be considered prior to lethal control in prairie dog colonies outside of boundary management zones. This guideline will provide some degree of	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. This colony area target is intended to provide for a healthy, resilient prairie dog colony ecosystem within a mosaic of other vegetation types on the grassland. This healthy prairie dog colony ecosystem will provide ecological conditions necessary for the persistence of the population of burrowing owl on the Grassland. *GPA-FW-ADM-GL-11 (GW)*: GPA-FW-ADM-GL-11 stipulates that habitat value for associated species, including burrowing owl, will be considered prior to lethal control in prairie dog colonies outside of boundary management zones. This guideline will provide some degree of	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is prohibited when composite colony area does not sum to the targets. These colony area targets are intended to provide for a healthy, resilient prairie dog colony ecosystem within a mosaic of other vegetation types on the grassland. This healthy prairie dog colony ecosystem will provide ecological conditions necessary for the persistence of the population of burrowing owl on the Grassland. *GPA-FW-ADM-GL-07 (PDE)*: GPA-FW-ADM-GL-07 stipulates that habitat value for associated species, including burrowing owl, will be considered prior to lethal control in prairie dog colonies outside of	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-12 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the objective. 7,500 acres of colonies is the minimum threshold for use of rodenticides in MA 3.67 outside of boundary management zones in all circumstances except density control. *Ch. 1, Standards and Guidelines, H.1 (Preferred)*: Standard H.1 in Chapter 1 provides for consideration of impacts to nesting, breeding, and denning habitat for associated species in prairie dog colonies outside of MA 3.67 before control of those colonies may occur. *GPA-MA3.67-FWRP-ST-15 (Preferred); GPA-MA3.67-FWRP-GL-16 (Preferred)*: GPA-

Threats	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	Strategy by prohibiting activities that would inhibit increases in the prairie dog population in MA 3.63 until the colonies could support a sustainable black-footed ferret population. This colony area target is intended to provide for a healthy, resilient prairie dog colony ecosystem within a mosaic of other vegetation types on the grassland. This healthy prairie dog colony ecosystem will provide ecological conditions necessary for the persistence of the population of burrowing owl on the Grassland. *Ch. 1, Standards and Guidelines, F.62 (NA)*: Guideline F.62 stipulates managing for individual colonies greater than 80 acres in size to optimize habitat for burrowing owls.	protection to burrowing owl from loss of habitat due to control of prairie dog colonies. *Ch. 1, Standards and Guidelines, F.62 (PA)*: Guideline F.62 stipulates managing for individual colonies greater than 80 acres in size to optimize habitat for burrowing owls. *GPA-MA3.67-FWRP-ST-12 (PA)*: GPA-MA3.67-FWRP-ST-12 prohibits density control in more than 50% of the area of an individual colony when composite colony area is smaller than the target. This standard will maintain some degree of burrowing owl habitat characteristics in colonies subject to density control in such a scenario. *GPA-FW-FWRP-GL-02 (PA)*: GPA-FW-FWRP-GL-02 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics. Plague control tools may help to maintain colonies that provide habitat for burrowing owl.	protection to burrowing owl from loss of habitat due to control of prairie dog colonies. *GPA-FW-FWRP-GL-01 (GW)*: GPA-FW-FWRP-GL-01 stipulates managing for individual colonies up to 1,000 acres in size, with an emphasis on colonies of 200 to 500 acres. This guideline provides for colonies that will support burrowing owls. *GPA-FW-FWRP-ST-06 (GW)*: GPA-FW-FWRP-ST-06 prohibits density control in more than 50% of the area of an individual colony when composite colony area is smaller than the target. This standard will maintain some degree of burrowing owl habitat characteristics in colonies subject to density control in such a scenario. *GPA-FW-FWRP-GL-04 (GW)*: GPA-FW-FWRP-GL-04 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics. Plague control tools may help to maintain colonies that provide habitat for burrowing owl.	boundary management zones. This guideline will provide some degree of protection to burrowing owl from loss of habitat due to control of prairie dog colonies. *Ch. 1, Standards and Guidelines, F.62 (PDE)*: Guideline F.62 stipulates managing for individual colonies greater than 80 acres in size to optimize habitat for burrowing owls. *GPA-FW-FWRP-GL-03 (PDE)*: GPA-FW-FWRP-GL-03 directs the use of sylvatic plague control tools where practical and effective to prevent collapse of prairie dog colonies during plague epizootics. Plague control tools may help to maintain colonies that provide habitat for burrowing owl.	MA3.67-FWRP-ST-15 stipulates that prairie dog density control is not allowed in MA 3.67 when composite colony area is less than 7,500, unless the best available scientific information indicates that density control will achieve site-specific objectives and maintain habitat requirements for associated species. GPA-MA3.67-FWRP-GL-16 indicates that density control in MA 3.67 should not occur in more than 50 percent of the area of any individual colony and should not occur more than every other year. *Ch. 1, Standards and Guidelines, F.62 (Preferred)*: Guideline F.62 in Chapter 1 stipulates managing for individual colonies greater than 80 acres in size. *GPA-FW-FWRP-GL-02 (Preferred); GPA-MA3.67-FWRP-O-08 (Preferred); GPA-MA3.67-FWRP-ST-18 (Preferred)*: GPA-FW-FWRP-GL-02 allows the use of plague mitigation tools in prairie dog colonies anywhere in the plan area. GPA-MA3.67-FWRP-ST-18 mandates that an integrated approach to plague management will be used in MA 3.67 annually. GPA-MA3.67-FWRP-O-08 states that the Forest Service intends to develop a plague management plan within 3 years of plan amendment approval.

Threats	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat Suitability – Non-target poisoning of individuals via inadvertent consumption of grain-bait rodenticides in prairie dog colonies	*Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of grain-bait rodenticides in prairie dog colonies from January 1 to September 30 to protect migratory birds from consumption of poisoned baits. This seasonal restriction generally overlaps burrowing owl occupation of the Grassland, except for portions of October, when some burrowing owls may not yet have migrated to wintering grounds.	*Ch. 1, Standards and Guidelines, H.2 (PA)*: Standard H.2 prohibits use of grain-bait rodenticides in prairie dog colonies from February 1 to September 30 to protect migratory birds from consumption of poisoned baits. This seasonal restriction generally overlaps burrowing owl occupation of the Grassland, except for portions of October, when some burrowing owls may not yet have migrated to wintering grounds.	*Ch. 1, Standards and Guidelines, H.2 (GW)*: Standard H.2 prohibits use of grain-bait rodenticides in prairie dog colonies from February 1 to September 30 to protect migratory birds from consumption of poisoned baits. This seasonal restriction generally overlaps burrowing owl occupation of the Grassland, except for portions of October, when some burrowing owls may not yet have migrated to wintering grounds.	*Ch. 1, Standards and Guidelines, H.2 (PDE)*: Standard H.2 prohibits use of grain-bait rodenticides in prairie dog colonies from February 1 to September 30 to protect migratory birds from consumption of poisoned baits. This seasonal restriction generally overlaps burrowing owl occupation of the Grassland, except for portions of October, when some burrowing owls may not yet have migrated to wintering grounds.	*Ch. 1, Standards and Guidelines, H.2 (Preferred)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.

Threats	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat Suitability - Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW); Ch. 1, Standards and Guidelines, H.2 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide. Standard H.2 prohibits the use of rodenticides between February 1 and September 30. This seasonal restriction overlaps with burrowing owl occupancy of the Grassland except for portions of October, when some burrowing owls may have not yet migrated to wintering grounds. These two standards provide that direct poisoning of burrowing owls by anticoagulant rodenticides will be infrequent and localized.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.

Threats	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat Suitability - Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. Standard F.63 provides protections to burrowing owl from secondary lead poisoning wherever that risk has been identified. Additional protections from lead poisoning are provided by Standard F.65b and Standard 1 for MA 2.1b. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect associated species, including burrowing owl, from risks associated with shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to ensure that those colonies protect associated species, including burrowing owl, from risks associated with shooting in prairie dog colonies. These seasonal restrictions overlap with burrowing owl occupancy of the Grassland except for the period between August 15 and October prior to burrowing owl migration to wintering grounds.	Shooting of prairie dogs is not prohibited in the Grassland-wide Alternative. However, effects to burrowing owls are expected to be infrequent and localized.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of all prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times. These shooting restrictions protect burrowing owl from lead poisoning across much of the Grassland where prairie dog colonies and burrowing owl populations are concentrated.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Threats	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat Suitability – Risk of direct poisoning by fumigant rodenticides used in prairie dog colonies	*Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of burrow fumigants in prairie dog colonies.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of fumigants.	*GPA-FW-ADM-ST-08 (GW); Ch. 1, Standards and Guidelines, H.2 (GW)*: Standard H.1 prohibits use of fumigants except in boundary management zones after three consecutive applications of zinc phosphide. Standard H.2 prohibits the use of rodenticides between February 1 and September 30. This seasonal restriction overlaps with burrowing owl occupancy of the Grassland except for portions of October, when some burrowing owls may have not yet migrated to wintering grounds. These two standards provide that direct poisoning of burrowing owls by fumigants will be infrequent and localized.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of fumigants.	*GPA-FW-ADM-ST-05 (Preferred)*: GPA-FW-ADM-ST-05 prohibits use of fumigants except in boundary management zones, 1-mile buffers around residences, and within ¼-mile of non-Federal land after two consecutive applications of zinc phosphide.

Threats	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Mortality - Risk of being shot in prairie dog colonies open to shooting	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. Standard F.63 provides protections to burrowing owl from shooting wherever that risk has been identified. Additional protections from shooting are provided by Standard F.65b and Standard 1 for MA 2.1b. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect associated species, including burrowing owl, from risks associated with shooting. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to ensure that those colonies protect associated species, including burrowing owl, from risks associated with shooting in prairie dog colonies. These seasonal restrictions overlap with burrowing owl occupancy of the Grassland except for the period between August 15 and October prior to burrowing owl migration to wintering grounds.	Shooting of prairie dogs is not prohibited in the Grassland-wide Alternative. However, effects to burrowing owls are expected to be infrequent and localized.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of all prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times. These shooting restrictions protect burrowing owl from shooting across much of the Grassland where prairie dog colonies and burrowing owl populations are concentrated.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting.

Threats	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat Availability - Risk of loss of habitat due to burrow collapsing in prairie dog colonies	Burrow collapsing is not addressed under the No Action Alternative.	*Ch. 1, Standards and Guidelines, F.62 (PA)*: Guideline F.62 prohibits the collapsing of inactive prairie dog burrows where burrowing owls are present.	*Ch. 1, Standards and Guidelines, F.62 (GW)*: Guideline F.62 prohibits the collapsing of inactive prairie dog burrows where burrowing owls are present.	*Ch. 1, Standards and Guidelines, F.62 (PDE)*: Guideline F.62 prohibits the collapsing of inactive prairie dog burrows where burrowing owls are present.	*Ch. 1, Standards and Guidelines, F.62 (Preferred)*: Guideline F.62 in Chapter 1 prohibits the collapsing of prairie dog burrows between April 15 and August 31 or where burrowing owls are present at the time of implementation.
Habitat Suitability - Possible impacts because of decline in insect prey base after use of deltamethrin in prairie dog colonies	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to burrowing owls.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to burrowing owls.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to burrowing owls.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to burrowing owls.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to burrowing owls.

Determination of Effects

With all activities combined, along with resource protection measures and plan components, all alternatives have an effects determination of, "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 negative effects are expected be localized. Despite the impacts of the alternatives, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. In addition, plan components were developed with the intent of maintaining ecological conditions on the grassland. These components are expected to provide for burrowing owl habitat on the grassland.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species' habitat on the TBNG.

Primary impacts of the alternatives include those activities that would decrease available habitat and cause mortality. The rationale for effects determinations of all alternatives is based on the availability of foraging and nesting habitat in and adjacent to MA 3.67, along with sufficient distribution of habitat on the TBNG and throughout the species' overall range. Burrowing owls have been observed across the grassland, but they tend to cluster in Management Area 3.63 in the central portion of the grassland (based on data collected by the TBNG). Within the range of black-tailed prairie dog, burrowing owl abundance increases with colony size and total prairie dog colony area as a proportion of the landscape because of the increased density and total availability of burrows, though burrow density may decrease (along with burrowing owl occupancy) in very large colonies (Desmond and Savidge 1996, Alverson and Dinsmore 2014, Ray et al. 2016; but see Bayless and Beier 2011). When selecting nest sites and territories, burrowing owls are somewhat adaptable to the conditions of the space where burrows are located and densities can vary greatly throughout their range. For example, Desmond and Savidge (1996) found that burrowing owls typically nest at higher densities on smaller prairie dog colonies, but nest in clusters within colonies larger than approximately 86 acres, though still at somewhat lower densities than in the smaller colonies. Burrowing owls can nest at very high densities, ranging up to an observed 0.17 pairs per acre in ground squirrel burrow complexes in central California (Smallwood and Morrison 2018). At the landscape scale, observed nesting densities have ranged up to approximately 0.01 nesting pairs per acre in an urban landscape in the Bay Area of California (Trulio and Chromczak 2003), approximately 0.03 pairs per acre in a nearly 9,000 acre, regularly mowed urban development site in Florida (Millsap and Bear 2000), and approximately 0.01 pairs per acre across over 37,000 acres of agricultural landscape in the Imperial Valley of southern California (DeSante et al. 2004; see also Rosenberg and Haley 2004). Primary impacts of the alternatives include those activities that decrease prairie dog colony areas as a habitat source, whether it is from habitat reductions or direct removal from density control and recreational shooting.

Rationale to support the effects determinations for all alternatives (unless otherwise noted) are listed as follows:

- Burrowing owls depend on prairie dog burrows (active or within the last few years), specifically on the Thunder Basin National Grassland for nesting and foraging habitat. Burrowing owls also depend on prairie dogs for predator detection, since the species will sound an alert call when a predator is near. As a result, managing for active prairie dog colonies is needed to ensure habitat is available for burrowing owls.
- Burrowing owl nesting density can vary greatly across the species range. The species can also be semi-colonial or nest in clusters throughout its range. On black-tailed prairie dog colonies in mixed-grass prairie, burrowing owl density has been observed to range up to an extreme of 12.1 owls per acre on small prairie dog colonies, with average densities on the order of 0.1 to 2.3 owls per acre on all colonies (Desmond and Savidge 1996). All alternatives are expected to provide for sufficient distribution of the species on the TBNG.
- Boundary management is expected to have minimal effects on the overall habitat available for burrowing owls. All alternatives are expected to provide for sufficient distribution of the species.
- All alternatives would manage for colony sizes greater than 80 acres and are expected to provide for sufficient distribution of the species. Desmond and Savidge (1996) found that burrowing owls typically nest at higher densities on smaller prairie dog colonies but nest in clusters within colonies larger than approximately 86 acres, though still at somewhat lower densities than in the smaller colonies.
- Restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to burrowing owls.
- No substantive effect (secondary poisoning) from zinc phosphide. Effects from use of anticoagulants and fumigants would occur, but only in limited circumstances and limited area in boundary management zones. It is expected effects would be minimal, and the number of individuals impacted would be low, since rodenticide and fumigant use would be used outside of the general season that burrowing owls occupy the TBNG. Most individuals would have migrated by October 1st.
- Recreational shooting poses a risk and the Grassland-wide Alternative would have a higher potential for loss of individuals because shooting is not restricted in proposed management area 3.67. In the remaining alternatives, shooting restrictions (especially during the breeding season) are expected to substantively decrease mortality.

Chestnut-collared Longspur (*Calcarius ornatus)*

Introduction

Chestnut-collared longspur occurs in relatively low numbers on the TBNG. The TBNG lies at the southern edge of the species' main breeding range. The species has experienced declines in population according to trend data in the state of Wyoming; however, unit-specific information on population trends or abundance is unavailable. Chestnut-collared longspur generally depend on large patches of native grassland subject to recent disturbance, such as grazing, fire, or herbivory by prairie dogs. The species prefers shorter-statured vegetation compared to other passerine grassland associates. Threats to chestnut-collared longspur habitat on TBNG could include disruptions to historical grazing and fire regimes and fragmentation or habitat loss as a result of energy extraction. In addition, the use of rodenticides or insecticides for the management of prairie dogs or grasshoppers could result in direct poisoning of chestnut-collared longspur.

Range-wide Information, Distribution and Abundance

Chestnut-collared longspur breed in shortgrass and mixed-grass prairies in southcentral Canada and the northcentral United States. In winter, the species migrates in flocks to prairies and open fields in the southern United States and Mexico (Bleho et al. 2015). Northeastern Wyoming is on the southern edge of the core breeding range, while southeastern Wyoming encompasses one of several smaller, discrete southern breeding areas (Bleho et al. 2015). Chestnut-collared longspur migrate through Wyoming in the spring and fall and are a summer residents (Faulkner 2010, Orabona et al. 2012). Confirmed and suspected breeding has been documented in 5 of the 28 latitude/longitude degree blocks in the Wyoming, all in the far eastern part of the state (Orabona et. al. 2012).

Life History and Habitat

Chestnut-collared longspur prefer large, arid, open tracts of short-statured vegetation, generally less than 30 centimeters tall, with little ground litter. Disturbances such as grazing by ungulates and fire can help to maintain this vegetation structure, and chestnut-collared longspur is generally more abundant in grasslands that have recently been exposed to such disturbances (Bleho et al. 2015). Chestnut-collared longspur also may use areas disturbed by black-tailed prairie dog colonies (Campbell and Clark 1981). Although chestnut-collared longspur will occasionally breed in non-native grasslands, such as planted hay fields and pastures, abundance and productivity can be lower in these agricultural landscapes (Sedgwick 2004). Chestnut-collared longspur is sensitive to patch size and the ratio of edge to patch area, and agricultural and other industrial disturbances that fragment grassland habitat such as oil and gas well development can result in reduced chestnut-collared longspur abundance (Davis 2004).

This species typically selects nesting sites with shorter, sparser vegetation than other grassland songbirds, but with taller, denser vegetation than the closely related McCown's longspur (Dieni and Jones 2003, Bleho et al. 2015). Chestnut-collared longspur tend to avoid areas of western wheatgrass (*Pascopyrum smithii*) when nesting (Dieni and Jones 2003). The species builds nests on the ground in small depressions, usually hidden by structures such as grass clumps, shrubs, or cattle dung pats. Territories of nesting pairs are discrete and range from less than 1 acre up to approximately 10 acres. Chestnut-collared longspur is an omnivorous ground-forager, eating primarily insects and grass seeds. Individuals tend to feed far from vegetative cover (Bleho et al. 2015).

Population Trends and Threats

Chestnut-collared longspur is particularly sensitive to interruptions in historical disturbance regimes; interruptions to regular, frequent fire and short-term intense grazing by bison (*Bison bison*) has altered the historical vegetation structure across much of the northern Great Plains (Grant et al. 2010). Fragmentation of shortgrass and mixed-grass prairies has resulted in a scattered distribution within the species' range, and it has experienced large contractions of both its historic summer and winter ranges (Sedgwick 2004, Bleho et al. 2015). Data from the U.S. Geological Survey North American Breeding Bird Survey suggest that chestnut-collared longspur has experienced large population declines in all regions of its breeding distribution, including Wyoming, between 1966 to 2015 and 2005 to 2015. Range-wide, these annual declines were statistically significant at 4.19 percent from 1966 to 2015 and 2.9 percent from 2005 to 2015. In Wyoming, populations declined significantly at 8.27 percent annually from 1968 to 2015 and non-significantly at 8.17 percent annually from 2005 to 2015 (Sauer et al. 2017).

Key threats to this species include prairie dog control, plague, insecticides, disruptions to historical grazing and fire regimes, fragmentation or habitat loss as a result of energy extraction and infrastructure, and climate change. Loss and fragmentation of native mixed-grass and shortgrass breeding and wintering grounds to agriculture and industrial development is the greatest threat to chestnut-collared longspurs (Sedgwick 2004). Coal mine and oil and gas well development and the road building associated with those activities can reduce the size of available patches of grassland habitat and negatively affect chestnut-collared longspur clutch size (Sedgwick 2004, Hamilton et al. 2011, Yoo and Koper 2017). Somewhat lesser threats that can affect productivity and survivorship include fire suppression, recreational activities, and the use of pesticides and recreational shooting related to prairie dog control (Sedgwick 2004).

Species Status in the Plan Area

In general, chestnut-collared longspur is less common than other grassland birds on the TBNG. The TBNG lies at the southern edge of the largest contiguous breeding range of the chestnut-collared Longspur. In avian surveys on the TBNG, Duchardt et al. (2019) did not observe chestnut-collared Longspur, and Augustine and Baker (2013) observed the species in very low numbers.

Distribution, Abundance and Population Trend in the Plan Area

The Forest Service does not monitor chestnut-collared longspur populations on the TBNG. Some annual survey data have been collected on parts of the TBNG by the North American Breeding Bird Survey and the Bird Conservancy of the Rockies Integrated Monitoring in Bird Conservation Regions program. The North American Breeding Bird Survey transects intersect the TBNG but also cover large areas of adjacent non-Forest Service lands. Neither the North American Breeding Bird Survey nor the Bird Conservancy of the Rockies Integrated Monitoring in Bird Conservation Regions datasets contain enough chestnut-collared longspur observation data specific to the TBNG to show population trends. The citizen science birding database eBird contains additional records of sightings (https://eBird.org/; Sullivan et al. 2009). Existing observation records are distributed across the grassland (Figure E-4).

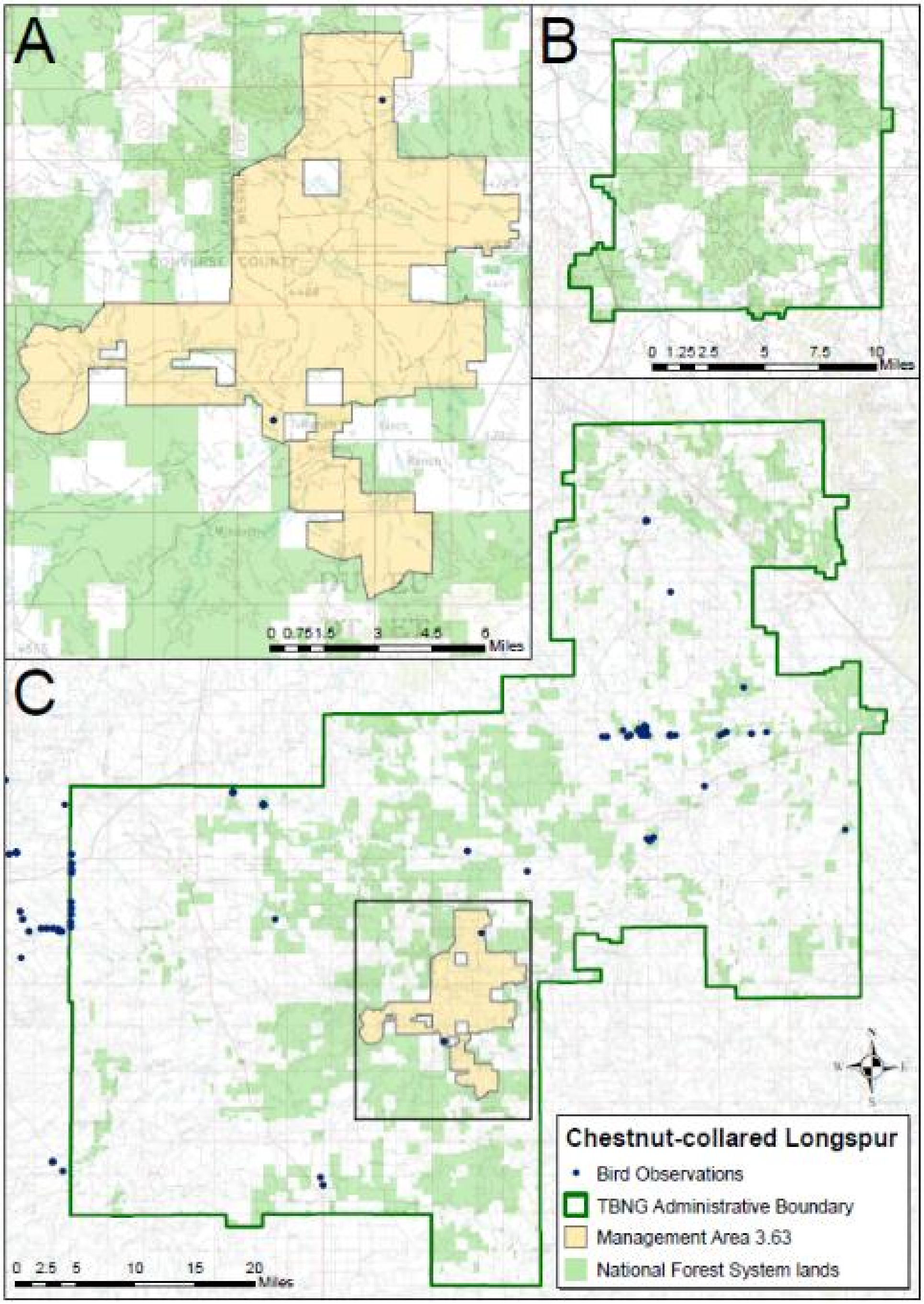

Figure E-4. Chestnut-collared longspur observations on the Thunder Basin National Grassland and vicinity. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1978, 1980-1982, 1987-1995, 2004, 2005, 2007-2009, 2011-2013, and 2015-2018. Observation data are from the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of the species on the Thunder Basin National Grassland. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Habitat Requirements and Characteristics in the Plan Area

Research shows that chestnut-collared longspur inhabit recently disturbed shortgrass and open mixed-grass prairies with a preference for native grasses and heterogeneity in spatial vegetative composition (Sedgwick 2004). Avian surveys specific to the TBNG (e.g., Augustine and Baker 2013, Duchardt et al. 2019) have not detected chestnut-collared longspur in sufficient numbers to demonstrate preferred habitat in the area. Across their surveys in the northern Great Plains, Augustine and Baker (2013) found that chestnut-collared longspur occur both on and off prairie dog colonies at comparable densities. Overall, it is likely that chestnut-collared longspur habitat on the TBNG reflects findings in other areas of their breeding range, and the species likely prefers areas with shortened grass cover as a result of fire or of herbivory by ungulates or prairie dogs.

Environmental Consequences

Direct Effects–Habitat Availability

Direct effects to chestnut-collared longspur could result from changes in habitat availability. There would be no change in habitat availability from the No Action Alternative, however habitat availability would change as a result of the decrease in acreage objectives for prairie dog colony extent in the Prairie Dog Emphasis Alternative, Grassland-wide Alternative, Proposed Action and Preferred Alternative. Sylvatic plague can also cause contraction of prairie dog colonies and complexes and decrease the availability of potential habitat if prairie dogs do not recolonize poisoned or plagued-out areas within a few years. Direct impacts to habitat availability are expected to be low under all alternatives, since the species does not depend on size, distribution, or extent of prairie dog colonies for nesting or breeding habitat.

Indirect Effects – Habitat Suitability

Indirect effects would include accidental poisoning from rodenticides, potential mortality from recreational shooting, and effects of density control and sylvatic plague management.

The effects of lethal prairie dog control on chestnut-collared longspur have not been heavily studied, but impacts could include the reduction of habitat or secondary poisoning by rodenticides. All alternatives would allow the continued use of zinc phosphide for prairie dog control, and the action alternatives are likely to use zinc phosphide more frequently than the no action alternative because of the inclusion of boundary management zones that are intended to remain clear of prairie dogs. The use of zinc phosphide generally does not result in secondary poisoning in songbirds because prairie dogs tend to consume more of the bait, making it less available to birds, and because the birds typically have an aversion to the zinc phosphide baits (Apa et al. 1991). The Grassland-wide alternative would also allow for the use of anticoagulant rodenticides in the boundary management zone after three applications of zinc phosphide prove ineffective. Secondary poisoning by anticoagulant rodenticides may occur because songbirds may eat poisoned grain baits when they have access to them (Apa et al. 1991, Vyas et al. 2013). In addition to colony removal, the Proposed Action, Grassland-wide and Preferred Alternatives allow for use of rodenticides for density control in colonies that contribute towards the acreage objectives for conservation, thus increasing potential exposure of songbirds. However, for all alternatives, seasonal restrictions on rodenticide use are intended to protect songbirds by limiting exposure to rodenticides to fall and winter months. There is a small potential for overlap of rodenticide use and when this species occupies the grassland. Very late departures of individuals may result in occupancy of colonies during lethal control activities.

Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives, but all except the Grassland-wide Alternative include seasonal or year-round prohibitions on recreational shooting in specific locations. Recreational shooting poses little to no risk to chestnut-collared longspurs. The species is very small and likely to flush easily with presence of humans and associated disturbance.

Sylvatic plague appears to be the biggest indirect threat to prairie dogs and associated species. The 2017 plague event that occurred on Thunder Basin reduced active prairie dog colony acres from 75,000 acres to 1,100 over the course of one year. The unpredictable nature of plague and its mortality complicates efforts to manage for prairie dogs (Cully et al. 2006) and associated species as a result. Plague mitigation is proposed to continue under all alternatives and may impact chestnut-collared longspur. The primary plague prevention product is deltamethrin, which poisons plague-carrying fleas (Seery et al. 2003). Deltamethrin has been shown to be an effective tool in treating prairie dogs by reducing flea infestations up to 50-80% in some cases and minimizing the potential of plague (Maestas and Britten 2019, Roth 2019). In addition, fipronil has been shown to be around 94% effective in treating fleas on small mammals (Roth 2019). Both deltamethrin and fipronil appear to exhibit residual effects for 10-12 months on prairie dogs (Eads et al. 2019). Fipronil is considered toxic to birds and fish species, and as a result, there could be indirect impacts to chestnut-collared longspur that forage in treatment areas (Gibbons et al. 2015). Deltamethrin is considered to be less toxic to birds, however, it can kill insects around areas of use. In addition, Martin et al. (1998, 2000) studied indirect effects of deltamethrin on the reproductive success of chestnut-collared longspur and did not find significant differences between sprayed and unsprayed sites in clutch size or nestling survival, but did find that egg viability was significantly reduced in sprayed plots. The reduction in potential foraging opportunities and impacts to egg viability may impact chestnut-collared longspur where deltamethrin is used. As a result, plan components were developed to restrict the use of plague mitigation tools in prairie dog colonies where it may pose a risk to species associated with prairie dog habitat.

Cumulative Effects to All Alternatives

In addition, to proposed activities in each alternative, other actions contribute to potential impacts to the chestnut-collared longspur. A summary of cumulative effects are provided below.

Insecticides – Other insecticide application, particularly for control of grasshoppers, could pose a threat to chestnut-collared longspur via direct poisoning. The Forest Service has occasionally treated the TBNG for grasshoppers, and the last treatment of diflubenzuron (Dimilin) occurred in 2011. Several insecticides have been shown to have negative effects on the abundance of grassland bird populations (McEwen et al. 1972).

Energy development – Construction and maintenance of energy extraction facilities (e.g., coal mines, oil and gas wells) can have negative effects on grassland birds through potential mortality, habitat loss and degradation, and disturbance (Ruth 2015). For chestnut-collared longspur, Yoo and Koper (2017) observed negative effects on clutch size from well development for natural gas. Ng et al. (2019) found that roads, noise, and human activity associated with oil and gas development significantly reduced levels of parental care, resulting in reductions in fledged offspring of chestnut-collared longspur. Oil and gas well development has been found to have mixed effects on overall chestnut-collared longspur occurrence or abundance, ranging from no effect (Hamilton et al. 2011, Yoo and Koper 2017, Nenninger and Koper 2018) to an observed decline in abundance with proximity to oil and gas wells (Linnen 2008, Bogard and Davis 2014, Thompson et al. 2015). Habitat fragmentation as a result of the development of drilling, mining, and transportation infrastructure is an additional concern because interior-dependent bird species like chestnut-collared longspur may tend to avoid small patches, leading to decreases in productivity (Davis 2004).

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and more extreme weather events (Conant et al. 2018). Further, because the TBNG ecotone represents the breeding range limit for chestnut-collared longspur, unexpected shifts in vegetation composition due to changing weather patterns and moisture regimes may place additional constraints on chestnut-collared longspur habitat.

Plan Components

Plan components developed for other species will indirectly benefit chestnut-collared longspur by reducing or eliminating potential impacts (see Table E-11). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-11. Plan components that support chestnut-collared longspur habitat availability and suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat availability – Loss of some breeding season habitat in prairie dog colonies because of decline in total area of prairie dog colonies	*Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 3.63, Standards and Guidelines, General, 1 (NA)*: Standard F.65b in Chapter 1 adopts the Black-tailed Prairie Dog Conservation Assessment and Management Strategy (Strategy), which contains the existing area targets for prairie dog colonies. Control of prairie dogs is generally not allowed under the Strategy if composite colony area is below targets. General standard 1 for MA 3.63 supports the composite colony area targets contained in the Strategy by prohibiting activities that would inhibit increases in the prairie dog population in MA 3.63 until the colonies could support a sustainable black-footed ferret population. *Ch. 1, Standards and Guidelines, F.23 (N/A); Ch. 1, Standards and Guidelines, F.34 (NA); Ch. 1, Standards and*	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *Ch. 1, Standards and Guidelines, F.34 (PA); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; GPA-FW-ADM-GL-07 (PA); Ch. 2, Broken Hills GA, Desired Conditions (PA); Ch. 2, Cellers Rosecrans GA, Desired Conditions (PA); Ch. 3, MA 3.67, Desired Conditions (PA); GRSG-FM-ST-048*: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a mosaic of other vegetation types. These components allow for use of prescribed fire targeted livestock	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *Ch. 1, Standards and Guidelines, F.34 (GW); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; GPA-FW-ADM-GL-11 (GW); Ch. 2, Broken Hills GA, Desired Conditions (GW); Ch. 2, Cellers Rosecrans GA, Desired Conditions (GW); Ch. 3, MA 3.67, Desired Conditions (GW); GRSG-FM-ST-048*: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a mosaic of other vegetation types. These components allow for use of prescribed fire targeted livestock	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is prohibited when composite colony area does not sum to the targets. *Ch. 1, Standards and Guidelines, F.23 (PDE); Ch. 1, Standards and Guidelines, F.34 (PDE); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; GPA-FW-ADM-GL-07 (PDE); Ch. 2, Broken Hills GA, Desired Conditions (PDE); Ch. 2, Broken Hills GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (PDE); Ch. 2, Cellers Rosecrans GA, Desired Conditions (PDE); Ch. 2, Cellers Rosecrans GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (PDE); Ch. 3, MA 3.67, Desired Conditions (PDE); GRSG-*	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-12 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the objective. 7,500 acres of colonies is the minimum threshold for use of rodenticides in MA 3.67 outside of boundary management zones in all circumstances except density control. *Ch. 1, Standards and Guidelines, F.34 (Preferred); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; Ch. 1, Standards and Guidelines, H.1 (Preferred); Ch. 2, Broken Hills GA, Desired Conditions (Preferred); Ch. 2, Cellers Rosecrans GA,*

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (NA); Ch. 2, Broken Hills GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (NA); Ch. 2, Cellers Rosecrans GA, Desired Conditions (NA); Ch. 2, Cellers Rosecrans GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (NA); Ch. 3, MA 3.63, Desired Conditions (NA); GRSG-FM-ST-048: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a mosaic of other vegetation types. These components stipulate target acreages of short-stature vegetation ecosystems and the use of prescribed fire and targeted livestock grazing to achieve vegetation goals.	grazing, and other vegetation management tools to achieve vegetation goals. GPA-FW-ADM-GL-07 additionally provides for consideration of habitat value for associated species in prairie dog colonies outside of boundary management zones before lethal control of those colonies may occur.	grazing, and other vegetation management tools to achieve vegetation goals. GPA-FW-ADM-GL-11 additionally provides for consideration of habitat value for associated species in prairie dog colonies outside of boundary management zones before lethal control of those colonies may occur.	*FM-ST-048*: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a mosaic of other vegetation types. These components stipulate target acreages of short-stature vegetation ecosystems and the use of prescribed fire and targeted livestock grazing to achieve vegetation goals. GPA-FW-ADM-GL-07 additionally provides for consideration of habitat value for associated species in prairie dog colonies outside of boundary management zones before lethal control of those colonies may occur.	*Desired Conditions (Preferred); Ch. 3, MA 3.67, Desired Conditions (Preferred); GRSG-FM-ST-048*: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the grassland among a mosaic of other vegetation types. These components allow for use of prescribed fire targeted livestock grazing, and other vegetation management tools to achieve vegetation goals. Standard H.1 in Chapter 1 additionally provides for consideration of impacts to nesting, breeding, and denning habitat for associated species in prairie dog colonies outside of MA 3.67 before control of those colonies may occur.
Habitat suitability – Non-target poisoning of individuals via consumption of grain-bait rodenticides in prairie dog colonies	*Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of grain-bait rodenticides in prairie dog colonies from January 1 to September 30 to protect migratory birds from consumption of poisoned baits.	*Ch. 1, Standards and Guidelines, H.2 (PA)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*Ch. 1, Standards and Guidelines, H.2 (GW)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*Ch. 1, Standards and Guidelines, H.2 (PDE)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*Ch. 1, Standards and Guidelines, H.2 (Preferred)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Possible impacts because of decline in prey base after use of deltamethrin in prairie dog colonies	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to chestnut-collared longspurs.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to chestnut-collared longspurs.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to chestnut-collared longspurs.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to chestnut-collared longspurs.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to chestnut-collared longspurs.

Determination of Effects

With all activities combined, along with resource protection measures and plan components, all alternatives have an effects determination of, "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 TBNG and throughout its range. In addition, existing plan components were developed with the intent of maintaining ecological conditions on the grassland. These components are expected to provide for chestnut-collared longspur habitat on the grassland.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species' habitat on the TBNG.

The rationale for effects determinations of all alternatives is based on the availability of foraging and nesting habitat in and adjacent to MA 3.67, along with sufficient distribution of habitat within the species' range. Although, detections for chestnut-collared longspur are low on the TBNG, habitat is still present and distributed throughout the plan area. Direct effects of boundary changes may pose a risk to chestnut-collared longspurs by limiting available habitat; however, the reduction in any of the alternatives are expected to allow for the species to maintain sufficient distribution, since this species does not use prairie dog habitat exclusively. Primary impacts of the alternatives include those activities that involve some loss of habitat and rodenticide use.

Rationale to support the effects determinations for all alternatives (unless otherwise noted) are listed as follows:

- This species does not depend on size, distribution, or extent of colonies for nesting or breeding habitat, but may nest in prairie dog colonies. This species uses disturbed mixed-grass prairie for breeding in general. Overall, somewhat uncommon on Thunder Basin National Grassland and distributed across plan area but with few observations in management area 3.63 or proposed management area 3.67.
- Population has not been observed to track fluctuations in prairie dog total colony extent on the Thunder Basin National Grassland (during plague epizootics).
- Those individuals that may occupy prairie dog colonies could consume rodenticide bait and experience non-targeted poisoning, but seasonal restrictions may help. There is a small potential for overlap of rodenticide use and when this species occupies the grassland. Very late departures of individuals may result in occupancy of colonies during lethal control activities.
- Recreational shooting poses little to no risk. The species is very small and likely to flush easily with presence of humans and associated disturbance.

Ferruginous Hawk (*Buteo regalis)*

Introduction

Ferruginous hawk is a large grassland and shrubland raptor of western North America. The species breeds across the western United States and southern Canada. Habitat needs include adequate nesting locations and a large prey base, generally consisting of small mammals (Cartron et al. 2004). Ferruginous hawks are sensitive to decreases in the availability of prey and to human activity during nesting. Ferruginous hawk populations tend to vary with fluctuations in the size of the prey base. Land-use conversion to row-crop agriculture, control of ground squirrels, and other disturbances that reduce the size of the prey base can cause severe local declines in Ferruginous hawk abundance. Ferruginous hawk populations declined in Canada because of large-scale conversion of native prairie to cultivated fields (WGFD 2017). Range-wide, ferruginous hawk has declined in abundance, likely due to agriculture cultivation, eradication of the prey base, and breeding-season disturbances associated with energy development (WGFD 2017).

Range-wide Information, Distribution and Abundance

Ferruginous hawk is widely distributed across the western United States, southern Canada, and northern and central Mexico. Ferruginous hawks tend to migrate three times per year, moving from breeding territories to late summer grounds for a short time before leaving for wintering locations. Migration patterns are variable depending on breeding location, and some birds may not migrate (Watson et al. 2018b). High population breeding centers include Wyoming, southern Alberta, southeastern Colorado and northeastern New Mexico, and the Columbia River Basin. Wintering occurs in California, northeast Arizona, and east of the Rocky Mountains from Wyoming and South Dakota to central Mexico (Olendorff 1993, Watson et al. 2018b). The current range is constricted relative to the historic range at the northern and northeastern periphery in Canada and eastern North Dakota (Ng et al. 2017).

In 1992, the U.S. Fish and Wildlife Service published a range-wide population estimate for ferruginous hawk of 5,220 to 6,004 breeding pairs (57 FR 37509; Olendorff 1993). The U.S. Fish and Wildlife Service noted that this range was an underestimate of the total population because it did not capture non-breeding individuals. In addition, the U.S. Fish and Wildlife Service noted the high inter-annual variability of ferruginous hawk populations, because they are highly sensitive to disturbances but also have very high reproductive rates (57 FR 37508). The 1992 U.S. Fish and Wildlife Service population estimate for Wyoming was 800 breeding pairs, derived from surveys by the Wyoming Game and Fish Department (57 FR 37512). The most recent state-wide survey, conducted in 2011 by the Wyoming Game and Fish Department, estimated 1,107 nesting pairs, with a density of approximately 94 pairs per square kilometer (Abernethy et al. 2017).

Life History and Habitat

Ferruginous hawk occupy a variety of habitat types including open grassland, shrub-steppe, cropland, desert, and the periphery of pinyon-juniper woodlands. To the west of the Continental Divide, ferruginous hawks primarily inhabit shrub-steppe communities, and east of the Continental Divide, it typically uses grasslands (Ng et al. 2017). The main habitat requirement of ferruginous hawk, regardless of vegetation type, is an adequate supply of small mammals, its primary food source (Weston 1968). Where prey is available, ferruginous hawks may use areas with short, sparse vegetation to facilitate detection of prey (Wakeley 1978).

Because ferruginous hawk population density and abundance is largely dependent upon prey availability, populations can be sensitive to declines in prey abundance. Across the range, ferruginous hawk abundance has been shown to be strongly correlated with prairie dog (*Cynomys* spp.) colony area (Cully 1991, Seery and Matiatos 2000, Bak et al. 2001, Cook et al. 2003, Plumpton and Anderson 1997), other ground squirrel (*Urocitellus* spp.) populations (Carton et al. 2004, Schmutz and Hungle 1989, Schmutz et al. 2008, Wallace et al. 2016a), and jackrabbit (*Lepus* spp.) populations (Smith and Murphy 1979, Woffinden and Murphy 1989). In addition, proximity to easily locatable prey such as prairie dogs enhances ferruginous hawk nesting success and resilience to disturbances because the birds expend less energy hunting (Keeley et al. 2016). In the central grassland region, prey consist of small, ground-dwelling mammals such as prairie dogs and other ground squirrels, pocket gophers (*Geomyidae* spp.), and white-tailed jackrabbits (*Lepus townsendii*) (Bakker 2005).

Ferruginous hawk nesting habitat can include isolated trees, woodland edges, buttes, cliffs, or grassland with some relief. Ferruginous hawks generally nest within a short distance of their food supply (Jasikoff 1982). Most ferruginous hawk nesting studies report a preference for tree nests (Olendorff 1973, Smith and Murphy 1973, Lokemoen and Debbert 1976); however, ferruginous hawks will use a wide variety of sites, including riverbed mounds, cutbanks, small hills, small cliffs, powerline structures, and haystacks (DeGraaf et al. 1991). Ferruginous hawks also readily and successfully use artificial nesting structures, which can increase nesting density in areas with an abundant prey base (Schmutz et al. 1984, Tigner et al. 1996, Olson et al. 2015, Wallace et al. 2016b).

Tree nests are usually located in the upper canopy, from six to 55 feet above the ground (DeGraaf et al. 1991). The nest tree is typically isolated or is part of an isolated small cluster of trees in an exposed location. Juniper (*Juniperus* spp.) is the most commonly used tree for nesting, but pine (*Pinus* spp.), willow (*Salix* spp.), cottonwood (*Populus* spp.), swamp oak (*Quercus* spp.), and sagebrush (*Artemisia* spp.) are also used (Lokemoen and Debbert 1976, Phillips and Beske 1990). Nesting densities can vary widely, often based on prey abundance. In Wyoming in 2015, Olson et al. (2015) observed statewide densities of one nesting pair per approximately 36 square miles. In that study, ferruginous hawks nested at higher densities in the Wyoming Basin than the eastern plains, likely due to an abundance of artificial nesting sites associated with oil and gas well development in the Wyoming Basin, and very few pairs nested in the Bighorn Basin, where prey abundance was lower (Olson et al. 2015).

Population Trends and Threats

Ferruginous hawk population trend data from U.S. Department of the Interior Geological Survey North American Breeding Bird Survey routes are not conclusive due to limits in the size of the dataset (Sauer et al. 2017). Trend estimation for ferruginous hawk populations is generally difficult because the low density at which the species occupies the landscape yields low statistical power in most abundance surveys (Johnson et al. 2019). Across its range, ferruginous hawk is believed to have declined in abundance over the course of the 20th century, but the magnitude and direction of trends vary among states and regions (Houston and Bechard 1984, Schmutz 1984, Olendorff 1993, Hoffman and Smith 2003, Collins and Reynolds 2005, Ng et al. 2017). Severe population declines and an apparent range contraction have occurred at the northern and northeastern periphery of the species' range (Ng et al. 2017). These declines led to Federal protections and listing of the species as threatened under Species at Risk Act in Canada in 1980, with a subsequent relisting as threatened in 2008 (COSEWIC 2008a).

Key threats to this species include prairie dog control and plague, rodenticides, energy development and infrastructure and climate change. Threats to ferruginous hawk populations include land-use change, management of small mammal populations, and energy development. Among raptors, ferruginous hawk is especially sensitive to anthropogenic disturbance and fragmentation of the landscape that changes in the size of its prey base (Cully 1991, Seery and Matiatos 2000, Coates et al. 2014, Plumpton and Anderson 1998, Wiggins et al. 2014). As a result of its sensitivity, congeneric competition can sometimes result in decreased nest success (Schmutz et al. 1980, Schmutz 1989, Zelenak and Rotella 1997). Anthropogenic disturbance can affect ferruginous hawks by interrupting nest site selection and incubation, shrinking the prey base, removing nesting sites, and creating habitat edges. For example, landscape-scale land-use conversion from native prairie to row-crop agriculture is the presumed cause of historical range contractions in Canada and North Dakota because of an associated loss of ground squirrel prey base and potential nesting sites (Houston and Bechard 1984, Schmutz 1984). Ferruginous hawks have also responded negatively to land-use conversion for cultivation in the southern part of the breeding range (Wiggins et al. 2014); however, where cultivated land occupies small proportions of the landscape, such as in the drier western portions of the species' range, ferruginous hawks may benefit from the ground disturbance at field and road edges that attracts higher densities of burrowing mammals (Zelenak and Rotella 1997, Smith et al. 2010).

Energy development can have some negative effects on ferruginous hawks due to their sensitivity to nearby activity during nesting and to fragmentation of their relatively large territories (Dechant et al. 2002, Smith et al. 2010, Coates et al. 2014; Zelenak and Rotella 1997, Wallace et al. 2016b). Wind energy development has been shown to negatively affect ferruginous hawk populations by reducing nest success rates and causing potential mortality of birds as they fly into turbines (Kolar and Bechard 2016, Watson et al. 2018a). In addition, Wiggins et al. (2017) found that ferruginous hawks tend to re-use nest sites less often in areas with high levels of oil and gas development. Conversely, Ferruginous hawks may benefit from oil and gas development where it provides artificial nesting substrates and increased small mammal abundance (Smith et al. 2010, Keough and Conover 2012, Keough et al. 2015). Overall, the effects of oil and gas activities on nest site selection and nest success tend to vary with local conditions, including well density, availability of suitable nesting substrates, initial prey abundance, and climatic factors (Keough 2006, Smith et al. 2010, Oakleaf et al. 2013, Wallace et al. 2016b).

The management of small burrowing mammals also poses a general threat to ferruginous hawks. Because they compete with livestock for forage and diminish the agricultural productivity of land, fossorial mammals such as prairie dogs and other ground squirrels have been subject to anthropogenic control measures since Euro-American settlement of the Great Plains (Vermeire et al. 2004, Davidson et al. 2012). Settler enmity toward ground squirrels resulted in large-scale eradication campaigns, especially of prairie dog species (Forrest and Luchsinger 2006). The direct loss of a prey base as a result of ground squirrel eradication can negatively impact ferruginous hawk populations at a local scale (Schmutz and Hungle 1989, Woffinden and Murphy 1989). In addition, indirect side effects of ground squirrel management include lethal secondary poisoning to ferruginous hawks from rodenticides or lead ammunition used for recreational shooting (Knopper et al. 2006, Vyas et al. 2017, Katzner et al. 2018). Correlated to the management of ground squirrels is the loss of ground squirrel prey base as a result of sylvatic plague epizootics (Cully 1991, Seery and Matiatos 2000).

Species Status in the Plan Area

Ferruginous hawk populations are generally reliant on a large prey base of small mammals. An abundance of prey contributes to better physiological condition and higher resilience to disturbance among ferruginous hawks (Keeley 2009). Ferruginous hawks may be reliant on prairie dog populations on portions of the TBNG. Prairie dog management and sylvatic plague epizootics can cause regular contraction or eradication of prairie dog colonies across the landscape. Anthropogenic control measures usually include the use of rodenticides, translocation of groups of prairie dogs, and the creation of visual, topographic, or hydrologic barriers to which prairie dogs may have an aversion (USDA Forest Service 2015). Sylvatic plague has been active in prairie dog colonies on the TBNG since at least the 1990s, and has caused three landscape-wide epizootics since 2001.

Research specific to the TBNG regarding ferruginous hawk is limited to an article about lead poisoning in raptors due to the recreational shooting of prairie dogs (Stephens et al. 2005). Additional research has used data points on the TBNG to determine ferruginous hawk habitat characteristics and demographics across Wyoming (Olson et al. 2015, Wallace et al. 2016a, 2016b).

Distribution, Abundance and Population Trend in the Plan Area

Ferruginous hawks occur across the TNBG. Nest surveys have occurred on the TBNG since at least the 1990s. Figure E-5 shows the distribution of observed active ferruginous hawk nests on the TBNG between 1997 and 2018. 2018 surveys in the central and northeastern portions of the TBNG yielded no active nests, indicating very low abundance in the plan area (Orabona 2019). The greatest number of active Ferruginous hawk nests observed by the Forest Service on the TBNG in any one year was 55 in 2005. Survey data is insufficient to show local population trends.

Habitat Requirements and Characteristics in the Plan Area

Ferruginous hawks typically utilize the TBNG as breeding and summer habitat, generally arriving between late February and early April and departing between mid-June and early September. During years with high prey availability, some breeders may overwinter at their breeding territories (Watson et al. 2018b). On TBNG, the Forest Service has observed that ferruginous hawks tend to nest in areas with elevated topography or trees, and hunt primarily in sparsely vegetated areas with high populations of rabbits or rodents. In addition, they tend to nest near shrubs for use as nest-building materials, as has been shown in other portions of the species' range (McConnell et al. 2008, Wallace et al. 2016b).

Ferruginous hawk populations generally track the availability major mammalian prey species (Ng et al. 2017). On TBNG, black-tailed prairie dogs constitute large portions of the prey base in certain areas, and annual Forest Service surveys show that ferruginous hawk populations may track the extent of black-tailed prairie dog populations. A 2017 reduction in prairie dog populations as a result of a sylvatic plague epizootic likely resulted in the lack of nesting ferruginous hawks in the subsequent breeding season (Orabona 2019). Studies from other areas of the ferruginous hawk range corroborate this sensitivity to prairie dog population trends (Cully 1991, Seery and Matiatos 2000). Black-tailed prairie dogs are a primary food source for ferruginous hawks across the Great Plains (Travsky and Beauvais 2005). Further research specific to TBNG is needed to fully determine local prey base composition for ferruginous hawks and the overall importance of prairie dog colonies to the health of the ferruginous hawk population.

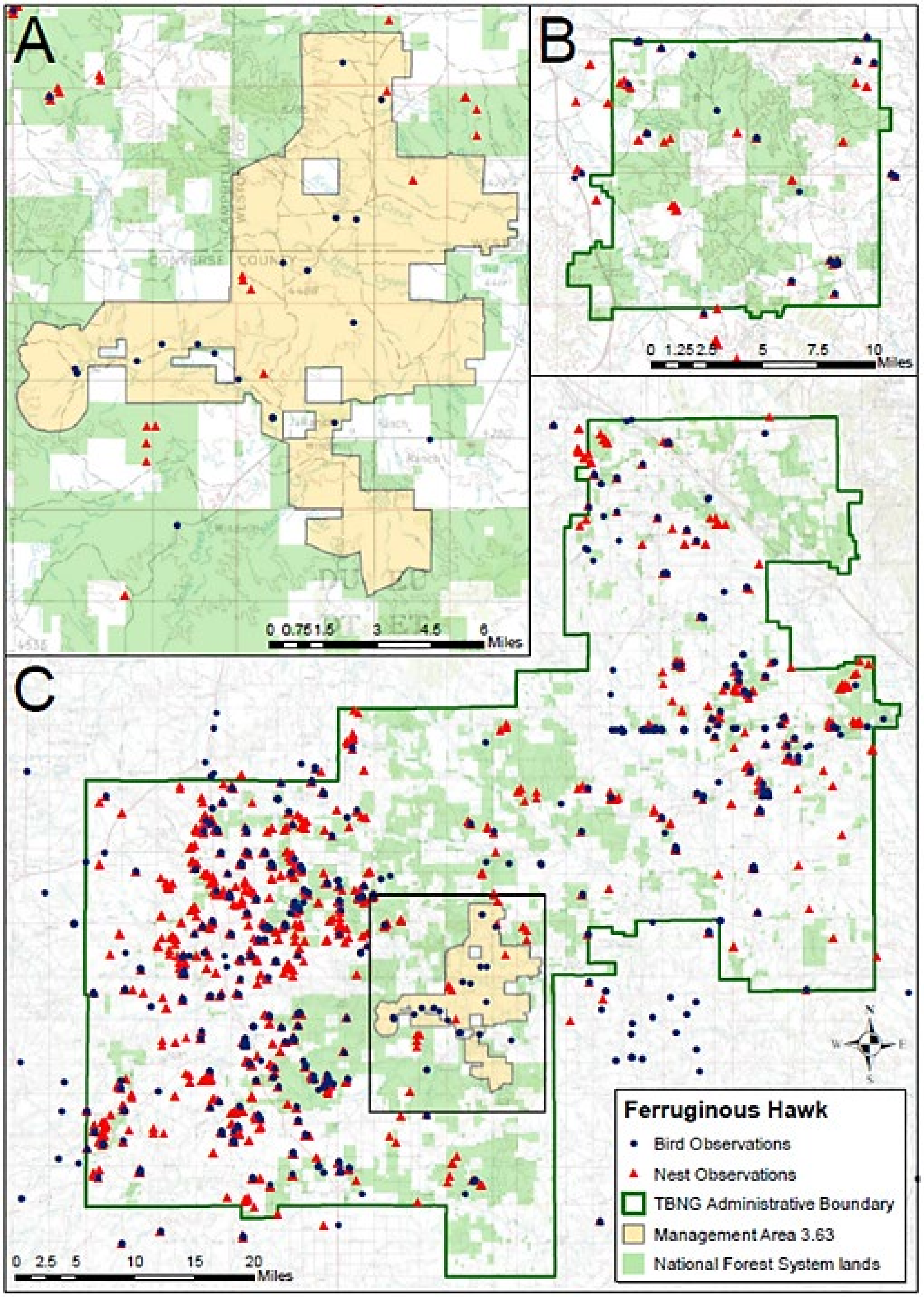

Figure E-5. Ferruginous hawk bird and nest observations on the Thunder Basin National Grassland and vicinity. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1969, 1974, 1980-1985, 1987-2001, and 2003-2018. Observation data are from the local survey dataset maintained by the Douglas Ranger District, the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of the species on the Thunder Basin National Grassland. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Environmental Consequences

Direct Effects – Habitat Availability

Direct effects to ferruginous hawks would include removal or degradation of localized available habitat resulting from establishment of boundary management zones or other prairie dog control activities, which decrease available habitat patch size, contiguity, structure and quality for prairie dogs. Habitat availability would remain unchanged under the no action alternative, but would decrease under each of the action alternatives proportional to the acreages objectives for prairie dog colony extent and the size of the boundary management zone. Drought acreage objectives that may be put in place under the Proposed Action, Grassland-wide and Preferred Alternatives would further limit habitat availability during drought conditions. In addition, occurrences of sylvatic plague can decrease habitat availability, since plague causes contraction of prairie dog colonies and complexes and decreases the availability of prairie dogs as prey sources if recolonization of plagued-out areas does not occur within a few years.

Indirect Effects – Habitat Suitability

Indirect effects would include accidental poisoning from rodenticides, mortality from recreational shooting, along with naturally occurring events, such as sylvatic plague.

The continued use of rodenticides and limited recreational shooting of prairie dogs may impact ferruginous hawks. Ferruginous hawks sometimes scavenge prairie dog carcasses after a colony has been poisoned using rodenticides (Vyas et al. 2017) and as a result, rodenticides may pose a risk of secondary poisoning to ferruginous hawks. All alternatives would allow the continued use of zinc phosphide for prairie dog control, and the action alternatives are likely to use zinc phosphide more frequently than the no action alternative because of the inclusion of boundary management zones that are intended to remain clear of prairie dogs. The Grassland-wide alternative would also allow for the use of anticoagulant rodenticides in the boundary management zone after three applications of zinc phosphide prove ineffective. Anticoagulant rodenticides remain potent within prairie dog carcasses for up to 2 weeks, causing high risk to predators and scavengers if the carcasses are not removed from the environment (Ruder et al. 2011, Witmer et al. 2016). Contrary to anticoagulants, zinc phosphide poses a lower secondary poisoning risk to scavengers because residues are not retained at consequential levels in carcasses (Bell and Dimmick 1975, Marsh 1987, Matschke et al. 1992).

Sylvatic plague appears to be the biggest indirect threat to prairie dogs and associated species. The 2017 plague event that occurred on Thunder Basin reduced active prairie dog colony acres from 75,000 acres to 1,100 over the course of one year. The unpredictable nature of plague and its mortality complicates efforts to manage for prairie dogs (Cully et al. 2006) and associated species as a result. Deltamethrin has been shown to be an effective tool in treating prairie dogs by reducing flea infestations up to 50-80% in some cases and minimizing the potential of plague (Maestas and Britten 2019, Roth 2019). In addition, fipronil has been shown to be around 94% effective in treating fleas on small mammals (Roth 2019). Both deltamethrin and fipronil appear to exhibit residual effects for 10-12 months (Eads et al. 2019). Fipronil is considered toxic to birds and fish species, and as a result, there could be indirect impacts to ferruginous hawks from foraging in treatment areas (Gibbons et al. 2015). Deltamethrin is considered to be less toxic to birds and impacts are expected to be low. As a result, plan components were developed to restrict the use of plague mitigation tools in prairie dog colonies where it may pose a risk to species associated with prairie dog habitat.

Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives and can pose a risk to ferruginous hawks. Ferruginous hawks may be shot and killed directly or sometimes scavenge on the carcasses of shot prairie dogs. This can result in the ingestion of lead ammunition, which can lead to the accumulation of harmful concentrations of lead in both adults and fledgling ferruginous hawks (Knopper et al. 2006, Herring et al. 2016, Katzner et al. 2018). A study of lead poisoning in ferruginous hawks and other raptors on the TBNG showed that shooting did not result in considerable levels of lead poisoning in those birds (Stephens et al. 2005). The No Action and Prairie Dog Emphasis alternatives have the most limitations on recreational shooting and thus the greatest protections for ferruginous hawk from this activity, with a year-round shooting prohibition in MA 3.63 and in Category 2 areas. The Proposed Action and Preferred Alternative offers the next highest level of protections, with a seasonal recreational shooting restriction in MA 3.67 from February 1 through August 15, but effects to individuals may still occur in late August and throughout the fall season. The Grassland-wide Alternative does not include any recreational shooting restrictions and has a higher potential for loss of individual hawks.

Cumulative Effects to All Alternatives

In addition to proposed activities in each alternative, other actions contribute to potential impacts to the ferruginous hawk. A summary of cumulative effects are provided below.

Energy development and infrastructure – Energy development may negatively impact ferruginous hawk because of the potential for increased disturbance during the breeding season and increased road building, which can fragment territories (Dechant et al. 2002, Smith et al. 2010, Coates et al. 2014, Wiggins et al. 2017). The effects, however, are equivocal, because of the potential benefits derived from an increased prey base with ground disturbance, and increased availability of artificial nest sites (Smith et al. 2010, Keough et al. 2015, Olson et al. 2015). The TBNG currently hosts approximately 835 acres of surface disturbance caused by active oil and gas wells and approximately 10,000 acres of surface disturbance due to coal mining.

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). Increased incidence of hot days during the late spring can lead to declines in nest success (Steenhof et al. 1997, Kochert et al. 2019). In addition, if climate change results in greater frequency of drought on the TBNG, it could reduce the availability of prey because of a loss of forage for small mammalian herbivores (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for ferruginous hawks and other species will directly and indirectly reduce potential impacts (see Table E-12). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat that support the prey base for this species.

Table E-12. Plan components that support ferruginous hawk habitat availability and suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat availability – Loss of breeding season foraging habitat and prey base in prairie dog colonies because of decline in total area of prairie dog colonies	*Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 3.63, Standards and Guidelines, General, 1 (NA)*: Standard F.65b in Chapter 1 adopts the Black-tailed Prairie Dog Conservation Assessment and Management Strategy (Strategy), which contains the existing area targets for prairie dog colonies. Control of prairie dogs is generally not allowed under the Strategy if composite colony area is below targets. The Strategy also directs use of sylvatic plague management tools to prevent collapse of prairie dog colonies during plague epizootics and translocation to support regrowth of prairie dog colonies that have been impacted by plague. General standard 1 for MA 3.63 supports the composite colony area targets contained in the Strategy by prohibiting activities that would inhibit increases in the prairie dog population in MA 3.63 until the colonies could support a sustainable black-footed ferret population.	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-FWRP-GL-02 (PA)*: GPA-FW-FWRP-GL-02 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-FWRP-GL-04 (GW)*: GPA-FW-FWRP-GL-04 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is prohibited when composite colony area does not sum to the targets. *GPA-FW-FWRP-GL-03 (PDE)*: GPA-FW-FWRP-GL-03 directs the use of sylvatic plague control tools where practical and effective to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-12 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the objective. 7,500 acres of colonies is the minimum threshold for use of rodenticides in MA 3.67 outside of boundary management zones in all circumstances except density control. *GPA-FW-FWRP-GL-02 (Preferred); GPA-MA3.67-FWRP-O-08 (Preferred); GPA-MA3.67-FWRP-ST-18 (Preferred)*: GPA-FW-FWRP-GL-02 allows the use of plague mitigation tools in prairie dog colonies anywhere in the plan area. GPA-MA3.67-FWRP-ST-18 mandates that an integrated approach to plague management will be used in MA 3.67 annually. GPA-MA3.67-FWRP-O-08 states that the Forest Service intends to develop a plague management plan within 3 years of plan amendment approval.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management. *Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of grain-bait rodenticides in prairie dog colonies from January 1 to September 30 to protect migratory birds.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide. *Ch. 1, Standards and Guidelines, H.2 (GW)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
		to protect species associated with prairie dog colonies from risks related to shooting.		MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	

Determination of Effects

With all proposed activities combined, along with resource protection measures and plan components, all alternatives have an effects determination of, "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 the alternatives, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. In addition, existing plan components were developed with the intent of maintaining ecological conditions on the grassland. These components are expected to provide for ferruginous hawk habitat on the grassland.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species' habitat on the TBNG.

The rationale for effects determinations of all alternatives is based on the availability of foraging and nesting habitat in and adjacent to MA 3.67, along with sufficient distribution of habitat within the species' range. There are numerous detections of ferruginous hawk on the TBNG and the species is well-distributed. Direct effects of boundary changes may pose a risk by limiting prey availability; however, the reduction in any of the alternatives are expected to allow for the species to maintain sufficient distribution, since this species does not use prairie dog habitat exclusively. Primary impacts of the alternatives include those activities that involve some prey loss, secondary poisoning or recreational shooting.

Rationale to support the effects determinations for all alternatives include:

- Acreage objectives provide a substantial prey base next to known nest locations or territories.
- Ferruginous hawk do not exclusively depend on prairie dogs as prey base. The species is considered a generalist that feeds on rodents and jackrabbits and will scavenge opportunistically.
- The project does not affect or remove potential nest areas.
- No substantive effect (secondary poisoning) from zinc phosphide are expected in alternatives 1, 2, and 4. The Grassland-wide Alternative (Alternative 3) does use anticoagulants after 3 consecutive years of zinc phosphide poisoning (in a specific area), if it proves ineffective.
- Mortality to ferruginous hawks from anticoagulant use in the Grassland-wide Alternative (Alternative 3) would result in the potential for secondary poisoning; however effects are considered localized and to a few individuals only.
- Recreational shooting would have a lower impact on ferruginous hawks in alternatives 1, 2, and 4 because the shooting restriction is applied during most of the season when they are present. Effects to individuals may still occur in late August and September when shooting is permitted.

In the Grassland-wide Alternative (Alternative 3), there is higher potential for loss of individuals because shooting is not restricted in management area 3.67 at any time. In addition, ferruginous hawks may ingest lead shot from prairie dog carcasses leading to secondary poisoning.

Grasshopper Sparrow (*Ammodramus savannarum*)

Introduction

Grasshopper sparrow is a wide-ranging species in North America, but has faced population declines across its range because of the fragmentation and loss of native grassland. This habitat degradation has primarily resulted from agricultural, urban, and industrial development. The TBNG lies in the core of the grasshopper sparrow breeding range, and observed grasshopper sparrow populations have fluctuated widely over the past few years, though longer-term population trend data are unavailable. This population fluctuation is negatively correlated with the extent of prairie dog colonies. Grasshopper sparrow depends on the availability of large tracts of intact, native grassland of intermediate height. In the mixed-grass prairie ecotone of the TBNG, disturbances such as fire and herbivory by prairie dogs or livestock can temporarily reduce or eliminate grass height, rendering areas unsuitable for grasshopper sparrow breeding and nesting.

Range-wide Information, Distribution and Abundance

During the breeding season, grasshopper sparrow is distributed across much of the eastern United States, Great Plains, Columbia River Basin, and northern Great Basin. The Great Plains constitute the core of the breeding range, where the species is more abundant (Ruth 2015). The grasshopper sparrow winter range extends from the southern United States south to Colombia and the Caribbean. Wyoming lies toward the western edge of the species' breeding range. Despite major population declines, no range contractions have been documented (Vickery 1996, Slater 2004).

Life History and Habitat

Across its range, grasshopper sparrow uses a broad array of open grassland intermixed with patches of bare ground, clumped vegetation, and sparse shrub cover (Slater 2004, Ruth 2015). In general, grasshopper sparrow prefers intermediate vegetation height. In the wetter, eastern part of the breeding range, grasshopper sparrow selects for shorter than average vegetation, while in the drier, western part of the breeding range, it prefers taller than average vegetation (Ruth 2015). One study in mixed-grass prairie in northern Montana found that grasshopper sparrows used areas with taller vegetation and minimal bare ground (Dieni and Jones 2003). In this same study, grasshopper sparrows avoided western wheatgrass (*Pascopyrum smithii*) and preferred blue grama (*Bouteloua gracilis*) (Dieni and Jones 2003). Another study, conducted in Minnesota, found that grasshopper sparrow abundance peaked in areas far from grassland edges, with lower than 5 percent shrub cover and lower than 10 percent bare ground (Elliott and Johnson 2017). In territory and nest site selection, the species typically looks for areas that have shrubs or other taller vegetation available for singing perches but minimal perches and camouflaging structures for predators (Ruth and Skagen 2017). Additional nest site characteristics include proximity to patches of herbaceous vegetation that provide nesting material and concealment (Vickery 1996, Fogarty et al. 2017). Grasshopper sparrows are ground-foragers and feed almost exclusively on grasshoppers (*Orthoptera*) during the breeding season (Vickery 1996). In Wyoming, these preferred vegetation conditions occur in the shortgrass and mixed-grass prairies of the eastern portion of the state (Keinath et al. 2010).

Grasshopper sparrow tends to require large, contiguous patches of grassland habitat, and negatively responds to both decreases in area of total grassland and increases in fragmentation (Herkert 1994, Ribic et al. 2009, Herse et al. 2018). While territory sizes are typically less than 5 acres (Slater 2004), grasshopper sparrows have a relatively strong aversion to patch edges, most likely to avoid predation (Ruth 2015). Grasshopper sparrow is generally more sensitive to declines in the total amount of available habitat in an area than other grassland birds (Lockhart and Koper 2018). In mixed-grass prairie of the northern Great Plains, Davis (2004) found preferred minimum patch size for grasshopper sparrow to be well over 300 acres, whereas Helzer (1996) found that the species will use patches greater than approximately 20 acres in Nebraska. Other research in the eastern part of the species' range found that fragmentation was contributing to the declines in return rates and productivity, and that all available patches in the study area, ranging up to approximately 33 acres, were acting as population sinks for the bird (Balent and Norment 2003).

In addition to preferring large patches of intermediate-height vegetation, the species avoids recently disturbed areas in the drier, western portions of its range (Duchardt et al. 2018). In avian surveys in South Dakota, Montana, Wyoming, and Colorado, it has been uncommon in disturbed areas, including prairie dog (*Cynomys* spp.) colonies and burned areas (Agnew et al. 1986, Augustine and Baker 2013, Augustine and Derner 2015, Duchardt et al. 2018, Geaumont et al. 2019). In North Dakota, however, Grant et al. (2010) found that grasshopper sparrow abundance was unaffected by prescribed fires, and correlated negatively with the presence of taller vegetation, such as shrubs. Livestock grazing also has a mixed effect on grasshopper sparrow abundance, generally favoring the species in tallgrass prairie, but possibly reducing its abundance in mixed- or shortgrass systems (Wiens 1973, Fritcher et al. 2004, Ahlering and Merkord 2016, Gennet et al. 2017). Across the range, agricultural and industrial development including cultivation, roads, and mining and drilling structures generally reduce patch size, resulting in documented reductions in grasshopper sparrow abundance (Thompson et al. 2015).

Population Trends and Threats

Continental trend data from the U.S. Geological Survey North American Breeding Bird Survey indicate that grasshopper sparrow numbers experienced a statistically significant decrease of 2.52 percent annually from 1966–2015. From 2005 to 2015, North American Breeding Bird Survey data showed grasshopper sparrow populations remained more stable and no statistically significant trend was observed. In Wyoming, North American Breeding Bird Survey trend data indicate that grasshopper sparrow populations remained relatively stable from 1968 to 2015, though there has been an increase in number of observations over time (not statistically significant) (Sauer et al. 2017).

Key threats to this species include, habitat loss, grazing, prairie dog expansion, insecticides, fire, energy development and infrastructure and climate change. Habitat loss and fragmentation are the greatest range-wide threats to grasshopper sparrow (Herse et al. 2018). These threats result primarily from anthropogenic disturbances such as poorly managed grazing, urban and agricultural expansion, and energy development (Slater 2004, Ruth 2015). Limited research has shown negative effects to grasshopper sparrow by wind turbines and oil and gas development. Drought is also a limiting factor, affecting grass stature and density and forage availability (Ruth 2015).

Species Status in the Plan Area

Habitat characteristics of the grasshopper sparrow on the TBNG are the subject of an ongoing study by the Thunder Basin Research Initiative, which is a collaborative research project among the University of Wyoming, the Thunder Basin Grassland Prairie Ecosystem Association, the United States Department of Agriculture Agricultural Research Service, and the Forest Service (Duchardt et al. 2016a, 2016b, 2017, 2019).

Distribution, Abundance and Population Trend in the Plan Area

The Forest Service does not monitor grasshopper sparrow populations on the TBNG. Avian surveys, however, have consistently observed grasshopper sparrow across the grassland, and several databases, including the Forest Service's Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the citizen science birding database eBird (https://ebird.org; Sullivan et al. 2009), contain several hundred records going back to the mid-20th century. Despite the abundance of observation records, these databases do not show population trends in the plan area. Data collected in avian surveys as part of the Thunder Basin Research Initiative in and around black-tailed prairie dog colonies on the TBNG showed that grasshopper sparrow can vary widely in relative abundance, from among the 10 most abundant species observed in 2015 to the 29th most common bird observed in 2016 (Duchardt et al. 2016a, 2016b, 2017). These surveys found a large increase in the raw abundance of grasshopper sparrow in 2018 after an outbreak of sylvatic plague (*Yersinia pestis*) caused a contraction in prairie dog colonies across the surveyed area (Duchardt et al. 2018). Existing observation records are distributed across the grassland (Figure E-6).

Habitat Requirements and Characteristics in the Plan Area

Recent research has shown that grasshopper sparrow occurs at higher densities in areas not disturbed by prairie dog colonies (Augustine and Baker 2013, Duchardt et al. 2018, 2019). In surveys on and off 32 colonies on the TBNG in 1996, Grasshopper sparrow occurred at densities of 0.55 birds per square kilometer on colonies and 3.56 birds per square kilometer outside of colonies (Augustine and Baker 2013). Duchardt et al. (2018) similarly found that the species occurred at lower densities on prairie dog colonies than off prairie dog colonies. The same surveys showed an inverse relationship between grasshopper sparrow abundance and prairie dog colony extent (Duchardt, unpublished data). These studies suggest that grasshopper sparrow likely utilizes areas of the TBNG with taller vegetation that has not been subject to herbivory by prairie dogs. Regarding fire, Duchardt et al. (2018) found that grasshopper sparrow abundance peaked within burn perimeters of fire that had occurred 5 to 43 years prior to the time of surveys. This result may indicate that grasshopper sparrow benefit from the reduction of shrubs and other woody vegetation by historical fires. While the effect has not been studied on the TBNG, it is likely that over the short term, fires limit grasshopper sparrow habitat due to the temporary shortening of vegetation height (Augustine and Derner 2015). The relationship between species abundance and current livestock grazing regimes on the TBNG has not been studied; however, evidence from elsewhere in the mixed-grass prairie region of the grasshopper sparrow range shows a possible negative effect when grazing shortens vegetation to levels unsuitable for the bird's nesting habits (Wiens 1973, Fritcher et al. 2004).

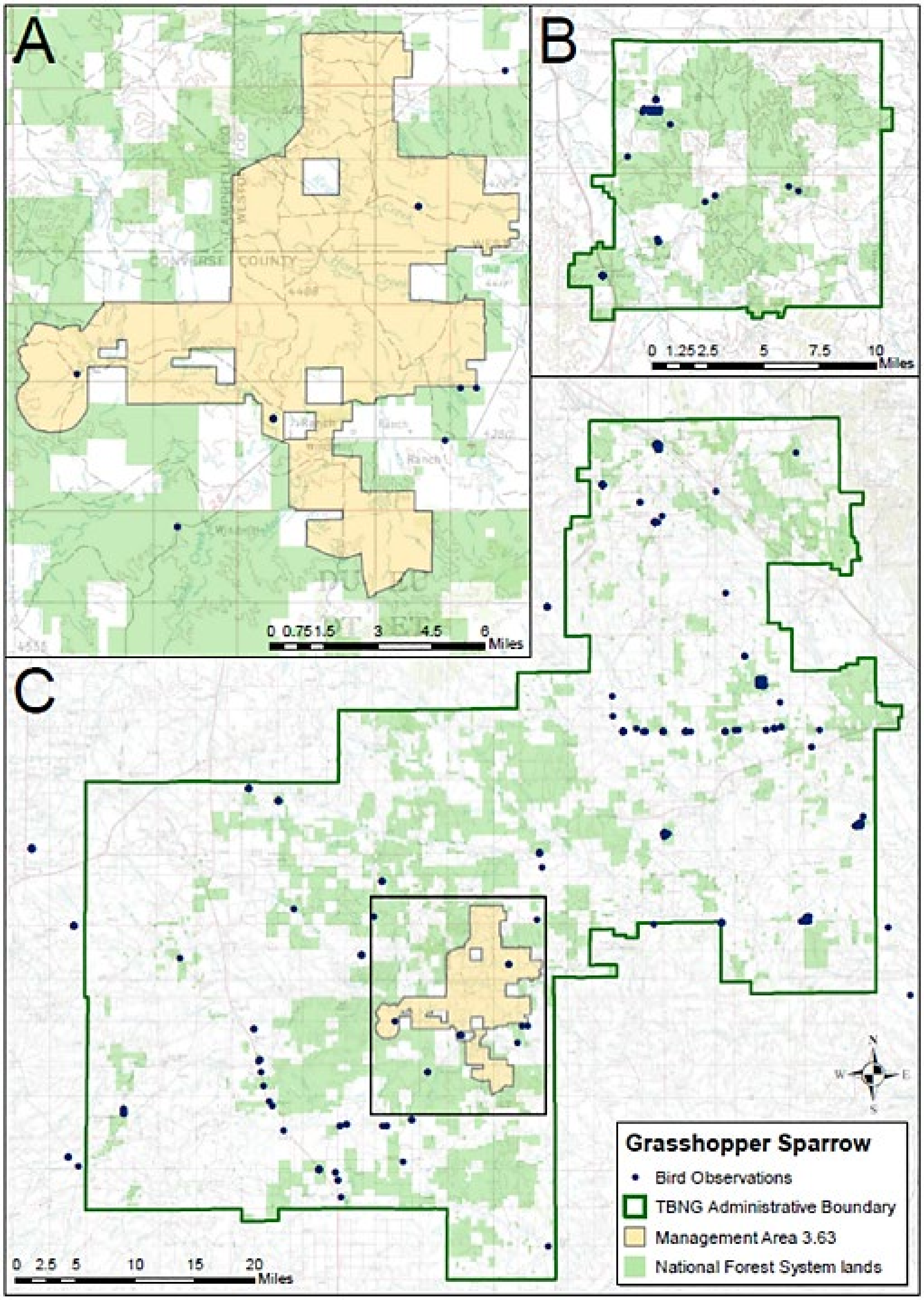

Figure E-6. Grasshopper sparrow observations on the Thunder Basin National Grassland and nearby lands. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1969, 1971, 1972, 1975, 1976, 1978-1981, 1983, 1985, 1987-1999, 2004, 2007-2009, and 2012-2018. Observation data are from the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of the species on the Thunder Basin National Grassland. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Environmental Consequences

Direct and Indirect Effects

All alternatives are considered to have similar, minimal impacts to this species. Grasshopper sparrow do not depend on prairie dog colonies and prefer moderate to tall grass vegetation for nesting and foraging habitat. Therefore, components of all alternatives, including allowing the recreational shooting of prairie dogs and expanded use of rodenticides for prairie dog control, would pose little risk to the species. The primary impact to this species would occur from allowing prairie dog expansion and secondary poisoning by rodenticides. Secondary poisoning by anticoagulant rodenticides may occur because songbirds may eat poisoned grain baits when they have access to them (Apa et al. 1991, Vyas et al. 2013). The use of zinc phosphide, however, generally does not result in secondary poisoning in songbirds because prairie dogs tend to consume more of the bait, making it less available to birds, and because the birds typically have an aversion to the zinc phosphide baits (Apa et al. 1991). In addition, the likelihood of grasshopper sparrows foraging around areas where bait is used is low. Plague management may also have an effect on grasshopper sparrows due to studies on similar songbirds, although research is limited. Indirect effects of proposed activities may benefit grasshopper sparrow by limiting prairie dogs and their habitat. In addition, plan components developed for other species will indirectly benefit grasshopper sparrow by reducing or eliminating potential impacts. Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives, but all except the Grassland-wide Alternative include seasonal or year-round prohibitions on recreational shooting in specific locations. Recreational shooting poses little to no risk to chestnut-collared longspurs. The species is very small and likely to flush easily with presence of humans and associated disturbance.

Cumulative Effects to All Alternatives

In addition, to proposed activities in each alternative, other actions contribute to potential impacts to the grasshopper sparrow. A summary of cumulative effects are provided below.

Grazing – Grasshopper sparrow habitat may be affected negatively by grazing on the TBNG, but the relationship has not been studied in the TBNG ecotone. Research from other areas of the range suggest that grazing in mixed-grass prairie may shorten vegetation below the preferred height for grasshopper sparrow nesting habitat (Wiens 1973, Fritcher et al. 2004). Wiens (1973) found that grazing on the mixed-grass prairie in western South Dakota significantly reduced grasshopper sparrow density relative to ungrazed areas. Also in the mixed-grass prairie of South Dakota, Fritcher et al. (2004) found that grasshopper sparrow are significantly denser in later seral stages when vegetation is taller.

Insecticides – Insecticide application, particularly for control of grasshoppers, could pose a threat to grasshopper sparrow via direct poisoning of individuals or reduction of its breeding season prey base. The Forest Service has occasionally treated the TBNG for grasshoppers, and the last treatment occurred in 2011. Several insecticides have been shown to have negative effects on the abundance of grassland bird populations (McEwen et al. 1972). No studies, however, have investigated the effects of insecticides specific to grasshopper sparrow.

Fire – Wildland and prescribed fires can temporarily reduce the availability of grassland habitat for grasshopper sparrow because of the loss of vegetation structure in recently burned areas (Augustine and Derner 2015). This effect, however, is short-lived, and vegetative regrowth in burned areas can create preferred habitat for the species after just a few years (Duchardt et al. 2018).

Energy Development – There is limited information in the literature on effects from oil and gas development on grasshopper sparrow. Multiple studies, however, have found that grasshopper sparrow density declined in proximity to oil wells (Bogard and Davis 2014, Thompson et al. 2015). Bogard and

Davis (2014), however, found that vegetation structure was more explanatory of grasshopper sparrow abundance than oil and gas well development. In a study in North Dakota, Thompson et al. (2015) did not find evidence that the species avoids roads built in association with oil and gas wells. In general, studies on grasshopper sparrow in mixed- and shortgrass prairie are limited regarding the relationship between oil and gas development and grasshopper sparrow (Ruth 2015). Despite this lack of research, studies regarding landscape fragmentation and edge effects have found that grasshopper sparrow is especially sensitive to the presence of edges and reductions in total available habitat relative to other grassland birds (Herkert 1994, Davis 2004, Herse et al. 2018, Lockhart and Koper 2018); this intolerance of habitat fragmentation and loss may indicate the potential for negative effects as a result of oil and gas development. In addition, several studies have documented negative effects of oil and gas well and road development on other, closely-related avian grassland obligates in the northern Great Plains, such as Baird’s sparrow (*Ammodramus bairdii*) (Dale et al. 2009, Hamilton et al. 2011, Bernath-Plaisted 2015, Yoo and Koper 2017).

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and more extreme weather events (Conant et al. 2018). Further, because the TBNG ecotone represents a large portion of the breeding range for grasshopper sparrow, unexpected shifts in vegetation composition due to changing weather patterns and moisture regimes may place additional constraints on habitat suitability.

Plan Components

Plan components developed for other species will indirectly benefit grasshopper sparrow by reducing or eliminating potential impacts (see Table E-13). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-13. Plan components that support grasshopper sparrow habitat availability and suitability

Threats	Habitat availability – Loss of breeding season habitat in mixed-grass prairie sites with relatively tall vegetation because of expansion of prairie dog colonies
No Action Alternative	*Ch. 1, Standards and Guidelines, F.8; Ch. 1, Standards and Guidelines, F.17; Ch. 1, Standards and Guidelines, I.5; Ch. 2, Spring Creek GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Spring Creek GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1; Ch. 2, Upton Osage GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Upton Osage GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1*: These plan components as a whole provide for the maintenance of healthy mixed-grass or high-structure vegetation ecosystems on the Grassland among a mosaic of other vegetation types. Guidelines F.8, F.17, and I.5 in Chapter 1 restrict livestock grazing to provide for high-structure grassland vegetation on portions of the Grassland. The objectives and guidelines listed from Chapter 2 prescribe high-structure grassland vegetation in the Spring Creek and Upton Osage GAs.
Proposed Action Alternative	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *Ch. 1, Standards and Guidelines, F.8; Ch. 1, Standards and Guidelines, F.17; Ch. 1, Standards and Guidelines, I.5; Ch. 2, Spring Creek GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Spring Creek GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1; Ch. 2, Upton Osage GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Upton Osage GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1*: These plan components as a whole provide for the maintenance of healthy mixed-grass or high-structure vegetation ecosystems on the Grassland among a mosaic of other vegetation types. Guidelines F.8, F.17, and I.5 in Chapter 1 restrict livestock grazing to provide for high-structure grassland vegetation on portions of the Grassland. The objectives and guidelines listed from Chapter 2 prescribe high-structure grassland vegetation in the Spring Creek and Upton Osage GAs.
Grassland-wide Alternative	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *Ch. 1, Standards and Guidelines, F.8; Ch. 1, Standards and Guidelines, F.17; Ch. 1, Standards and Guidelines, I.5; Ch. 2, Spring Creek GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Spring Creek GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1; Ch. 2, Upton Osage GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Upton Osage GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1*: These plan components as a whole provide for the maintenance of healthy mixed-grass or high-structure vegetation ecosystems on the Grassland among a mosaic of other vegetation types. Guidelines F.8, F.17, and I.5 in Chapter 1 restrict livestock grazing to provide for high-structure grassland vegetation on portions of the Grassland. The objectives and guidelines listed from Chapter 2 prescribe high-structure grassland vegetation in the Spring Creek and Upton Osage GAs.

Threats	Habitat availability – Loss of breeding season habitat in mixed-grass prairie sites with relatively tall vegetation because of expansion of prairie dog colonies
Prairie Dog Emphasis Alternative	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is allowed when composite colony area is greater than the targets. *Ch. 1, Standards and Guidelines, F.8; Ch. 1, Standards and Guidelines, F.17; Ch. 1, Standards and Guidelines, I.5; Ch. 2, Spring Creek GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Spring Creek GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1; Ch. 2, Upton Osage GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Upton Osage GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1*: These plan components as a whole provide for the maintenance of healthy mixed-grass or high-structure vegetation ecosystems on the Grassland among a mosaic of other vegetation types. Guidelines F.8, F.17, and I.5 in Chapter 1 restrict livestock grazing to provide for high-structure grassland vegetation on portions of the Grassland. The objectives and guidelines listed from Chapter 2 prescribe high-structure grassland vegetation in the Spring Creek and Upton Osage GAs.
Preferred Alternative	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-11 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the objective. *Ch. 1, Standards and Guidelines, F.8; Ch. 1, Standards and Guidelines, F.17; Ch. 1, Standards and Guidelines, I.5; Ch. 2, Spring Creek GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Spring Creek GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1; Ch. 2, Upton Osage GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Upton Osage GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1*: These plan components as a whole provide for the maintenance of healthy mixed-grass or high-structure vegetation ecosystems on the Grassland among a mosaic of other vegetation types. Guidelines F.8, F.17, and I.5 in Chapter 1 restrict livestock grazing to provide for high-structure grassland vegetation on portions of the Grassland. The objectives and guidelines listed from Chapter 2 prescribe high-structure grassland vegetation in the Spring Creek and Upton Osage GAs.

Determination of Effects

With all activities combined, along with resource protection measures and plan components, all alternatives have a finding of, “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 TBNG and throughout its range. In addition, existing plan components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for grasshopper sparrow habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, “no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated” under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species’ habitat on the TBNG.

The rationale for effects determinations of all alternatives is based on the availability of foraging and nesting habitat in and adjacent to MA 3.67, along with sufficient distribution of habitat within the species’ range. Although, detections for grasshopper sparrow are relatively low on the TBNG, habitat is still present and distributed through the plan area. Primary impacts of the alternatives include those activities that would allow prairie dogs to expand, thereby limiting grasshopper sparrow preferred habitat.

Rationale to support the effects determinations for all alternatives (unless otherwise noted) are listed as follows:

- This species uses large tracts of undisturbed mixed-grass prairie. Growth of prairie dog colonies could cause a reduction in total available habitat. Locally, population has been observed to track large fluctuations in the area of prairie dog colonies (surveys specific to management area 3.63). However, acreage ojectives in alternatives will limit this potential.
- Grasshopper sparrow are typically do not forage in prairie dog habitat. However, there is a possibility of non-targeted poisoning from rodenticide use.
- Recreational shooting poses little to no risk. The species is very small and likely to flush easily with presence of humans and associated disturbance.

Greater Sage-grouse (*Centrocercus urophasianus*)

Introduction

Greater sage-grouse is a large, ground-dwelling bird that inhabits sagebrush steppe ecosystems across western North America. The bird is a resident in all parts of its range, but uses areas with differing amounts of sagebrush cover during different parts of its lifecycle. Overall, the species requires large, continuous tracts of sagebrush and is sensitive to loss or fragmentation of sagebrush canopy at both landscape and local scales. Primary threats to greater sage-grouse across its range and on the TBNG include fragmentation and removal of sagebrush as a result of fire and energy development and infrastructure. Predation and noise pollution have also increased as a result of anthropogenic disturbances. Although sagebrush typically does not occur or occurs at low densities within prairie dog colonies, prairie dogs may clip and remove nearby sagebrush vegetation during times of colony expansion, resulting in disturbance to greater sage-grouse habitat. State and Federal land management agencies across the greater sage-grouse range have implemented conservation plans intended to protect the species from natural and anthropogenic disturbances. The TBNG grassland plan includes management direction for greater sage-grouse that was adopted as part of a statewide amendment to land and resource management plans for Forest Service units that host greater sage-grouse leks.

The state of Wyoming manages greater sage-grouse populations by core areas, to ensure protection measures are centered at minimizing man-made development that results in a loss of habitat. Approximately, 15,409,173 acres are designated throughout the state, with 228,329 acres distributed on the TBNG. Core areas were delineated across the state by the Wyoming Game and Fish Department to identify and manage populations that make up the largest percentage (80%) of birds, the most productive leks, and the highest quality habitat. Core area protection measures are intended to limit man-made developmental disturbance, such as oil and gas well pad construction or other development, which alters and/or removes suitable habitat for long periods of time. The priority habitat potentially impacted occurs in the Thunder Basin Core Area which was delineated in the Wyoming Executive Order for Greater Sage-Grouse Core Area Protection (Order 2019-3) and partially overlaps with the proposed management area 3.67 boundary.

Range-wide Information, Distribution and Abundance

Greater sage-grouse inhabit the shrub-steppe region of western North America. Greater sage-grouse is a non-migratory, year-round resident across its range. Greater sage-grouse historically inhabited 13 western U.S. states and 3 Canadian provinces, but the species has declined across its range and now occupies approximately 56 percent of its historic range. It is currently found in 11 states and 2 Canadian provinces (80 FR 59857-59942). Despite these declines, in 2015, the U.S. Fish and Wildlife Service concluded that greater sage-grouse remains relatively abundant and well-distributed across its range (80 FR 59857-59942). The core of the species' range lies in the Great Basin, the Wyoming Basin, and the northwestern portion of the Great Plains. Wyoming contains a higher greater sage-grouse population and more sagebrush habitat than any other state in the species' range. The state is home to 43 million acres of sagebrush, an estimated 37 percent of the greater sage-grouse population, and more leks than any other state (USDOI Fish and Wildlife Service 2013).

Life History and Habitat

Greater sage-grouse is a sagebrush obligate, requiring large areas of healthy, unbroken sagebrush to thrive (Burkhalter et al. 2018). A variety of sagebrush structural stages and associated herbaceous components provide different seasonal habitats. Sagebrush is essential year-round, but is particularly important during late fall and winter when the Greater sage-grouse use it for food and cover.

For breeding, Greater sage-grouse use gaps in the sagebrush cover called leks, where males gather in groups to engage in strutting displays between March and May. Leks are small sites that have less herbaceous and shrub cover than surrounding habitats (Hanna 1936, Patterson 1952, Hartzler 1972, Giezentanner and Clark 1974, Wallestad 1975, Dingman 1980, Autenrieth 1981, Klott and Lindzey 1989). Leks are often natural breaks in sagebrush cover, but they also may be associated with altered habitats such as cultivated fields, airstrips, gravel pits, and roads (Tate et al. 1979, Connelly et al. 1981, Gates 1985). Greater sage-grouse generally exhibit high site fidelity during the breeding season (Dunn and Braun 1985, Schroeder and Robb 2003, Fremgen et al. 2017).

Greater sage-grouse typically place nests in shaded areas under overhanging sagebrush or residual grass cover. Gibson et al. (2016b) found that nest-site selection is critical to chick survival. Nest sites are usually free of protective vegetation on at least two sides to permit females to escape predators (Griner 1939, Batterson and Morse 1948). Greater sage-grouse build nest bowls on the ground in relatively soft soil and line the nest with leaves, small twigs, and feathers from the female's brood patch (Batterson and Morse 1948, Petersen 1980, Autenrieth 1981). Average sagebrush height at nest sites can range from 36 to 79 centimeters, and sagebrush cover can range from 15 to 38 percent (Patterson 1952, Klebenow 1969, Wallestad 1975, Petersen 1980, Autenrieth 1981, Wakkinen 1990, Gregg et al. 1994, Sveum et al. 1998). Relatively high residual grass cover is usually also a feature of nest sites (Klebenow 1969, Wakkinen 1990, Connelly et al. 1991, Fischer 1994, Sveum et al. 1998). More recent studies, on microhabitat selection, however, question the relative importance of previously accepted conclusions regarding the relationship between nest success and understory herbaceous vegetation height due to biases stemming from the timing of nest surveys (Gibson et al. 2016a, Coates et al. 2017, Smith et al. 2018a). Smith et al. (2018a) did not find a strong relationship between grass height and nest survival for Greater sage-grouse.

Greater sage-grouse are ground foragers that utilize open areas surrounded by sagebrush (Hupp and Braun 1989). Greater sage-grouse eat numerous species of sagebrush, including big sagebrush (*Artemisia tridentata*), little sagebrush (*Artemisia arbuscula*), silver sagebrush (*Artemisia cana*), and prairie sagewort (*Artemisia frigida*) (Remington and Braun 1985, Welch et al. 1988, Welch et al. 1991, Myers 1992). During the spring and summer, succulent forbs and insects become important additional food sources (Bendire 1982). Insects and forbs are especially critical food for young birds during this time, while adults forage predominately on forbs and sagebrush during the spring (Patterson 1952, Drut et al. 1994, Pyle and Crawford 1996). Forbs provide are a critical nutritional resource for females prior to the onset of nesting (Barnett and Crawford 1994).

Population Trends and Threats

Greater sage-grouse has long been recognized as a species of concern due to observed population declines and the species' strict reliance on sagebrush habitats, which have faced loss and fragmentation across western North America. A large body of literature regarding threats to sage-grouse was captured and reviewed in the 2015 U.S. Fish and Wildlife Service 12-month finding on the petition to list the species (80 FR 59857-59942). These include conversion, degradation, and fragmentation of sagebrush habitats through solid and liquid mineral extraction development, renewable energy development, infrastructure development, wildland fire, agriculture, invasive species encroachment, grazing, urbanization, conifer encroachment, drought and climate change, and recreation. Predation, disease, hunting, and pollution can additionally impact populations.

In 2018, the U.S. Geological Survey initiated a review of research regarding threats to greater sage-grouse that had been published since 2015 (Hanser et al. 2018). This literature review found that new research for the most part corroborated or built upon existing knowledge. For example, discrete anthropogenic activities, such as oil and gas well development, agriculture, and transmission lines all have significant negative impacts on nearby leks, and existing regulations to protect greater sage-grouse will maintain current rates of decline, rather than reverse declines. Diffuse anthropogenic activities, including livestock grazing, predation, and noise can also result in effects to sage-grouse population, though the effects of livestock grazing are dependent on intensity and seasonality. Fire and invasive species pose a final major threat to greater sage-grouse through the reduction of sagebrush habitat area, and recent research shows anticipated increases in fire activity with climate change (Hanser et al. 2018).

Range-wide, greater sage-grouse populations have declined significantly since the mid-20th century, when lek counts began to be implemented regularly on a broad scale (Garton et al. 2015, WAFWA 2015). The range-wide rate of population decline has slowed in recent years, but populations at the edge of the range are declining more rapidly than interior populations (80 FR 59868). Populations at the far western and northeastern periphery of the range in Oregon, California, Montana, northeastern Wyoming, and the Dakotas have seen more rapid declines in recent years (WAFWA 2015). In Wyoming, population trends have been variable since the mid-1990s, depending on local factors (Edmunds et al. 2018).

Species Status in the Plan Area

Although the TBNG lies near the eastern edge of the greater sage-grouse range, the species is a common, year-round resident on the TBNG. Greater sage-grouse observations tend to concentrate in clusters of suitable habitat in and around leks. The Forest Service has monitored active leks on the TBNG since the 1960s (Figure E-7).

Distribution, Abundance and Population Trend in the Plan Area

Forest Service lek surveys on the TBNG have been relatively comprehensive since the mid-2000s and provide crude measures of raw abundance and lek activity. However, the surveys are not based on a probabilistic sample and cannot be used to infer the true number of birds on the TBNG. Thirty-eight total leks have been surveyed on TBNG. Between 2007 and 2017, 28 to 36 leks were surveyed each year, with the highest number of active leks counted in 2007 (23 leks) and the lowest number of active leks counted in 2015 (14 leks). Raw numbers of bird observations ranged from nearly 1,700 in 2007 to fewer than 500 in 2014. State and private lands adjacent to TBNG also include many active leks, approximately equaling the count on TBNG in any given year. In addition, trends on TBNG have fluctuated consistent with statewide trends and cycles (Figure E-7).

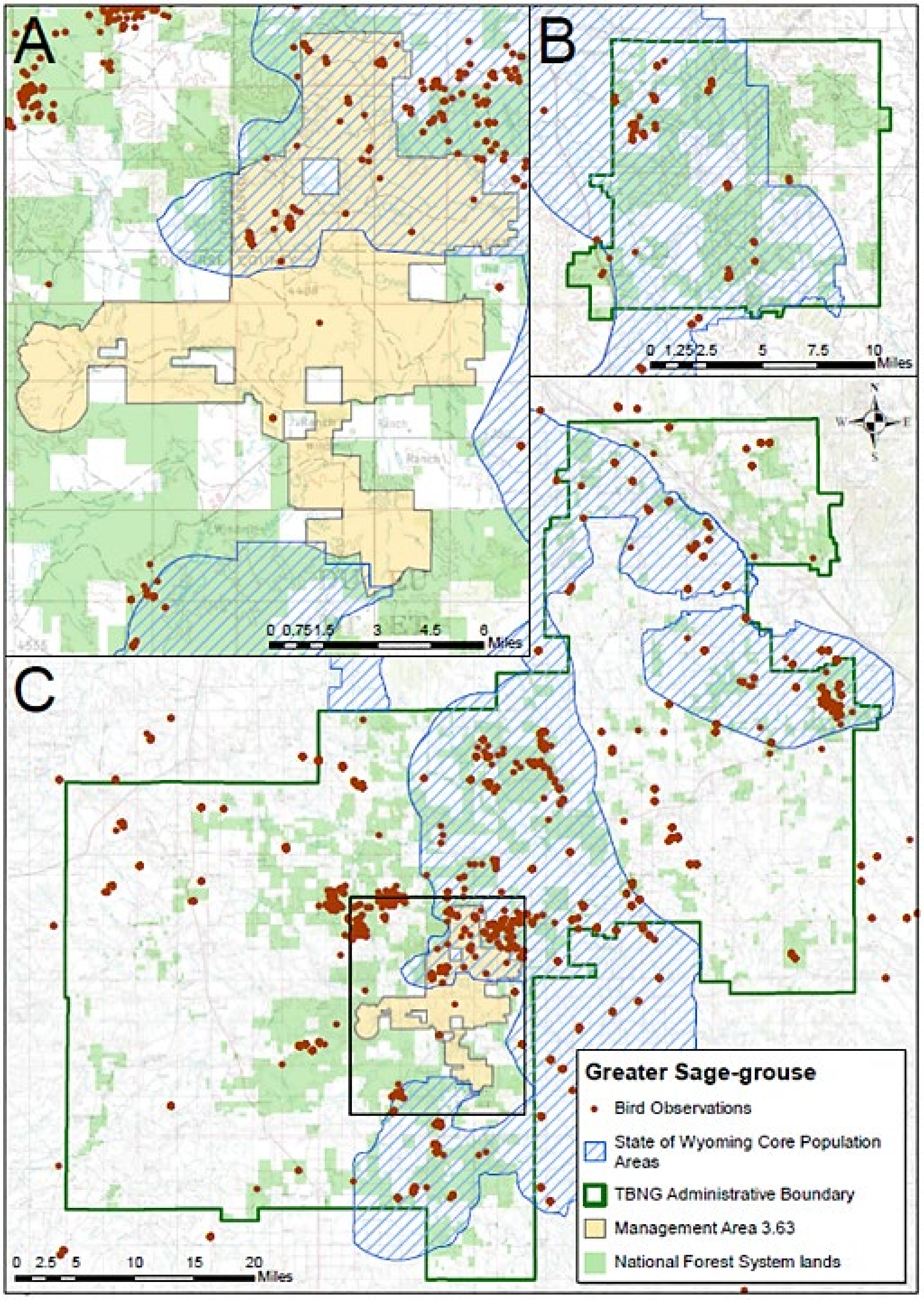

Figure E-7. Greater sage-grouse bird observations on the Thunder Basin National Grassland and vicinity. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1948-1951, 1962, 1963, and 1966-2018. Observation data are from the local survey dataset maintained by the Douglas Ranger District, the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, the Wyoming Game and Fish Department, and the eBird Basic Dataset (https://ebird.org/data/download). Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Habitat Requirements and Characteristics in the Plan Area

Large areas of sagebrush are critical for greater sage-grouse life cycles in all parts of the species' range, including TBNG. Greater sage-grouse use large, continuous areas of sagebrush for nesting, feeding, and wintering habitat. For breeding, Greater sage-grouse use gaps in sagebrush of a few acres or smaller as leks. In the Powder River Basin in Montana and Wyoming, in which sample sites likely reflect similar ecological conditions to those on the TBNG, Doherty et al. (2010) found that birds preferred sagebrush habitat in smoother terrain and avoided conifer, grassland, and riparian habitats. Doherty et al. (2008), in the same study area, found that greater sage-grouse avoid breaks in sagebrush at scales up to approximately 1,000 acres for riparian areas and over 150 acres for coniferous stands and rugged terrain. At the local scale, very dense sagebrush was critical food and cover in winter, even though less dense sagebrush was preferred for nest sites (Doherty et al. 2010). Doherty et al. (2014) found that nest success was positively correlated with grass height in the Powder River Basin (but see Smith et al. 2018a).

On TBNG, sagebrush habitat commonly interfaces with grasslands dominated by herbaceous vegetation. In the absence of disturbance, sagebrush can slowly colonize an area, but disturbances are common and can result in the extirpation of sagebrush for long periods of time. Sagebrush communities that have burned in wildland or prescribed fire, for example, can take several decades to more than a century to recover from fire and develop a mature canopy (Baker 2006). Black-tailed prairie dog colonies are also generally free of sagebrush (Connell et al. 2018) or have significantly reduced shrub cover and density relative to adjacent areas without colonies because prairie dogs clip the vegetation (Baker et al. 2013, Connell et al. 2018).

Anthropogenic activity can result in reduced availability and suitability of greater sage-grouse habitat, usually by fragmenting or removing sagebrush cover, increasing opportunities for predation, or increasing noise disturbance. Oil and gas well development, range improvements for livestock, surface coal mining, and roads are all common anthropogenic disturbances to greater sage-grouse habitat on TBNG.

Key threats to this species include grazing management, prairie dog management, prairie dog expansion, insecticides, fire, invasive species, predation, energy development and infrastructure, and climate change.

Environmental Consequences

Direct Effects – Habitat Availability

Habitat availability would remain unchanged under the no action alternative and may increase under each of the action alternatives as a result of limiting prairie dog colony extent and reducing the likelihood of prairie dog colony expansion into sagebrush. Portions of management area 3.67 in the action alternatives do overlap with greater sage-grouse Priority Habitat Management Area, specifically, the Thunder Basin Core Area. Although management area 3.67 still overlaps with greater sage-grouse priority habitat management area, the Forest Service expects conflicts to be minimal and flexibility in plan direction to allow appropriate management in specific locations and situations. Proposed activities in the action alternatives would indirectly benefit greater sage-grouse by limiting the expansion of prairie dog colonies, especially near sagebrush. Consistent with the Greater Sage-Grouse Plan Amendment, plan direction for management area 3.67 supersede plan direction for sage-grouse priority habitat management areas when they are in conflict.

The priority habitat potentially impacted occurs in the Thunder Basin Core Area which was delineated in the Wyoming Executive Order for Greater Sage-Grouse Core Area Protection (Order 2019-3) and partially overlaps with the proposed management area 3.67 boundary. This Core Area is approximately 847,000 acres in total size while the portion of Core Area within management area 3.67 is approximately 14,900 acres in size for the Preferred Alternative, 12,700 acres for the Proposed Action and Grassland-wide Alternatives and 19,000 acres for the No Action and Prairie Dog Emphasis Alternatives. As a result, approximately 1.5% to 2.2% of the Core Area within the proposed 3.67 management area boundaries are potentially being affected by plan amendment. Furthermore, the plan amendment does not propose any activities in any alternatives that remove sagebrush, but instead, proposes activities that promote maintaining and protecting sagebrush habitat. The acreage objective of approximately 10,000 acres of prairie dog colonies is proposed across the 3.67 management area but is not specifically centered within greater sage-grouse core area. There are four occupied leks present with a varying numbers of birds using these breeding grounds in the last 10 years.

Sylvatic plague, which causes contraction of prairie dog colonies and complexes, could also decrease prairie dog colony expansion and increase the potential for sagebrush to re-establish. Direct impacts to habitat availability are expected to be low or beneficial, since the greater sage-grouse does not depend on size, distribution, extent of prairie dog colonies for nesting and breeding habitat.

Indirect Effects – Habitat Suitability

Impacts to habitat suitability are expected to be low or beneficial greater sage-grouse under any of the alternatives, since activities that limit the expansion of prairie dog colonies would indirectly benefit greater sage-grouse. Rodenticides, including anticoagulants, pose little risk to the species, since they do not often occupy prairie dog colonies. Seasonal restrictions to rodenticide application apply during lekking may indirectly benefit the species. Recreational shooting may pose a potential risk from accidental or intentionally shooting; however, the likelihood of sage-grouse being shot is low, since this species does not often occupy prairie dog colonies. Proposed recreational shooting restrictions in the No Action, Prairie Dog Emphasis, Proposed Action and Preferred Alternatives could indirectly benefit greater sage-grouse. Overall, indirect effects of prairie dog management may benefit greater-sage grouse by limiting prairie dogs and their habitat.

Cumulative Effects to All Alternatives

In addition to proposed activities in each alternative, other actions contribute to potential impacts to the greater-sage grouse.

Energy infrastructure and development – Energy development and associated infrastructure is one of the most significant threats facing greater sage-grouse in the eastern portion of its range. The 2015 listing decision by the U.S. Fish and Wildlife Service showed that over one-fifth of existing greater sage-grouse habitat in the northern Great Plains could be affected by future non-renewable energy development (80 FR 59890). Taylor et al. (2012) suggested that if energy development continues, future viability of greater sage-grouse populations in northeast Wyoming will be compromised. State and Federal management plans have implemented regulations on energy development that will likely reduce but not eliminate negative effects in greater sage-grouse populations and habitat, and future declines will likely occur (Hanser et al. 2018, 80 FR 59890). Negative effects of energy infrastructure, including well structures, powerlines, and roads, include removal of sagebrush; increased predation on both nests and individual birds (Dinkins et al. 2014, Gibson et al. 2018); noise pollution from mine, well, or road activity that can interfere with lekking vocalizations (Blickley et al. 2012); and reservoir construction associated with oil and gas wells that can facilitate mosquito (*Culex* spp.) breeding and the potential for the spread of West Nile virus (Walker et al. 2007).

Fire and invasive species – Fire directly reduces sagebrush cover and causes declines in the abundance, nest success, and survival rate of greater sage-grouse (Smith and Beck 2017, Foster et al. 2019). On TBNG, Wyoming big sagebrush is easily destroyed by fire and can take longer than 50 years to reestablish (Lesica et al. 2008). Wildland fire may begin to cause increasingly larger losses of sagebrush habitat if climate change causes increases in temperature and fuel availability that alter the frequency and intensity of the natural fire regime (Hanser et al. 2018). The invasive annual brome, cheatgrass (*Bromus tectorum*), which is highly flammable, directly displaces native grasses and forbs and increases fire risk and intensity (TBPGEA and USDOI Fish and Wildlife Service 2017). On TBNG, however, the positive feedback loop between cheatgrass and wildland fire is not as strong as has been observed in the Great Basin, and cheatgrass has not spread as widely as it has in other parts of the greater sage-grouse range (Porensky and Blumethal 2016).

Grazing and herbivory – The greatest potential impact to greater sage-grouse from livestock grazing on TBNG is through increased predation as a result of available perches for predators on range improvements, including water tanks and fences (Cutting et al. 2019). Water tanks for livestock can also increase potential for West Nile virus, degrade nesting habitat quality, and decrease habitat through sagebrush removal and overgrazing. Fencing can cause mortality and habitat fragmentation (Beck and Mitchell 2000, Connelly et al. 2004, Crawford et al. 2004, Cagney et al. 2010). Livestock grazing effects on species composition and structure on TBNG are minimal due to the moderate intensities permitted and practiced across the landscape that are intended to maintain moderate height herbaceous cover. Black-tailed prairie dogs are a native herbivore and colonizer that can enter sagebrush and remove the canopy as they seek out new territory. However, colony expansion into sagebrush is limited and typically occurs only under extreme cases of population pressure within colonies as was seen in 2016-2017, and has little potential to impact greater sage-grouse populations.

Predation – Greater sage-grouse serve as part of the prey base for mammalian and avian predators on TBNG. When alternative prey populations such as prairie dogs are limited, coyotes (*Canis latrans*), golden eagles (*Aquila chrysaetos*), and hawks (*Buteo* spp.) may rely on greater sage-grouse for prey, somewhat reducing populations. The presence of raptors can often interfere with lekking males. Overall, these predators likely have a minor influence on greater sage-grouse populations because the predators have not increased in prevalence. Smaller predators that have increased in population with anthropogenic disturbance such as corvids have had a larger impact on greater sage-grouse populations via nest depredation (Conover and Roberts 2016).

Disease - West Nile Virus has been known to decrease greater sage-grouse survivorship in Wyoming and Montana (Naugle et al. 2004, 2005, Walker et al. 2007), with profound impacts on the Powder River Basin population (USDOI Fish and Wildlife Service 2013). Walker et al. (2007) found low to moderate annual infection rates (four to 29 percent) and recommend reduction of artificial water sources that support breeding mosquitos. Also in the Powder River Basin, Walker et al. (2004) attributed short-term declines in lek attendance by both male and female birds to an outbreak of West Nile virus. However, more recent research has shown an increasing resistance to the virus among greater sage-grouse (Conover and Roberts 2016).

Weather, climate, and climate change – Extreme precipitation during the nesting season can cause short-term dips in greater sage-grouse populations by decreasing nest success (Smith et al. 2018b). Climate change may cause an increase in the occurrence of extreme weather events on TBNG, thus increasing the potential for extreme weather during the nesting season (Conant et al. 2018). In contrast, increases in average precipitation could benefit Greater Sage-grouse by increasing vegetative cover around nests (Coates et al. 2018). In general, the impacts of climate change on greater sage-grouse are highly uncertain, with the most likely negative effects due to increased wildland fire frequency in sagebrush habitat due to a hotter climate (McKelvey and Buotte 2018).

Plan Components

Plan components developed for greater sage-grouse and for other species will directly and indirectly benefit greater sage-grouse by reducing or eliminating potential impacts (see Table E-14). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-14. Plan components that support greater sage-grouse habitat availability and suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat availability – Loss of exclusive breeding season habitat in sagebrush-dominated sites because of expansion of prairie dog colonies	*GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is allowed when composite colony area is greater than the targets. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-11 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the objective. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem,

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.	GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.	that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.	sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.	including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.
Habitat availability – Loss of leks because of decline in total number of prairie dog colonies	Loss of leks due to control of prairie dog colonies is not addressed in the plan components.	Loss of leks due to control of prairie dog colonies is not addressed in the plan components.	Loss of leks due to control of prairie dog colonies is not addressed in the plan components.	Loss of leks due to control of prairie dog colonies is not addressed in the plan components.	Loss of leks due to control of prairie dog colonies is not addressed in the plan components.
Habitat suitability – Increased predation because of decline in total area of prairie dog colonies	*GRSG-INFRA-GL-023*: This infrastructure guideline stipulates design of overhead facilities in priority habitat management areas with perch deterrents to deter avian predators.	*GRSG-INFRA-GL-023*: This infrastructure guideline stipulates design of overhead facilities in priority habitat management areas with perch deterrents to deter avian predators.	*GRSG-INFRA-GL-023*: This infrastructure guideline stipulates design of overhead facilities in priority habitat management areas with perch deterrents to deter avian predators.	*GRSG-INFRA-GL-023*: This infrastructure guideline stipulates design of overhead facilities in priority habitat management areas with perch deterrents to deter avian predators.	*GRSG-INFRA-GL-023*: This infrastructure guideline stipulates design of overhead facilities in priority habitat management areas with perch deterrents to deter avian predators.

Determination of Effects

With all proposed activities combined, along with resource protection measures and plan components, all alternatives have an effects determination of, "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 minimal or beneficial. It is expected that sufficient distribution of the species will be maintained on the grassland and throughout its range. In addition, plan amendments were completed in 2015 and 2020 with the intent of maintaining greater sage-grouse habitat on the grassland. The rationale for effects determinations is based on the availability of greater-sage grouse habitat on the TBNG, along with sufficient distribution of habitat within the species' range. Primary impacts of the alternatives include those activities that promote prairie dog habitat and limit greater-sage grouse habitat.

The proposed boundary changes overlap with a small amount of core habitat and this habitat is of variable quality that contains suitable, marginal and non-suitable conditions as well as non-habitat areas (such as rocky or forested areas). The expected impacts to greater sage-grouse from proposed activities of the plan amendment or prairie dog management are considered minimal and not expected to result in changes to the sage-grouse population across the core area. Prairie dog control measures may result in small improvements for sage-grouse by reducing prairie dog encroachment into taller grasses or sagebrush. Consequently, prairie dogs may naturally expand into preferred sage-grouse habitats causing a natural and temporary reduction in the quality of available habitat. Regardless, the resulting impacts to greater sage-grouse from the proposed as will activities not modify habitat conditions to a degree that affects GSG populations and management conflicts for both species is not anticipated.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species' habitat on the TBNG.

Additional rationale to support the effects determinations for all alternatives include:

- One-third of proposed management area 3.67 in the Proposed Action is designated as greater sage-grouse Priority Habitat Management Area (PHMA). Although there are four active leks currently in management area 3.63; proposed plan direction does not conflict with the greater sage-grouse amendment, which acknowledges that, "Priority, connectivity, and general habitat management areas may contain non-habitat. Management direction would not apply to those areas of non-habitat if the proposed activity in non-habitat does not preclude effective sage-grouse use of adjacent habitats."
- Change in the size, distribution, and total extent of prairie dog colonies has not been shown to have a measurable effect on greater sage-grouse populations on TBNG. The total observed extent of prairie dog colonies on TBNG from all years totals less than 8 percent of the area of PHMA, and the extent of prairie dog colonies is typically much less than 6 percent of the PHMA in any single year. Acreage objectives in alternatives are far less than these extreme

levels. Acreage objectives in the action alternatives could result in expansion of sagebrush habitat over the long-term, relative to the no action.

- An additional potential effect of changes in prairie dog management could be increased predation on greater sage-grouse by large mammalian and avian predators that typically use the resident prairie dog population as their primary prey base. However, the impacts of serving as an alternative prey base are likely minimal due to the historical long-term presence of these predators in the plan area and the availability of other small mammals as alternative prey bases.
- Some small colonies may serve as leks, but loss of prairie dog colonies would minimally affect lek availability because they represent a very small proportion of the total number of leks. In 2018, no leks were in active prairie dog colonies. [Based on WGFD data, leks in 3.63 do not overlap 2016/2017 colony extent.]
- Shooting poses little risk because greater sage-grouse do not often occupy prairie dog colonies. Seasonal restrictions apply during lekking in alternatives 1, 2 and 4, which may indirectly benefit the species.
- Rodenticides pose little risk because greater sage-grouse do not often occupy prairie dog colonies. Seasonal restrictions to rodenticide application apply during lekking, which may indirectly benefit the species.

Overall, potential direct and indirect effects under this alternative, when combined with the cumulative effects generated by other activities listed above would not result in a decrease in viability for this species.

Long-billed Curlew (*Numenius americanus*)

Introduction

Long-billed curlew is a large shorebird that breeds in shortgrass and mixed-grass grasslands across the western United States and southwestern Canada (Pampush 1993). The species nests in very short herbaceous vegetation, but moves into somewhat taller mixed-grass vegetation after chicks have fledged for brood rearing. Historically, these mosaic habitat conditions resulted from the occurrence of regular disturbances that shortened grass in portions of the landscape, including fire and high intensity herbivory by native ungulates and prairie dogs. During the late 19th and early 20th centuries, hunting and land use conversion for agriculture resulted in large population declines, and the eastern portion of the breeding range decreased in size considerably. More recently, population declines have occurred in the Great Plains breeding centers in Nebraska, South Dakota, Colorado, New Mexico, Oklahoma, and Texas. In the shrub-steppe breeding centers west of the Rocky Mountains, long-billed curlew is benefitting from the habitat conditions created by the spread of the invasive brome, cheatgrass (*Bromus tectorum*).

Range-wide Information, Distribution and Abundance

Long-billed curlew breeds in the interior western United States and western Great Plains reaching into southern Canada. In the winter, long-billed curlew migrates to the Gulf Coast, the southern Atlantic United States, interior Mexico, and the Pacific coast, reaching from Oregon to Costa Rica (Dugger and Dugger 2002). Abundance in the breeding range is uneven, and major breeding centers occur in southern Idaho, central Utah, and western Montana and southern Alberta and Saskatchewan (Sedgwick 2006, Jones et al. 2008). Disjunct breeding centers lie in western Nebraska and where southeastern Colorado meets northeastern New Mexico and the Oklahoma panhandle (Sedgwick 2006). The range-wide average breeding season lasts from mid-April through June or early July (Sedgwick 2006). Long-billed curlews show high site fidelity in choice of breeding and wintering grounds and stopover locations during migration (Olalla-Kerstupp et al. 2015).

Life History and Habitat

The species tends to select breeding and nesting habitat primarily based on vegetation structure, rather than vegetative species composition (Saalfeld et al. 2010). Preferred vegetation structure may vary slightly between nesting habitat and brood-rearing habitat, with a tendency to use very short vegetation for nesting and somewhat taller grass for brood rearing (Saalfeld et al. 2010). The presence of wetlands may be positively correlated with long-billed curlew abundance during breeding, since they are likely to decrease energy expenditures and exposure for chicks traveling between water and foraging grounds (Saalfeld et al. 2010). Long-billed curlews typically avoid habitats with high densities of tall grass, forbs, shrubs, or trees (Faulkner 2010, Saalfeld et al. 2010). Where native prairie is fragmented or constitutes a small portion of the landscape, the species will nest in heavily grazed pastures, hayfields, and other agricultural landscapes with short-stature vegetation (Devries et al. 2010, Saalfeld et al. 2010), and high rates of nest success have been observed in such agricultural landscapes (Hartman and Oring 2009). In the Great Basin shrub-steppe landscape, observed increases in long-billed curlew abundance may be related to land use conversion from sagebrush to pastures for grazing, and long-billed curlew have been observed nesting in sites dominated by the invasive brome, cheatgrass (Earnst and Holmes 2012).

Other disturbed sites, such as prairie dog (*Cynomys* spp.) colonies, may be used to differing degrees depending on the structure of surrounding vegetation. In shortgrass steppe in northeastern New Mexico, long-billed curlew tended to use areas outside prairie dog colonies more than inside colonies (Goguen 2012). Slightly to the east, where the shortgrass steppe transitions into mixed-grass prairie, long-billed curlew abundance was slightly positively correlated with prairie dog colonies (Smith and Lomolino 2004). In mixed-grass prairie, long-billed curlew has been observed on prairie dog colonies (Agnew et al. 1986, Reading et al. 1989, Sharps and Uresk 1990, Tyler and Shackford 2002). Augustine and Baker (2013) found that long-billed curlew readily used areas both on and off prairie dog colonies in mixed-grass prairie in South Dakota. In general, heavily disturbed areas, including recently burned areas, heavily grazed areas, and prairie dog colonies can provide suitable nesting habitat for long-billed curlew, though the presence of undisturbed mixed- or shortgrass prairie nearby is important for brood rearing (Derner et al. 2009).

Long-billed curlew spends the non-breeding season in coastal estuaries, mudflats, salt marshes, wetlands, flooded fields, agricultural fields and pastures, and a variety of manmade waterbodies (Dugger and Dugger 2002, Leeman and Colwell 2005, Saalfeld et al. 2010, Shuford et al. 2013). During the nonbreeding season, the long-billed curlew prefers firm mud substrate or high-tidal areas to soft mud, sand, or low-tidal areas (Gerstenberg 1979).

Long-billed curlew is a ground nesting species. Individuals construct nests by scraping dirt from beneath the body with the feet to create a shallow depression, which they then line with a variety of materials depending on availability (e.g., pebbles, bark, twigs, grass stems and leaves, seeds, and bird and mammal droppings). Nest sites are generally located in flat areas with short-statured grass, but little bare ground, and next to objects such as rocks or livestock dung piles for concealment or camouflage. Nesting pairs are territorial, and nest territories are relatively large, ranging from 15 to 35 acres. Adults will forage outside of the nesting territory. Long-billed curlew is carnivorous, ground foraging for insects and other invertebrates in pastures or prairie with short-stature vegetation (Dugger and Dugger 2002).

Population Trends and Threats

Since the mid-20th century, long-billed curlew has experienced population declines and range contractions in the eastern United States and Great Plains, while populations west of the Rocky Mountains have grown slightly (Dugger and Dugger 2002, Fellows and Jones 2009). Earlier accounts report large declines in populations in the 19th century and early 20th century (Dugger and Dugger 2002). The U.S. Fish and Wildlife Service initially identified long-billed curlew as a Category 2 candidate species under the Endangered Species Act in the early 1980s, meaning listing could be appropriate, but that the U.S. Fish and Wildlife Service would need more information before it could ultimately determine whether listing was warranted (47 FR 58458). The U.S. Fish and Wildlife Service later found that the species was more abundant than it had initially believed (56 FR 58811). Data from the U.S. Geological Survey North American Breeding Bird Survey show few statistically significant trends in long-billed curlew populations. Survey-wide, North American Breeding Bird Survey data indicate a mostly stable long-billed curlew population since 1966 (Sauer et al. 2017). However, the reliability of the North American Breeding Bird Survey for detecting long-billed curlew is in question due to the timing of the survey, which usually occurs after long-billed curlews have left their nests (Jones et al. 2008). North American Breeding Bird Survey results for long-billed curlew in Wyoming are largely unreliable and do not show significant trends.

Key threats to this species include prairie dog management, insecticides, fire, invasive species, predation, energy development and infrastructure, and climate change. Early large-scale declines in long-billed curlew populations resulted from extensive hunting of the species (Dugger and Dugger 2002). More recent loss of range in the eastern United States and population declines in the Great Plains have likely resulted from loss and degradation of grassland habitat in those regions. Changes in land use in grasslands often result in interruptions to historical disturbance regimes that maintained a mosaic of herbaceous vegetation structure across the landscape (Derner et al. 2009). In general, grazing has become less intense and longer in duration, and fire has been suppressed. Fire suppression can negatively affect long-billed curlew breeding habitat by allowing woody encroachment on grasslands (Cannings 1999). The introduction of exotic species such as crested wheatgrass (*Agropyron cristatum*) to enhance livestock forage can result in increased grass cover and height and a subsequent loss of nesting habitat (Dugger and Dugger 2002). In addition to interruptions in historical disturbance regimes, other anthropogenic disturbances such as oil and gas well development, coal mining, and the use of pesticides can impact long-billed curlew, though substantial effects from these activities have not been recorded in the literature. In particular, the construction of roads in association with energy extraction could have impacts on long-billed curlew due to the fragmentation of grassland habitat. Long-billed curlews have relatively large breeding territories, and fragmentation of continuous grassland could compromise nest success (Armbruster 1983). Increases in long-billed curlew abundance west of the Rocky Mountains have primarily occurred in the shrub-steppe ecosystem, where cheatgrass has increased fire frequency in sagebrush habitats, reducing shrub cover and expanding the availability of grassland habitat for the bird (Earnst and Holmes 2012).

Species Status in the Plan Area

Little research exists regarding the habitat requirements or population history of long-billed curlew on TBNG or in eastern Wyoming. While the TBNG lies near the breeding center in western Nebraska and South Dakota, long-billed curlew has seldom used TBNG as a breeding site, at least since observation records began the mid- to late-20th century. Although the species is uncommon on TBNG, suitable brood-rearing habitat is available on large-portions of the grassland as a result of livestock grazing in mixed-grass prairie. Nesting habitat is less available, as the two disturbances that can create suitable nesting habitat, fire and prairie dogs, are limited to a small portion of the landscape.

Distribution, Abundance and Population Trend in the Plan Area

The number of observations of long-billed curlew in the plan area is limited (Figure E-8). Fewer than 30 total independent observation records are contained in the Forest Service's Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the citizen science birding database, eBird (https://ebird.org/; Sullivan et al. 2009). Though limited, observation records date back to 1989.

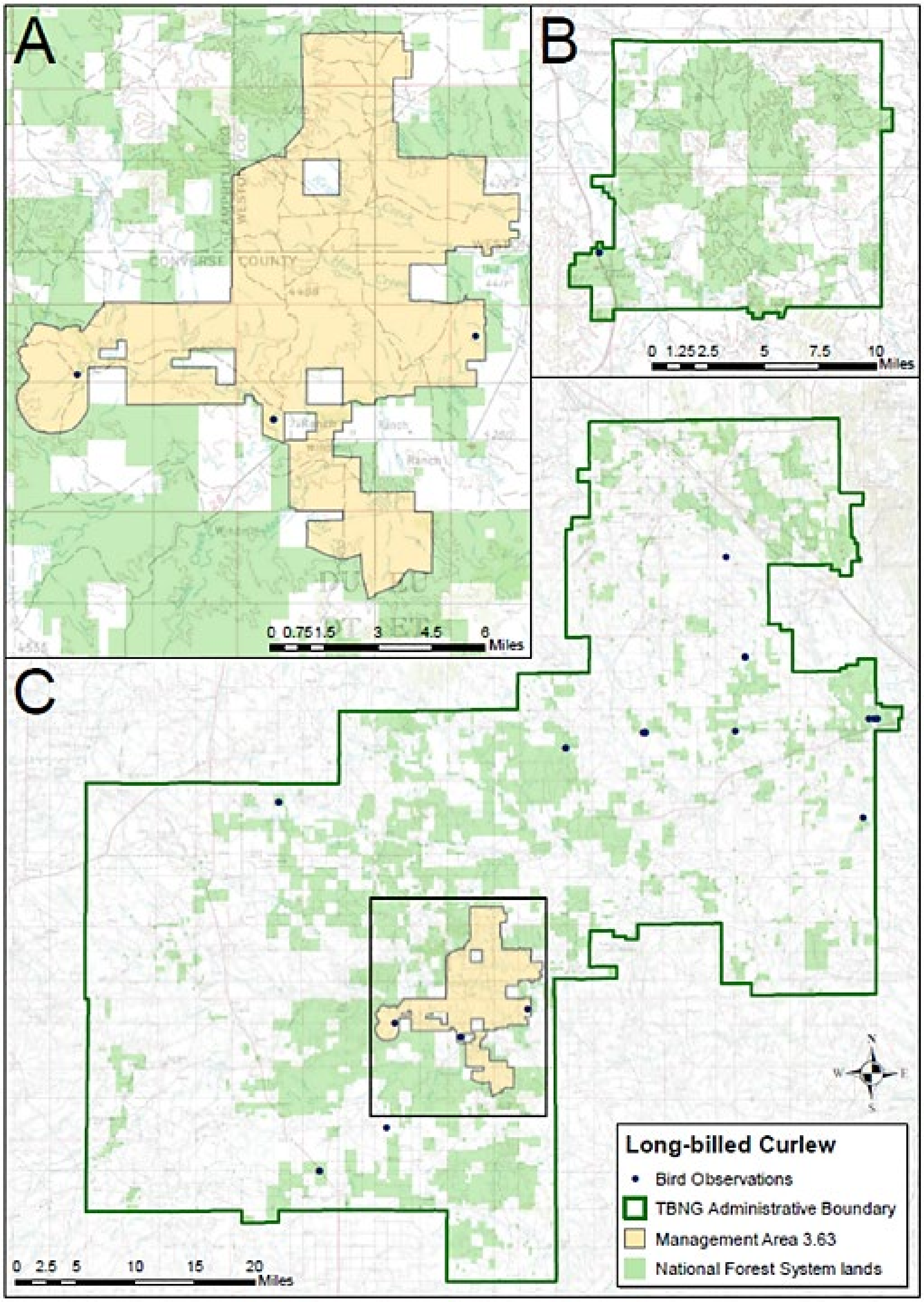

Figure E-8. Long-billed curlew observations on the Thunder Basin National Grassland and nearby lands. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1989, 1992, 1993, 2009, and 2015-2018. Observation data are from the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of the species on the Thunder Basin National Grassland. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Avian surveys on TBNG by the Thunder Basin Research Initiative, a collaborative research project among the University of Wyoming, the Thunder Basin Grassland Prairie Ecosystem Association, the United States Department of Agriculture Agricultural Research Service, and the Forest Service, showed a low relative abundance of long-billed curlew of 0.04 percent in 2015 and 2017. In those surveys, long-billed curlew occurred twice 2015 and 2017 and did not occur in 2016 (Duchardt et al. 2016a, 2016b, 2017). During avian surveys conducted in the mid-1990s, Augustine and Baker (2013) did not observe any long-billed curlews on the TBNG. The available data is not sufficient to indicate trends in density or occupancy across the planning unit.

Environmental Consequences

Direct Effects – Habitat Availability

Direct effects to long-billed curlew could result from changes in habitat availability. There would be no change in habitat availability from the No Action Alternative, however habitat availability would change as a result of the decrease in acreage objectives for prairie dog colony extent in the Prairie Dog Emphasis Alternative, Grassland-wide Alternative, Proposed Action Alternative and Preferred Alternative. Sylvatic plague can also cause contraction of prairie dog colonies and complexes and decrease the availability of potential habitat if prairie dogs do not recolonize poisoned or plagued-out areas within a few years. Direct impacts to habitat availability are expected to be low, however, since the species does not depend on size, distribution, extent of prairie dog colonies for nesting and breeding habitat on the TBNG. Proposed reductions in acreage objectives for prairie dog colony extent under all alternatives are expected to allow for the species to maintain sufficient distribution.

Indirect Effects – Habitat Suitability

Impacts to habitat suitability, including potential mortality, may result from lethal control of prairie dogs, recreational shooting of prairie dogs, and management for sylvatic plague.

The effects of lethal prairie dog control on long-billed curlew have not been studied, but impacts could include the reduction of potential nesting and foraging habitat as described under direct effects.

Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives and can pose a risk to long-billed curlew through intentional or accidental shooting. The No Action and Prairie Dog Emphasis alternatives have the most limitations on recreational shooting and thus the greatest protections for long-billed curlew from this activity, with a year-round shooting prohibition in MA 3.63 and in Category 2 areas. The Proposed Action and Preferred Alternative offer the next highest level of protections, with a seasonal recreational shooting restriction in MA 3.67 from February 1 through August 15. The Grassland-wide Alternative does not include any recreational shooting restrictions and has a higher potential for loss of individual birds.

Plague management could also affect long-billed curlew. The primary plague prevention product is the insecticide deltamethrin, which poisons plague-carrying fleas (Seery et al. 2003). The application of deltamethrin may result in reduced arthropod prey populations for insectivorous bird species, causing a potential for increased energy expenditure searching for food during nesting.

Overall indirect impacts to habitat suitability are expected to be low, however, since the species does not typically occupy prairie dog habitat and does not depend on size, distribution, extent of prairie dog colonies for nesting and breeding habitat on TBNG.

Cumulative Effects to All Alternatives

In addition to proposed activities in each alternative, other actions contribute to potential impacts to long-billed curlew. A summary of cumulative effects are provided below.

Insecticides – Other insecticide application, particularly for control of grasshoppers, could pose a threat to long-billed curlew via direct poisoning or reduction of prey populations. The Forest Service has occasionally treated the TBNG for grasshoppers, and the last treatment of diflubenzuron (Dimilin) occurred in 2011. Several insecticides have been shown to have negative effects on the abundance of grassland bird populations (McEwen et al. 1972). The effects of insecticides on long-billed curlew in particular have not been studied.

Energy development – The relationships between long-billed curlew and different types of energy development have received minimal attention in the literature. Potential effects could include fragmentation of grasslands due to the development of road networks and drilling and mining infrastructure. Fragmentation could be particularly impactful to long-billed curlew due to its relatively large breeding territory (Armbruster 1983). Fragmentation could increase opportunities for predators to detect long-billed curlew nests or reduce total area available for foraging.

Weather, climate, and climate change – Climate change may cause an increase in temperature and in the occurrence of extreme weather events on TBNG (Conant et al. 2018). In general, the impacts of climate change on long-billed curlew are highly uncertain, but will be crucial to monitor given the limited breeding population within the state. Fire occurrence may increase due to the increase in temperatures, possibly benefitting long-billed curlew by temporarily providing suitable nesting habitat across large areas of the plan area. Prairie dog populations, on the other hand, are negatively impacted by long-term drought (Facka et al. 2010, Stephens et al. 2018). Changes in average annual precipitation levels on TBNG could negatively impact the availability of habitat for long-billed curlew.

Plan Components

Plan components developed for other species will indirectly benefit long-billed curlew by reducing or eliminating potential impacts (see Table E-15). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-15. Plan components that support long-billed curlew habitat availability and suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat availability – Loss of some breeding season habitat in prairie dog colonies because of decline in total area of prairie dog colonies	*Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 3.63, Standards and Guidelines, General, 1 (NA)*: Standard F.65b in Chapter 1 adopts the Black-tailed Prairie Dog Conservation Assessment and Management Strategy (Strategy), which contains the existing area targets for prairie dog colonies. Control of prairie dogs is generally not allowed under the Strategy if composite colony area is below targets. General standard 1 for MA 3.63 supports the composite colony area targets contained in the Strategy by prohibiting activities that would inhibit increases in the prairie dog population in MA 3.63 until the colonies could support a sustainable black-footed ferret population. *Ch. 1, Standards and Guidelines, F.23 (N/A); Ch. 1, Standards and Guidelines, F.34 (NA); Ch. 1, Standards and Guidelines, F.70; Ch. 1,*	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *Ch. 1, Standards and Guidelines, F.34 (PA); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; GPA-FW-ADM-GL-07 (PA); Ch. 2, Broken Hills GA, Desired Conditions (PA); Ch. 2, Cellers Rosecrans GA, Desired Conditions (PA); Ch. 3, MA 3.67, Desired Conditions (PA); GRSG-FM-ST-048*: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a mosaic of other vegetation types. These components allow for use of prescribed fire targeted livestock grazing, and other vegetation	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *Ch. 1, Standards and Guidelines, F.34 (GW); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; GPA-FW-ADM-GL-11 (GW); Ch. 2, Broken Hills GA, Desired Conditions (GW); Ch. 2, Cellers Rosecrans GA, Desired Conditions (GW); Ch. 3, MA 3.67, Desired Conditions (GW); GRSG-FM-ST-048*: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a mosaic of other vegetation types. These components allow for use of prescribed fire targeted livestock	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is prohibited when composite colony area does not sum to the targets. *Ch. 1, Standards and Guidelines, F.23 (PDE); Ch. 1, Standards and Guidelines, F.34 (PDE); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; GPA-FW-ADM-GL-07 (PDE); Ch. 2, Broken Hills GA, Desired Conditions (PDE); Ch. 2, Broken Hills GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (PDE); Ch. 2, Cellers Rosecrans GA, Desired Conditions (PDE); Ch. 2, Cellers Rosecrans GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (PDE); Ch. 3, MA 3.67, Desired Conditions (PDE); GRSG-FM-ST-048*:	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-12 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the objective. 7,500 acres of colonies is the minimum threshold for use of rodenticides in MA 3.67 outside of boundary management zones in all circumstances except density control. *Ch. 1, Standards and Guidelines, F.34 (Preferred); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6;*

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (NA); Ch. 2, Broken Hills GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (NA);Ch. 2, Cellers Rosecrans GA, Desired Conditions (NA); Ch. 2, Cellers Rosecrans GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (NA); Ch. 3, MA 3.63, Desired Conditions (NA); GRSG-FM-ST-048: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a mosaic of other vegetation types. These components stipulate target acreages of short-stature vegetation ecosystems and the use of prescribed fire and targeted livestock grazing to achieve vegetation goals.	management tools to achieve vegetation goals. GPA-FW-ADM-GL-07 additionally provides for consideration of habitat value for associated species in prairie dog colonies outside of boundary management zones before lethal control of those colonies may occur.	grazing, and other vegetation management tools to achieve vegetation goals. GPA-FW-ADM-GL-11 additionally provides for consideration of habitat value for associated species in prairie dog colonies outside of boundary management zones before lethal control of those colonies may occur.	These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a mosaic of other vegetation types. These components stipulate target acreages of short-stature vegetation ecosystems and the use of prescribed fire and targeted livestock grazing to achieve vegetation goals. GPA-FW-ADM-GL-07 additionally provides for consideration of habitat value for associated species in prairie dog colonies outside of boundary management zones before lethal control of those colonies may occur.	*Ch. 1, Standards and Guidelines, H.1 (Preferred); Ch. 2, Broken Hills GA, Desired Conditions (Preferred); Ch. 2, Cellers Rosecrans GA, Desired Conditions (Preferred); Ch. 3, MA 3.67, Desired Conditions (Preferred);GRSG-FM-ST-048*: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the grassland among a mosaic of other vegetation types. These components allow for use of prescribed fire targeted livestock grazing, and other vegetation management tools to achieve vegetation goals. Standard H.1 in Chapter 1 additionally provides for consideration of impacts to nesting, breeding, and denning habitat for associated species in prairie dog colonies outside of MA 3.67 before control of those colonies may occur.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Risk of being shot in prairie dog colonies open to shooting	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting.
Habitat suitability – Possible impacts because of decline in insect prey base after use of deltamethrin in prairie dog colonies	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to long-billed curlews.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to long-billed curlews.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to long-billed curlews.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to long-billed curlews.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to long-billed curlews.

Determination of Effects

With all proposed activities combined, along with resource protection measures and plan components, all alternatives have an effects determination of, “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 activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. In addition, existing plan components were developed with the intent of maintaining ecological conditions on the grassland. These components are expected to provide for long-billed curlew habitat on the grassland.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, “no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated” under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species’ habitat on the TBNG.

The rationale for effects determinations to all alternatives is based on the availability of long-billed curlew habitat in and adjacent to the TBNG, along with sufficient distribution of habitat within the species’ range. Additional rationale to support the effects determinations for all alternatives include:

- This species is a very uncommon breeder on TBNG. May nest in prairie dog colonies but uses mixed-grass prairie subject to prairie dog herbivory or fire for breeding in general.
- Population has not been observed to track fluctuations in prairie dog total colony extent on TBNG (i.e., during epizootics).
- Insectivorous and very unlikely to consume grain-bait rodenticides. Seasonal restrictions on rodenticide use should decrease the opportunity to consume grain-baits.
- Deltamethrin used for plague control could result in some impacts to prey base, but effects would be very localized and short-term because adjacent insect populations could repopulate dusted colonies.
- Recreational shooting poses some risk to those individuals that occupy prairie dog colonies.

Overall, potential direct and indirect effects under this alternative, when combined with the cumulative effects generated by other activities listed above would not result in a decrease in viability for the species.

McCown's Longspur (*Rhynchophanes mccowni*)

Introduction

McCown's longspur occurs in low numbers relative to other bird species on the TBNG, and the TBNG lies at the northern end of a disjunct breeding range for the species. On the TBNG, the species depends on short-statured vegetation and bare ground conditions for suitable nesting habitat. Prairie dog colonies are a primary source of shortgrass and bare ground conditions across much of the plan area, though undisturbed shortgrass may occur in some parts of the Grassland. Fire is not considered a major provider of McCown's longspur habitat. As a result, a key threat to the McCown's longspur population in the plan area is prairie dog management, which may reduce the extent of available habitat or cause secondary poisoning by rodenticides or insecticides. Overall, low population numbers, a restricted range, and a degree of dependency on prairie dog colonies indicate that the species is vulnerable to changes in prairie dog management on TBNG.

Range-wide Information, Distribution and Abundance

Both the breeding and winter ranges of McCown's longspur are restricted to North America. Over the past approximately 120 years, McCown's longspur has experienced drastic contractions in its continental breeding range, which historically extended south to the Oklahoma Panhandle and east to Manitoba and western Minnesota (With 2010). The species currently has two disjunct breeding centers in the northwestern Great Plains of Canada and the United States (Sedgwick 2004, With 2010). Wyoming encompasses a majority of the southern breeding center, which extends into north-central Colorado (With 2010). Individuals breeding farther north may migrate through Wyoming in the spring and fall. Confirmed and suspected breeding has been documented in 16 of the 28 latitude/longitude degree blocks in Wyoming, primarily in the eastern half of the state (Orabona et al. 2012).

Life History and Habitat

Across its continental range, including Wyoming, McCown's longspur breeds primarily in large tracts of open, semi-arid, shortgrass prairie with low and sparse vegetation, extensive bare ground, and little ground litter (Sedgwick 2004). The species may also use mixed-grass prairie where recent disturbance, such as heavy grazing, prairie dog (*Cynomys* spp.) colonies, or cultivation, has created low and sparse vegetation structure (Campbell and Clark 1981, Clark et al. 1982, Snyder and Bly 2009, Augustine and Baker 2013). While fire was historically an integral part of prairie ecosystems, Augustine and Derner (2015) found that recent burns on the Pawnee National Grassland in Colorado did not affect McCown's longspur abundance on the landscape. At a local scale, however, fire can create areas of shorter vegetation that McCown's longspur will select for nesting (Skagen et al. 2018).

Habitat used by McCown's longspur is often compared to that of Chestnut-collared Longspur; both taxa use grassland with relatively short and sparse vegetation, but McCown's longspur uses notably more barren areas (With 2010). McCown's longspur build their nests on bare ground in shallow depressions, often adjacent to higher structures, such as clumps of grass, cacti, shrubs, or cow or horse dung pats, which provide protection from weather and solar radiation (Sedgwick 2004, Skagen et al. 2018). Shrubs and other taller vegetation may provide cover to predators (With 1994, Skagen et al. 2018). Barren areas may be beneficial because they allow for the warming and drying of nest sites early in the breeding season. They also allow for males' elaborate territory defense behavior (Kaufman 2005). Territories are discrete and generally range from approximately 1 to 5 acres (With 2010). McCown's longspurs are omnivorous ground foragers, feeding primarily on seeds and insects, with a heavy reliance on grasshoppers for nestlings (Sedgwick 2004, With 2010).

Population Trends and Threats

The U.S. Geological Survey North American Breeding Bird Survey provides population trend data for McCown's longspur dating back to the mid-20th century. Estimates of recent trends from North American Breeding Bird Survey data have deficiencies and should be viewed with caution. Across North America, McCown's longspur numbers experienced a statistically significant annual decline of 5.9 percent from 1966 to 2015. In Wyoming, North American Breeding Bird Survey data for McCown's longspur are insufficient to show trends (Sauer et al. 2017).

Key threats to this species include changes to historic grazing regimes, prairie dog control and plague, insecticides, energy development and infrastructure, and climate change. Long-term, historic declines of McCown's longspur in North American are attributable to the fragmentation of native grasslands as a result of agricultural or infrastructural development and to the disruption of historical disturbance regimes (Sedgwick 2004). In areas where grass is too tall or thick for McCown's longspur, herbivory by ungulates or prairie dogs can improve habitat by providing shorter, sparser vegetation (Bock et al. 1993). Shortgrass and mixed grass prairies historically were subject to intensive short-duration grazing by native herbivores followed by periods of rest. Constant season-long grazing by cattle has changed plant and animal composition by favoring a relatively small proportion of plant species adapted to prolonged grazing, and cattle grazing rotations typically avoid grazing intensities that create shortgrass and bare ground vegetation structural conditions.

Species Status in the Plan Area

In general, McCown's longspur is rare relative to other grassland birds on the TBNG (Duchardt et al. 2019).

Distribution, Abundance and Population Trend in the Plan Area

The TBNG lies at the north end of the southernmost breeding center of McCown's longspur (With 2010). The Forest Service does not monitor McCown's longspur populations on TBNG. Annual survey data have been collected on parts of TBNG by the North American Breeding Bird Survey and the Bird Conservancy of the Rockies Integrated Monitoring in Bird Conservation Regions program. North American Breeding Bird Survey transects intersect TBNG but include large areas of adjacent non-Forest Service lands. Neither the North American Breeding Bird Survey nor the Bird Conservancy of the Rockies datasets contain enough McCown's longspur observation data specific to TBNG to show population trends. The citizen science birding database eBird contains additional records of sightings (https://eBird.org/; Sullivan et al. 2009). Existing observation records are distributed randomly across the grassland (Figure E-9).

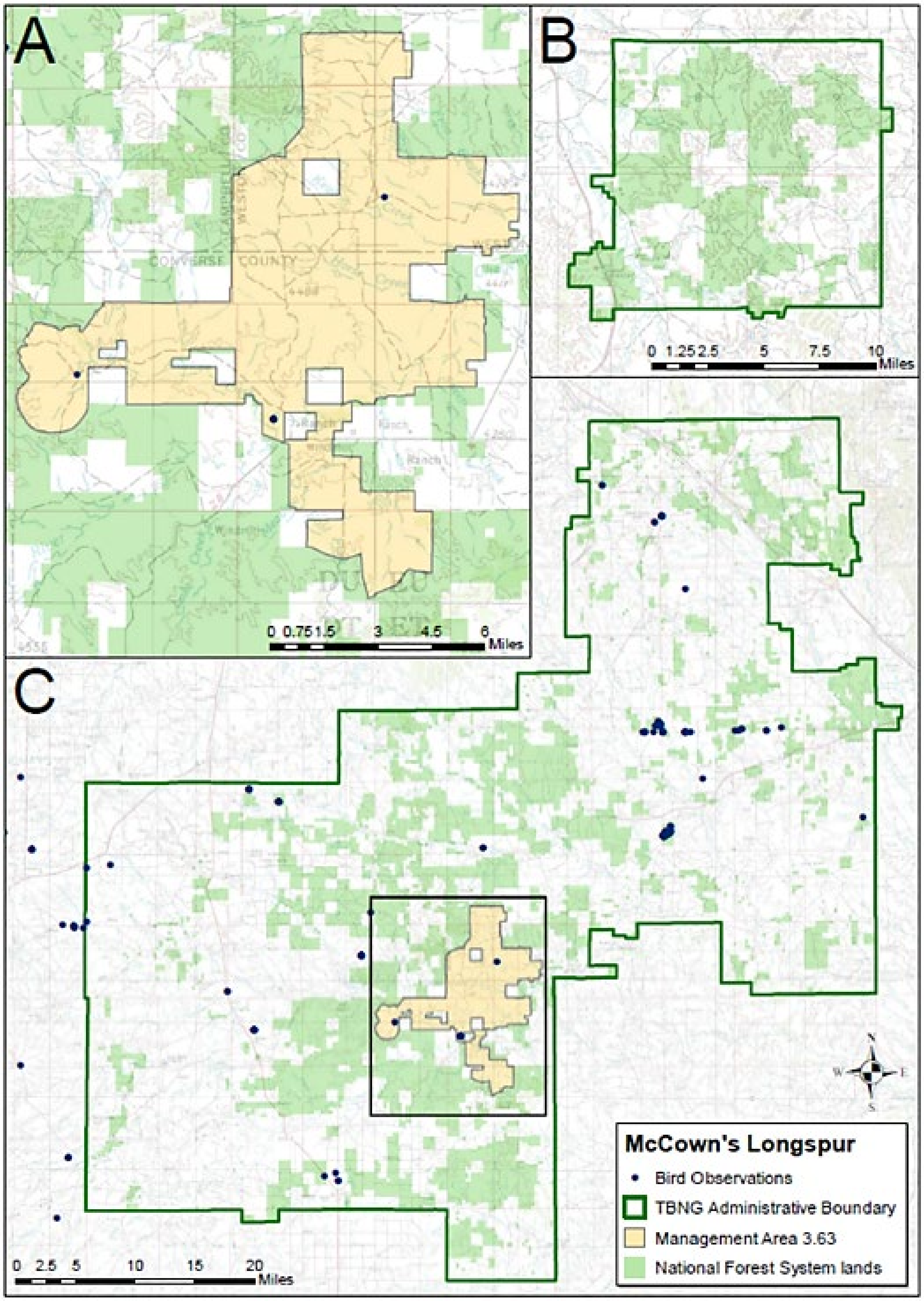

Figure E-9. McCown's longspur observations on the Thunder Basin National Grassland and nearby lands. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1978, 1980, 1981, 1987-1995, 2004, 2005, and 2007-2018. Observation data are from the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of the species on the Thunder Basin National Grassland. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Habitat Requirements and Characteristics in the Plan Area

Research from across the McCown's longspur range shows that the species inhabits shortgrass prairies or recently disturbed mixed-grass prairies (Sedgwick 2004). On TBNG, while shortgrass conditions exist in some locations, much of the landscape depends on disturbances such as herbivory to temporarily create such conditions. Current livestock grazing practices on TBNG do not create short-statured vegetation or bare ground conditions, and habitat requirements for nesting McCown's longspur exist primarily on prairie dog colonies. In a comparison of grassland bird abundance on and off prairie dog colonies at several sites in the northern Great Plains, including TBNG, Augustine and Baker (2013) observed McCown's longspur at higher densities on colonies. In that study, the researchers observed an average of 14.7 McCown's longspur per square mile at 32 prairie dog colonies on TBNG, and 1.3 McCown's longspur per square mile at 32 paired off-colony sites, though the low number of overall detections failed to produce a statistically significant relationship (Augustine and Baker 2013). McCown's longspurs are not abundant and apparently do not breed and nest in management area 3.63, where the largest prairie dog colonies have occurred historically on TBNG (USDA Forest Service 2015, Duchardt et al. 2019). McCown's longspurs likely regularly use large, flat shortgrass areas south of management area 3.63 and smaller active prairie dog colonies in flat uplands peripheral to the large colony complexes in Management Area 3.63 (Augustine, D., and Duchardt, C., personal communication).

Because grazing occurs across TBNG at moderate, stable levels, current black-tailed prairie dog colonies offer the most substantial tracts of nesting habitat for McCown's longspur. The extent of black-tailed prairie dog colonies on TBNG has varied widely since 2001, when the first landscape-scale sylvatic plague (*Yersinia pestis*) epizootic occurred on the TBNG. Prairie dog colonies on TBNG have undergone three large epizootics since 2001. The extent of prairie dog colonies has varied with both plague epizootics and lethal management activities.

Environmental Consequences

Direct Effects – Habitat Availability

Direct effects to McCown's longspur include impacts to habitat availability, including as a result of the acreage objectives for prairie dog colony extent, drought management, and impacts from sylvatic plague. Habitat availability for McCown's longspur is largely correlated to the availability of prairie dog colonies on the TBNG. Direct effects to McCown's longspur would include removal or degradation of habitat as a result of maintenance of a boundary management zone or any other prairie dog colony control activities. Habitat would be most available under the No Action alternative (33,000 acreage objective for prairie dog colony extent), followed by the Prairie Dog Emphasis Alternative (27,000 acreage objective for prairie dog colony extent), the Grassland-wide Alternative (10,000-15,000 acreage objective range for prairie dog colony extent, with a 10,000 acre drought objective), and then the Proposed Action and Preferred Alternative (10,000 acreage objective for prairie dog colony extent, with a 7,500 acre drought objective), proportional to acreage objectives described for each alternative.

Sylvatic plague epizootics would continue to occur during implementation of any alternative, with limited management intervention available, and would cause contraction of prairie dog colonies and complexes until prairie dog populations recover.

Direct effects on habitat availability may pose a risk to McCown's longspur by limiting available habitat; however, the acreage objectives in all alternatives are expected to allow for the species to maintain sufficient distribution.

Indirect Effects – Habitat Suitability

Indirect effects would include accidental poisoning from rodenticides and sylvatic plague management.

The continued use of rodenticides may impact McCown's longspur. The effects of lethal prairie dog control on the species have not been heavily studied, but impacts could include the reduction of nesting habitat or direct poisoning by rodenticides. All alternatives would allow the continued use of zinc phosphide for prairie dog control, and the action alternatives are likely to use zinc phosphide more frequently than the no action alternative because of the inclusion of boundary management zones that are intended to remain clear of prairie dogs. The Grassland-wide alternative would also allow for the use of anticoagulant rodenticides in the boundary management zone after three applications of zinc phosphide prove ineffective. Direct poisoning by anticoagulant rodenticides may occur because songbirds may eat poisoned grain baits when they have access to them (Apa et al. 1991, Vyas et al. 2013). The use of zinc phosphide, however, generally does not result in poisoning in songbirds because prairie dogs tend to consume more of the bait, making it less available to birds, and because the birds typically avoid the zinc phosphide baits (Apa et al. 1991). In addition, the Preferred Alternative, Proposed Action and Grassland-wide Alternatives allow for use of rodenticides for density control in colonies that contribute to the acreage objectives for conservation, thus increasing potential exposure of McCown's longspur. However, for all alternatives, seasonal restrictions on rodenticide use limit exposure of McCown's longspur to rodenticides to fall and winter months, and the presence of associated species must be considered prior to use of rodenticides outside of the boundary management zone.

Sylvatic plague appears to be the biggest indirect threat to prairie dogs and associated species. The 2017 plague event that occurred on Thunder Basin reduced active prairie dog colony acres from 75,000 acres to 1,100 over the course of one year. The unpredictable nature of plague and its mortality complicates efforts to manage for prairie dogs (Cully et al. 2006) and associated species as a result. Plague mitigation is proposed to continue under all alternatives and may impact chestnut-collared longspur. The primary plague prevention product is deltamethrin, which poisons plague-carrying fleas (Seery et al. 2003). Deltamethrin has been shown to be an effective tool in treating prairie dogs by reducing flea infestations up to 50-80% in some cases and minimizing the potential of plague (Maestas and Britten 2019, Roth 2019). In addition, fipronil has been shown to be around 94% effective in treating fleas on small mammals (Roth 2019). Both deltamethrin and fipronil appear to exhibit residual effects for 10-12 months on prairie dogs (Eads et al. 2019). Fipronil is considered toxic to birds and fish species, and as a result, there could be indirect impacts to McCown's longspur that forage in treatment areas (Gibbons et al. 2015). Deltamethrin is considered to be less toxic to birds, however, it can kill insects around areas of use. In addition, Martin et al. (1998, 2000) studied indirect effects of deltamethrin on the reproductive success of chestnut-collared longspur and did not find significant differences between sprayed and unsprayed sites in clutch size or nestling survival, but did find that egg viability was significantly reduced in sprayed plots. The reduction potential foraging opportunities and impacts to egg viability (as studied in a closely related species) may impact McCown's longspur where deltamethrin is used. As a result, plan components were developed to restrict the use of plague mitigation tools in prairie dog colonies where it may pose a risk to species associated with prairie dog habitat.

Recreational shooting of prairie dogs poses little to no risk to McCown's longspur. The species is very small and likely to flush easily with presence of humans and associated disturbance. Recreational shooting restrictions and prohibitions during the general breeding season could indirectly benefit McCown's longspur but would most likely be negligible.

Cumulative Effects to All Alternatives

In addition to proposed activities in each alternative, other actions contribute to potential impacts to the McCown's longspur. A summary of cumulative effects are provided below.

Insecticides – Other insecticide application, particularly for control of grasshoppers, could pose a threat to McCown's longspur via direct poisoning. The Forest Service has occasionally treated TBNG for grasshoppers, and the last treatment occurred in 2011. Several insecticides have been shown to have negative effects on the abundance of grassland bird populations (McEwen et al. 1972). Although long-term effects specific to McCown's longspurs have not been investigated, application of the insecticide toxaphene on the Pawnee National Grassland resulted in direct poisoning of nestling longspurs in the 1970's (McEwen and Ells 1975). This product was banned in the United States in 1990. At this time, the TBNG is not proposing control of grasshoppers.

Predation – Because McCown's longspur is a ground nesting bird, it is susceptible to predation. Predation on eggs and nestlings is the primary cause of reproductive failure for McCown's longspurs (Greer and Anderson 1989). Predation rates can vary from 30-75% of nests and are highest at the nestling stage (With 1994). Greer and Anderson (1989) and With (1994), studying predation in southeastern Wyoming and northcentral Colorado, found that thirteen-lined ground squirrels (*Ictidomys tridecemlineatus*) were the most common predator, but that larger mammals, raptors, and snakes also preyed on nests.

Natural gas well development – The relationships between McCown's longspur and different types of energy development have received minimal attention in the literature. Bogard and Davis (2014) found that McCown's longspur abundance declines in proximity to natural gas wells, but increases with increasing densities of gas wells in a given area.

Weather, climate, and climate change – Climate change may cause an increase in the occurrence of extreme weather events on TBNG (Conant et al. 2018). The impacts of climate change on McCown's longspur are highly uncertain, but will be crucial to monitor given the limited breeding population in the plan area. According to the National Audubon Society's climate model, McCown's longspur could face a complete loss of all summer range by 2080 (Langham et al. 2015). Changes in average annual precipitation levels on TBNG could impact the availability of habitat for McCown's longspur.

Plan Components

Plan components developed for other species will indirectly benefit McCown's longspur by reducing or eliminating potential impacts (see Table E-16). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-16. Plan components that support McCown's longspur habitat availability and suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat availability – Loss of breeding season habitat in prairie dog colonies because of decline in total area of prairie dog colonies	*Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 3.63, Standards and Guidelines, General, 1 (NA)*: Standard F.65b in Chapter 1 adopts the Black-tailed Prairie Dog Conservation Assessment and Management Strategy (Strategy), which contains the existing area targets for prairie dog colonies. Control of prairie dogs is generally not allowed under the Strategy if composite colony area is below targets. The Strategy also directs use of sylvatic plague management tools to prevent collapse of prairie dog colonies during plague epizootics and translocation to support regrowth of prairie dog colonies that have been impacted by plague. General standard 1 for MA 3.63 supports the composite colony area targets	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-ADM-GL-07 (PA)*: GPA-FW-ADM-GL-07 stipulates that habitat value for species associated with prairie dog colonies, such as McCown's longspur, will be considered prior to lethal control in prairie dog colonies outside of boundary management zones. *GPA-MA3.67-FWRP-ST-12 (PA)*: GPA-MA3.67-FWRP-ST-12 prohibits prairie dog density control in more than 50% of the area of an individual colony when composite colony area is smaller than the target.	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-ADM-GL-11 (GW)*: GPA-FW-ADM-GL-11 stipulates that habitat value for species associated with prairie dog colonies, such as McCown's longspur, will be considered prior to lethal control in prairie dog colonies outside of boundary management zones. *GPA-FW-FWRP-ST-06 (GW)*: GPA-FW-FWRP-ST-06 prohibits prairie dog density control in more than 50% of the area of an individual colony when composite colony area is smaller than the target.	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is prohibited when composite colony area does not sum to the targets. *GPA-FW-ADM-GL-07 (PDE)*: GPA-FW-ADM-GL-07 stipulates that habitat value for species associated with prairie dog colonies, such as McCown's longspur, will be considered prior to lethal control in prairie dog colonies outside of boundary management zones. *GPA-FW-FWRP-GL-03 (PDE)*: GPA-FW-FWRP-GL-03 directs the use of sylvatic plague control tools where practical and effective to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-12 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the objective. 7,500 acres of colonies is the minimum threshold for use of rodenticides in MA 3.67 outside of boundary management zones in all circumstances except density control. *Ch. 1, Standards and Guidelines, H.1 (Preferred)*: Standard H.1 in Chapter 1 provides for consideration of impacts to nesting, breeding, and denning habitat for associated species in prairie dog colonies outside of MA 3.67 before control of those colonies may occur. *GPA-MA3.67-FWRP-ST-15 (Preferred); GPA-MA3.67-FWRP-GL-16 (Preferred)*: GPA-MA3.67-FWRP-ST-15 stipulates that prairie dog density control is not allowed

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	contained in the Strategy by prohibiting activities that would inhibit increases in the prairie dog population in MA 3.63 until the colonies could support a sustainable black-footed ferret population. *Ch. 1, Standards and Guidelines, F.23 (N/A); Ch. 1, Standards and Guidelines, F.34 (NA); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (NA); Ch. 2, Broken Hills GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (NA); Ch. 2, Cellers Rosecrans GA, Desired Conditions (NA); Ch. 2, Cellers Rosecrans GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (NA); Ch. 3, MA 3.63, Desired Conditions (NA); GRSG-FM-ST-048*: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a	*GPA-FW-FWRP-GL-02 (PA)*: GPA-FW-FWRP-GL-02 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics. *Ch. 1, Standards and Guidelines, F.34 (PA); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (PA); Ch. 2, Cellers Rosecrans GA, Desired Conditions (PA); Ch. 3, MA 3.67, Desired Conditions (PA); GRSG-FM-ST-048*: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a mosaic of other vegetation types. These components allow for use of prescribed fire targeted livestock grazing, and other vegetation management tools to achieve vegetation goals.	*GPA-FW-FWRP-GL-04 (GW)*: GPA-FW-FWRP-GL-04 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics. *Ch. 1, Standards and Guidelines, F.34 (GW); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (GW); Ch. 2, Cellers Rosecrans GA, Desired Conditions (GW); Ch. 3, MA 3.67, Desired Conditions (GW); GRSG-FM-ST-048*: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a mosaic of other vegetation types. These components allow for use of prescribed fire targeted livestock grazing, and other vegetation management tools to achieve vegetation goals.	*Ch. 1, Standards and Guidelines, F.23 (PDE); Ch. 1, Standards and Guidelines, F.34 (PDE); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (PDE); Ch. 2, Broken Hills GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (PDE); Ch. 2, Cellers Rosecrans GA, Desired Conditions (PDE); Ch. 2, Cellers Rosecrans GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (PDE); Ch. 3, MA 3.67, Desired Conditions (PDE); GRSG-FM-ST-048*: These plan components as a whole provide for the maintenance of healthy shortgrass or short-stature vegetation ecosystems on the Grassland among a mosaic of other vegetation types. These components stipulate target acreages of short-stature vegetation ecosystems and the use of prescribed fire and targeted livestock grazing to achieve vegetation goals.	in MA 3.67 when composite colony area is less than 7,500, unless the best available scientific information indicates that density control will achieve site-specific objectives and maintain habitat requirements for associated species. GPA-MA3.67-FWRP-GL-16 indicates that density control in MA 3.67 should not occur in more than 50 percent of the area of any individual colony and should not occur more than every other year. *GPA-FW-FWRP-GL-02 (Preferred); GPA-MA3.67-FWRP-O-08 (Preferred); GPA-MA3.67-FWRP-ST-18 (Preferred)*: GPA-FW-FWRP-GL-02 allows the use of plague mitigation tools in prairie dog colonies anywhere in the plan area. GPA-MA3.67-FWRP-ST-18 mandates that an integrated approach to plague management will be used in MA 3.67 annually. GPA-MA3.67-FWRP-O-08 states that the Forest Service intends to develop a plague management plan within 3 years of plan amendment approval. *Ch. 1, Standards and Guidelines, F.34 (Preferred); Ch. 1, Standards and Guidelines, F.70; Ch. 1, Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (Preferred); Ch. 2, Cellers Rosecrans GA, Desired Conditions (Preferred); Ch. 3, MA 3.67, Desired Conditions (Preferred); GRSG-FM-ST-048*: These plan components as a whole provide for the maintenance of

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	mosaic of other vegetation types. These components stipulate target acreages of short-stature vegetation ecosystems and the use of prescribed fire and targeted livestock grazing to achieve vegetation goals.				healthy shortgrass or short-stature vegetation ecosystems on the grassland among a mosaic of other vegetation types. These components allow for use of prescribed fire targeted livestock grazing, and other vegetation management tools to achieve vegetation goals.
Habitat suitability – Non-target poisoning of individuals via consumption of grain-bait rodenticides in prairie dog colonies	*Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of grain-bait rodenticides in prairie dog colonies from January 1 to September 30 to protect migratory birds from consumption of poisoned baits.	*Ch. 1, Standards and Guidelines, H.2 (PA)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*Ch. 1, Standards and Guidelines, H.2 (GW)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*Ch. 1, Standards and Guidelines, H.2 (PDE)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*Ch. 1, Standards and Guidelines, H.2 (Preferred)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.
Habitat suitability – Possible impacts because of decline in insect prey base after use of deltamethrin in prairie dog colonies	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to McCown's longspurs.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to McCown's longspurs.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to McCown's longspurs.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to McCown's longspurs.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to McCown's longspurs.

Determination of Effects

With all proposed activities combined, along with resource protection measures and plan components, all alternatives have an effects determination of, "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 TBNG and throughout its range. In addition, existing grassland plan components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for McCown's longspur habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species' habitat on the TBNG.

The rationale for effects determinations for all alternatives is based on the availability of McCown's longspur habitat on TBNG, along with sufficient distribution of habitat within the species' range. Although detections for McCown's longspur are relatively low on TBNG, habitat is present and distributed through the plan area. Primary impacts of the alternatives include those activities that would decrease available habitat and cause secondary poisoning to individuals.

Rationale to support the effects determinations for all alternatives includes:

- McCown's longspur may depend on size, distribution, and extent of prairie dog colonies for nesting and breeding habitat. It may also breed in naturally shorter vegetation at the southern extent of TBNG. Overall, McCown's longspur is somewhat uncommon on TBNG. It is distributed across the plan area, but with few observations in management area 3.67/3.63. Outside of boundary management zones, presence of associated species will be considered before use of rodenticides to control prairie dogs. Acreage objectives for prairie dog colony extent are expected to provide breeding habitat conditions sufficient to support a population, despite distribution concentrating in 3.63/3.67.
- There has been a low number of McCown's longspur historically and sparsely distributed across TBNG, but the population has persisted despite the concentration of prairie dogs in management area 3.63 and plague epizootics. The population has not been observed to track fluctuations in prairie dog total colony extent on TBNG (i.e., during epizootics).
- McCown's longspur could consume rodenticides and experience non-target poisoning. Seasonal restrictions on rodenticide use will reduce exposure, but there is a potential for very late departures to occupy colonies during lethal control activities.
- Recreational shooting poses little to no risk. McCown's longspur is very small and likely to flush with the presence of humans or gunshots.

Overall, potential direct and indirect effects for all alternatives, when combined with the cumulative effects generated by other activities listed above, would not result in a decrease in viability for this species.

Mountain Plover (*Charadrius montanus*)

Introduction

Mountain plover is a small shorebird that breeds in shortgrass prairie in the western Great Plains. Mountain plover nests at low densities and depends on extremely short vegetation and bare ground conditions, usually created by grassland disturbances such as fire or grazing by native ungulates or burrowing mammals (Augustine 2011, Ellison Manning and White 2001). Because of their reliance on disturbed grassland, mountain plover have faced range-wide population declines with the conversion of native grasslands to cropland and rangeland, which has resulted in the interruption of historically common disturbances (Knowles and Knowles 2019). In addition, as a result of widespread fire suppression and the elimination of nomadic native ungulate grazing, the availability of mountain plover nesting habitat has become strongly tied to the area of active prairie dog colonies across the landscape (Augustine 2011). Active prairie dog colonies create and maintain the shortgrass and bare ground conditions preferred by mountain plover. Widespread disease and human efforts to control prairie dog colonies have reduced available nesting habitat and likely contribute to reduced mountain plover populations across its breeding range. While livestock grazing can be compatible with mountain plover nesting habitat and can maintain short-stature vegetation for short periods of time, contemporary livestock grazing practices without the additional disturbance of fire do not adequately create suitable nesting habitat on a long-term scale.

Despite the existing concern for mountain plover because of observed population declines and known threats to the species' persistence, mountain plover is not in immediate danger of extinction or becoming endangered. In 2011, the U.S. Fish and Wildlife Service withdrew a proposed rule to list mountain plover as threatened, citing evidence that mountain plover is somewhat more adaptable to existing threats and somewhat more abundant than previously believed. In addition, the U.S. Fish and Wildlife Service noted that prairie dog colonies appear to be resilient to extirpation by disease or anthropogenic control efforts. The U.S. Fish and Wildlife Service indicated that mountain plover did not warrant listing as endangered or threatened at the time of the decision.

Range-wide Information, Distribution and Abundance

The mountain plover is a North American endemic that breeds in the western Great Plains and winters in dry grasslands and deserts of northern Mexico and California (Knopf and Wunder 2006). In the United States, the species' breeding range extends from northern Montana to central New Mexico, and it winters in northern Mexico and the southwest U.S. states of California, Arizona, New Mexico, and Texas.

In 2011, the U.S. Fish and Wildlife Service estimated the range-wide breeding population of mountain plover to be over 20,000 birds, based on a synthesis of population estimates from the literature. The U.S. Fish and Wildlife Service qualified its estimate with the acknowledgement that all existing estimates are imprecise (76 FR 27761-27762).

Life History and Habitat

Mountain plover is a shortgrass-structural obligate and is found in short, sparse vegetation throughout its breeding range, with a preference for areas that feature generally greater than 25 percent bare ground (Olson and Edge 1985, Knopf and Miller 1994, Manning and White 2001, Dinsmore 2003, Knopf and Wunder 2006, Augustine and Derner 2015, Uresk 2017). These site conditions provide clear lines of sight to approaching threats. Across its breeding range, bare ground and short-stature vegetation characteristics suitable for breeding and nesting typically occur after disturbances, including fire (Augustine and Derner

2015, Shaffer et al. 2019), ungulate grazing (Uresk 2017), prairie dog colonies (Dinsmore et al. 2005, Augustine and Derner 2015, Goguen 2012, Duchardt et al. 2018), and recently plowed and tilled land for row-crop agriculture (Shackford et al. 1999, Woolley 2016). This species is less associated with disturbance in more arid, high-elevation sites (Wunder et al. 2003, Pierce 2017). Mountain plover nests consist of scrapes in the ground lined with nearby materials (Olson and Edge 1985). Mountain plovers may select habitat near certain types of forbs or shrubs, either for food resources, cover from predators, or thermoregulation (Graul 1975, Shackford 1996, Schneider et al. 2006). Pairs tend to nest at lower densities and require larger territories than other grassland birds, though they are not sensitive to habitat fragmentation by linear features such as roads (Mettenbrink et al. 2006, Tipton et al. 2009). Mountain plovers occur at densities of 3 to greater than 20 birds per square mile in suitable breeding and nesting habitat and establish territories of 40 to 70 acres (Olson and Edge 1987, Wunder et al. 2003, Knopf and Wunder 2006, Tipton et al. 2009, Augustine and Baker 2013). The species is an insectivorous ground-forager (Knopf and Wunder 2006). Young are precocial, but they are susceptible to overheating in the summer and may require vegetative cover for thermoregulation in some parts of the species' range (Shackford 1996, Knopf and Wunder 2006).

Mountain plover and grassland disturbances

In the Great Plains of northeastern Colorado, eastern Wyoming, and eastern Montana, mountain plover breed in areas subject to disturbances that create short-statured vegetation and bare ground. Studies have shown that the primary disturbances that can create suitable vegetation characteristics include active prairie dog colonies and recent fire. While mountain plovers have been observed using areas subject to high intensity livestock grazing, such grazing is not tantamount to prairie dog colonization or recent fire in its provision of suitable mountain plover habitat. Cultivation for row-crop agriculture is another disturbance that can create suitable nesting habitat, but the practice is not prevalent in the more northern portion of the species' breeding range.

Several studies conducted in Colorado, Wyoming, and Montana have demonstrated the importance of black-tailed prairie dog colonies as mountain plover breeding habitat (Olson and Edge 1987, Dinsmore et al. 2005, Dreitz 2009, Augustine and Derner 2015, Augustine and Baker 2013, Augustine and Skagen 2014, Duchardt et al. 2018). Nest sites within prairie dog colonies generally have shorter vegetation, more bare ground, and higher forb density relative to areas within colonies without nests (Olson 1984, Olson and Edge 1985, Dechant et al. 2002). Dreitz (2009) found that in shortgrass steppe, mountain plovers nesting on prairie dog colonies had three-fold greater brood rearing success compared to mountain plovers nesting on grassland without prairie dogs. In addition, mountain plover occur at far higher densities on prairie dog colonies than surrounding prairie (Childers and Dinsmore 2008, Tipton et al. 2009, Augustine and Baker 2013). Recent studies show that in certain parts of their range mountain plovers rely almost exclusively on black-tailed prairie dog habitat for nesting (Duchardt et al. 2020)

Within colonies, mountain plover densities vary with colony size, reaching peak densities in mid-sized to moderately large colonies of approximately 250 to 800 acres, while larger and smaller colonies carry somewhat reduced densities (Dinsmore et al. 2005, Augustine et al. 2008, Goguen 2012, Augustine and Skagen 2014, Duchardt et al. 2019; but see Olson and Edge 1987). Extremely large colonies may result in a loss of appropriate habitat toward the central portions of the colonies, where bare ground conditions or insect prey abundance may no longer be suitable for mountain plovers (Duchardt et al. 2019). Augustine and Derner (2015) showed that, within prairie dog colonies, vegetation surrounding mountain plover nests and foraging locations was characterized by a mosaic of short-statured vegetation and bare soil. Multiple additional studies compared mountain plover use of prairie dog colonies against areas that had experienced recent fire (Augustine and Derner 2015, Augustine and Skagen 2014). Augustine and Skagen (2014) found that fall and late-winter prescribed burns and black-tailed prairie dog colonies hosted similar densities of mountain plover on the Pawnee National Grassland, and that plover densities declined at similar rates over time since a burn and time since an epizootic sylvatic plague outbreak (caused by the bacterium *Yersinia pestis*) in a prairie dog colony. Augustine and Skagen (2014) also measured nest survival rates, and found that mountain plover had greater nesting success on prairie dog colonies than in recent burns, possibly because the effects of prairie dog colonies on vegetation structure are more stable over time than the effects of fires.

Some studies have shown that livestock grazing can be compatible with mountain plover breeding and nesting habitat, particularly if it occurs within active prairie dog towns. For example, Knowles et al. (1982) found that mountain plover in Montana used active prairie dog towns that were also grazed by cattle. Uresk (2017) studied habitat use in shortgrass prairie on the Pawnee National Grassland in Colorado in 1999 and 2000 and found that vegetation intensely grazed to approximately a one inch or less visual obstruction rating (Robel et al. 1970) provided areas that mountain plovers selected for nesting. Such high intensity grazing necessary to create this habitat resulted in unwanted longer-term vegetative changes towards sod forming grasses. While these studies provide evidence showing that plover will nest in areas subject to specific types of high intensity livestock grazing, under currently-practiced, moderate livestock grazing regimes, mountain plovers are far more often found in areas subject to regular fire or the presence of relatively large black-tailed prairie dog colonies. Bare ground and very short vegetation conditions are rare in moderately grazed grassland without prairie dogs, and even areas grazed at very high intensity by cattle create conditions less suitable than prairie dog colony occupation or recent fire (Augustine and Derner 2015). Interruptions to historical patterns of fire and prairie dog colonies on the landscape in the second half of the 20th century may have caused mountain plover to select grazed areas as their preferred nesting sites, indicating some adaptiveness to changing environmental conditions. The restoration of frequent burning and large black-tailed prairie dog colonies on the shortgrass steppe over the past few decades may have allowed mountain plover to begin to return to its historically preferred selection of burned areas and prairie dog colonies for nesting and breeding (Augustine and Derner 2015).

Population Trends and Threats

Mountain plover range-wide population numbers decreased substantially during the second half of the 20th century, and declines have continued since 2000 (Butcher and Niven 2007, Andres 2009). The U.S. Geological Survey North American Breeding Bird Survey is an annual avian survey conducted across the United States and Canada to determine long-term and ongoing trends in bird populations. North American Breeding Bird Survey data for mountain plover are generally of low power due to low detection rates during the surveys, but the surveys may indicate trends. Although not all estimates are significant, the North American Breeding Bird Survey shows falling mountain plover populations at all scales of analysis. Range-wide, North American Breeding Bird Survey data indicate that mountain plover experienced a statistically significant annual population decrease of 3.41 percent from 1966 to 2015 and a non-significant annual decrease of 2.88 percent from 2005 to 2015. North American Breeding Bird Survey data for Wyoming show declining, but non-significant trends (Sauer et al. 2017).

Key threats to this species include prairie dog control and plague, fire suppression, grazing, recreational shooting, energy development and infrastructure and climate change. Range-wide population declines have resulted from losses of suitable habitat in both the breeding range and wintering range. The Central Valley in California served as primary wintering habitat for much of the global mountain plover population, but conversion to row-crop agriculture decreased much of the available habitat, and mountain plovers moved elsewhere to winter. In the breeding and wintering ranges, mountain plover has faced interruptions to historical grassland disturbance regimes that create shortgrass and bare ground conditions. Suppression of wildland fire has resulted in the loss of mosaic vegetation structural patterns on the landscape that benefit mountain plover (Augustine and Skagen 2014). The loss of native herbivores including prairie dogs and bison (*Bison bison*) has homogenized vegetation structure across the mountain plover breeding range, typically resulting in a loss of intensely grazed patches of grassland (Knopf and Miller 1994). Mountain plover populations declined following the extirpation of bison, and remaining mountain plover populations are now often dependent on active prairie dog colonies for suitable breeding and nesting habitat (Dinsmore 2003). Continued threats to mountain plover stem from threats to prairie dogs, including invasive disease and shooting (intentional and accidental) by humans. Black-tailed prairie dogs are very sensitive to sylvatic plague, where mortality is often nearly 100 percent across colonies and events can impact species that depend on prairie dog habitat, like the mountain plover (Dinsmore and Smith 2010). Plague exists throughout the range of the black-tailed prairie dog, which overlaps the mountain plover breeding range to a large degree (Cully et al. 2010).

Prairie dogs are also subject to large-scale anthropogenic control because they are viewed as an agricultural pest, especially on rangeland where they may decrease the total availability of forage for livestock when climatic conditions are limiting to biomass production, such as during drought.

Current international protections exist for the species because of observed declines in populations and the availability of suitable habitat. In Canada, where mountain plover populations are very small, the species was listed as endangered under the Species at Risk Act in 2000. The Species at Risk Act affords protection from harm for individuals of any listed species in Canada. In Mexico, where many mountain plovers over-winter, the species is listed and protected as a threatened species under Federal law.

In the United States, which hosts a large majority of mountain plover breeding and wintering habitat, the U.S. Fish and Wildlife Service proposed to list the mountain plover as threatened under the Endangered Species Act in 1999 because of observed population declines and the apparent immediacy of threats including conversion of native prairie to cropland, uniform livestock grazing practices across the Great Plains, the loss of native herbivores, and the loss of native vegetative communities to cropland on wintering grounds in the Central Valley in California (64 FR 7587-7601). These threats amount to interruptions of historical grazing and fire regimes that maintained a mosaic of vegetation structure across the landscape. In 2003, the U.S. Fish and Wildlife Service withdrew the proposal because new information showed that mountain plover was more adaptable to threats than originally thought (68 FR 53083-53101). In particular, new research showed that mountain plover was able to nest in cropland and that the overall rate of conversion of native prairie to cropland constituted a small portion of the overall mountain plover breeding range (Shackford et al. 1999, 68 FR 53094). A legal challenge in 2006 caused the U.S. Fish and Wildlife Service to reinstate the proposed rule to list mountain plover in 2010 (75 FR 37353-37358), but the U.S. Fish and Wildlife Service once again withdrew the proposal in 2011, ultimately reiterating the finding that the species was somewhat adaptable to apparent threats, more widespread and abundant than originally thought, and not in immediate danger of extinction or becoming endangered in all or substantial portions of its range (76 FR 27756-27799). The U.S. Fish and Wildlife Service estimated the mountain plover breeding population to be over 20,000 birds in 2011 (76 FR 27762), and the potential for genetic drift because of habitat isolation and breeding site fidelity was shown to be negligible (Oyler-Mccance et al. 2008). The U.S. Fish and Wildlife Service decision was additionally based on an understanding of the high resilience of black-tailed prairie dog to extirpation by disease and anthropogenic control (76 FR 27776-27779).

Species Status in the Plan Area

Research specific to TBNG regarding mountain plover habitat and occurrence comes from an older set of studies associated with the Antelope Coal Mine (Parrish 1988, Oelklaus 1989, Parrish et al. 1993), and an ongoing study by the Thunder Basin Research Initiative, which is a research partnership between the University of Wyoming, the Thunder Basin Grasslands Prairie Ecosystem Association, the U.S. Department of Agriculture Agricultural Research Service, and the Forest Service (Duchardt et al. 2018, Duchardt et al. 2019). Parker et al. (2019) examined potential trophic drivers of mountain plover populations using Forest Service abundance data from the TBNG. In addition, some studies have included sites on the TBNG as part of broader-scale research about mountain plover habitat (e.g., Plumb et al. 2005, Augustine and Baker 2013).

Distribution, Abundance and Population Trend in the Plan Area

Mountain plover occupy the TBNG between April and early August and use the area primarily as summer breeding habitat. Individual birds breeding farther north may also use the TBNG as migratory habitat (Knopf and Wunder 2006). Documented nesting occurrences on the TBNG date back to at least the late 1970s (Oelklaus 1989). The Forest Service has surveyed portions of the TBNG for mountain plover presence since 1982; however, surveyed locations are not consistent from year to year, and total surveyed acreage is not consistent from year to year, with many years between 1982 and 2018 having had no surveys. The maximum number of mountain plover bird observations in any one year in Forest Service surveys was 297, in 2017. The maximum number of nests observed in any one year was 66, in 2016. Other observation records exist in the Forest Service's Enterprise Data Warehouse, the Forest Service's local survey dataset, the Wyoming Natural Diversity Database, and the citizen science birding database, eBird (https://eBird.org/; Sullivan et al. 2009). The majority of these observations are concentrated in the area designated Management Area 3.63 under the current grassland plan (USDA Forest Service 2002). Management Area 3.63 is currently managed to create habitat that would allow for the eventual reintroduction of the federally listed black-footed ferret (*Mustela nigripes*), an endangered, prairie dog colony-obligate predator (USDA Forest Service 2015). The high numbers of mountain plover individuals and nests observed in 2016 and 2017 correlate to highs in active prairie dog colony area on TBNG and especially in Management Area 3.63. A second, set of clustered observations occurs to the west of Management Area 3.63 and is not necessarily correlated to the occurrence of prairie dog colonies (Figure E-10 and Table E-11); these observations are the results of regular, long-term wildlife monitoring associated with surface coal mines on TBNG (Parrish 1988, Oelklaus 1989, Parrish et al. 1993). Mountain plover densities in these coal mine surveys were lower than recorded densities on prairie dog colonies in Management Area 3.63 (Parrish et al. 1993, Duchardt et al. 2019).

Studies conducted on TBNG have shown that mountain plovers are reliant on active prairie dog colonies. Mountain plovers nest at low densities and thus require areas of active prairie dog colonies to support multiple breeding pairs. Recent observed mountain plover densities on active prairie dog colonies ranged from 1.5 birds per 100 acres where colonies were smaller than 250 acres, up to 2.4 birds per 100 acres where prairie dog colonies were between 250 and 1,250 acres in size (Duchardt et al. 2020). These colonies tend to host mountain plover at their highest observed densities, while colonies larger than this generally support lower mountain plover densities because of declines in habitat suitability in the central portions of large colonies. Areas outside of prairie dog colonies on TBNG host few to no mountain plovers, especially in the absence of recent fire (Figure E-10).

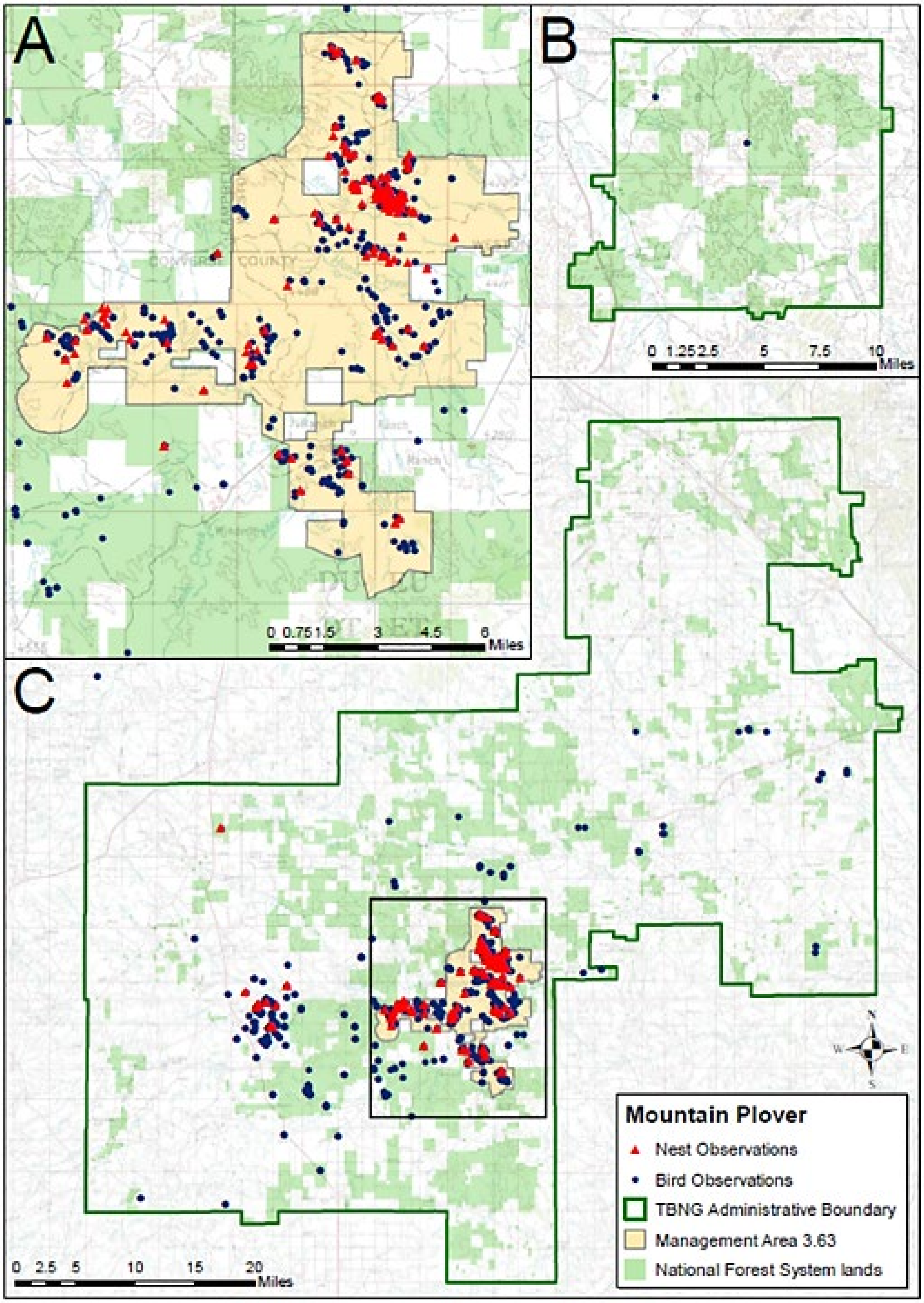

Figure E-10. Mountain plover bird and nest observations on the Thunder Basin National Grassland and vicinity. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1977, 1982, 1984-1986, 1988-2003, and 2005-2018. Observation data are from the local survey dataset maintained by the Douglas Ranger District, the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of mountain plover on the Thunder Basin National Grassland. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

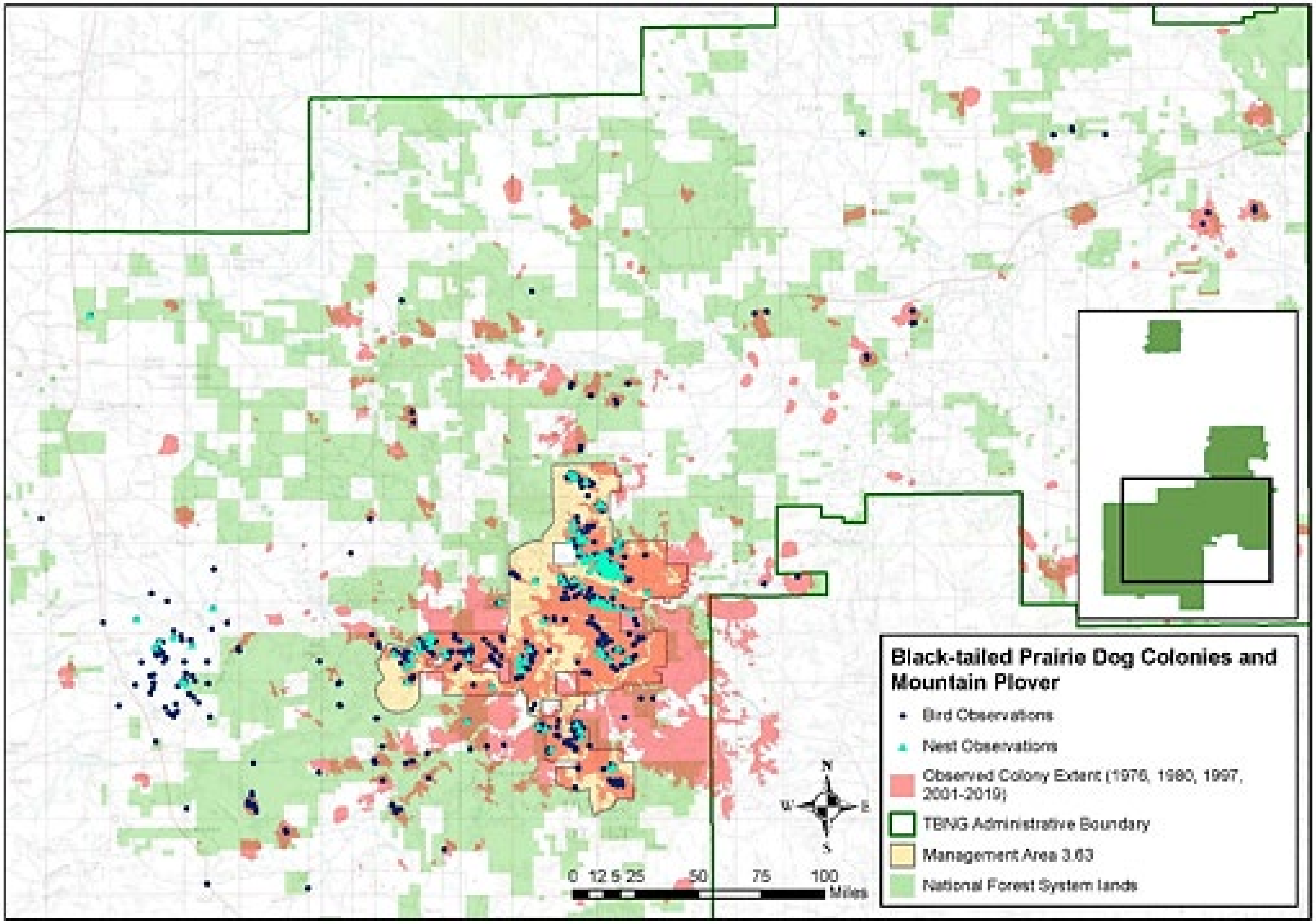

Figure E-11. Black-tailed prairie dog colony historical extent and mountain plover observations on the Thunder Basin National Grassland and nearby lands. Red polygons represent the total extent of all observed active black-tailed prairie dog colonies in 1976, 1997, and 2001-2019. Blue dots and turquoise triangles represent observations of mountain plover individuals and nests. Mountain plover observations shown on the map were collected in 1977, 1982, 1984-1986, 1988-2003, and 2005-2018. Mountain plover observation data are from the local survey dataset maintained by the Douglas Ranger District, the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of either species on the Thunder Basin National Grassland. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Habitat Requirements and Characteristics in the Plan Area

Mountain plover have been observed across the grassland, but they tend to cluster in Management Area 3.63 in the central portion of the grassland. Mountain plovers may select habitat near certain types of forbs or shrubs, either for food resources, cover from predators, or thermoregulation (Graul 1975, Shackford 1996, Schneider et al. 2006). Pairs tend to nest at lower densities and require larger territories than other grassland birds, though they are not sensitive to habitat fragmentation by linear features such as roads (Mettenbrink et al. 2006, Tipton et al. 2009). Mountain plovers occur at densities on the order of three to greater than 20 birds per square mile in suitable breeding and nesting habitat and establish territories on the order of 40 to 70 acres (Olson and Edge 1987, Wunder et al. 2003, Knopf and Wunder 2006, Tipton et al. 2009, Augustine and Baker 2013).

On the TBNG, mountain plover tend to select to breed and nest on black-tailed prairie dog colonies. Although mountain plover occur outside of prairie dog colonies (Parrish et al. 1993), recent studies have found that mountain plover occur at much higher densities on prairie dog colonies than off of prairie dog colonies. Augustine and Baker (2013) and Duchardt et al. (2018) studied habitat associations among several bird species on the TBNG in two different sets of avian surveys since the mid-1990s and found that mountain plover exclusively nest in prairie dog habitat. When available, it is likely that mountain plover also occur in burned areas during the year after a wildland or prescribed fire, though nest survival rates may be somewhat lower in burned areas than in prairie dog colonies (Augustine and Skagen 2014). Species model outputs from Duchardt et al. (2018) indicate that mountain plover abundance on the TBNG is related to bare ground, clayey soils, gentle topography, and low visual barriers, all of which occur to a greater degree and more consistently in prairie dog colonies than in other areas (Duchardt et al. 2018). Wildland and prescribed fire are currently suppressed and rare on TBNG and less likely to occur than prairie dog colonies in areas with suitable topography for mountain plover habitat. From 2009 to 2015, the Forest Service conducted prescribed burns in some areas to enhance mountain plover habitat; however, the Forest Service does not have prescribed fires planned for this purpose at this time. Prairie dog colonies also provide more continuous habitat than burns because they maintain short vegetation height over longer periods of time in a single location. An extensive review of ecological sites on the TBNG by Haufler et al. (2008) predicted that prairie dog colonies and mountain plover could occur on clayey, loamy, and saline upland ecological sites, which in total constitute approximately half of the surface area of TBNG. Most historically observed, large-scale prairie dog activity, however, has tended to occur in management area 3.63, where conditions are ideal for colonization.

According to recent avian surveys, mountain plover densities on TBNG vary depending on the quality of habitat and size of active prairie dog colonies. Data from the Thunder Basin Research Initiative showed that mountain plover densities within prairie dog colonies vary with distance from the colony edge, with low densities very near and very far from colony edges and peak densities at moderate distances from the colony edge (Duchardt et al. 2019). The largest prairie dog colonies that existed on TBNG in 2015, 2016, and 2017, reaching over 10,000 acres, hosted fewer mountain plover at distances greater than approximately 900 yards from the colony edge than at areas adjacent to the edge (Duchardt et al. 2018, Duchardt et al. 2019). Mountain plover occurred at the greatest densities approximately 550 yards from the colony edge (Duchardt et al. 2019). Regarding colony size, mountain plover occurred at their highest density of approximately 2.4 birds per 100 acres on colonies between approximately 250 and 1,250 acres in size. Density on the largest colonies of 6,000 to 10,300 acres, was approximately 0.8 birds per 100 acres, and density on the smallest colonies, of less than 250 acres, was 1.5 birds per 100 acres (Duchardt et al. 2020). These findings of peak densities in moderately large colonies match findings of the strong link between colony size and mountain plover abundance in other parts of the range (e.g., Dinsmore et al. 2005, Augustine et al. 2008, Goguen 2012, Augustine and Skagen 2014). On TBNG, the average bird density across all colonies was 1.2 birds per 100 acres (Duchardt et al. 2020). In comparable TBNG avian surveys conducted in 1996, Augustine and Baker (2013) found a somewhat lower density of 0.5 birds per

100 acres, though overall prairie dog acreage on TBNG was likely far lower in 1996 than in 2015, 2016, and 2017. Observed densities on active prairie dog colonies in other parts of the mountain plover breeding range are comparable to the TBNG (Tipton et al. 2009, Augustine and Baker 2013) or somewhat higher (Olson and Edge 1987, Childers and Dinsmore 2008, Augustine and Skagen 2014).

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 to 50 observations in 2016 and 2017, but decreased to only 3 birds in 2018 (Duchardt, C., 2018). 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).

Since the first landscape-scale plague epizootic in 2001, prairie dog colonies on the TBNG have experienced very large swings in extent. Though it is difficult to predict the magnitude of maximum and minimum colony extent on the TBNG, the plague cycle might be expected to regularly continue. In the absence of plague or management intervention, prairie dog colonies naturally fluctuate in size. Prairie dog colonies tend to expand under population pressure, and they expand especially rapidly during drought, when vegetation for forage is sparse (Cincotta et al. 1987, Derner et al. 2006, Archuleta 2014).

The current grassland plan emphasizes the growth of prairie dog colonies in Management Area 3.63. The plan directs the use of lethal control only in select situations when the expansion of prairie dog colonies threatens human health and safety and non-lethal control is ineffective (USDA Forest Service 2015). Any change in management direction for prairie dog colonies will likely alter the distribution and amount of habitat for mountain plover on the TBNG.

Wildland fire will also continue to occur on the landscape at low levels. The Forest Service engages all wildland fire starts on the TBNG with initial attack suppression due to the proximity of State and private lands to all areas of the TBNG, but it is likely that a few thousand acres will continue to burn annually despite suppression efforts. The proportion of burning that occurs in topography and vegetation types suitable for mountain plover habitat is unknown. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events, which will have uncertain effects on fire regimes in the region (Conant et al. 2018).

Environmental Consequences

Direct Effects – Habitat Availability

Prairie dogs are linked with mountain plover abundance throughout much of their range and reductions in the total area of prairie dog colonies would constitute direct reductions of the most successful mountain plover breeding and nesting habitat (Dinsmore et al. 2005, Augustine and Baker 2013, Duchardt et al. 2018). In the absence of prairie dog colonies, vegetative conditions are not typically suitable on the TBNG for mountain plover breeding and nesting habitat.

Habitat availability would be impacted by each of the alternatives as a result of the acreage objectives for prairie dog colony extent, drought management, and impacts from sylvatic plague. These activities and events reduce the potential available habitat mountain plover use for nesting and could decrease available patch size, contiguity, structure and quality. Habitat would be most available under the No Action alternative (33,000 acre acreage objective for prairie dog colony extent), followed by the Prairie Dog Emphasis Alternative (27,000 acreage objective for prairie dog colony extent), the Grassland-wide

Alternative (10,000-15,000 acreage objective range for prairie dog colony extent, with a 10,000 acre drought objective), and lastly, the Preferred Alternative and Proposed Action (10,000 acreage objective for prairie dog colony extent, with a 7,500 acre drought objective), proportional to acreage objectives described for each alternative.

Sylvatic plague epizootics would continue to occur during implementation of any alternative, with limited management intervention available, and would cause contraction of prairie dog colonies and complexes until prairie dog populations recover.

Because mountain plover rely largely on black-tailed prairie dogs to provide nesting and foraging habitat, any reduction in available habitat may impact individuals or clusters of mountain plover, however, the acreage objectives in all alternatives are expected to allow for the species to maintain sufficient distribution.

Indirect Effects – Habitat Suitability

Indirect effects would include accidental poisoning from rodenticides, potentential mortality from recreational shooting, and effects of density control and sylvatic plague management.

Habitat suitability would be impacted by components of this alternative. Where recreational shooting is allowed, individuals may be shot and such activities pose a risk to the species. In addition, occurrences of sylvatic plague can also impact habitat suitability if prairie dogs do not recolonize the area.

The continued use of rodenticides may impact mountain plover. The continued use of rodenticides and recreational shooting of prairie dogs may impact mountain plover. Mountain plover can be susceptible to direct or secondary poisoning by rodenticides, either by inadvertently ingesting the grain baits while foraging near poisoned prairie dogs (Butts 1973). All alternatives would allow the continued use of zinc phosphide for prairie dog control, and the action alternatives are likely to use zinc phosphide more frequently than the no action alternative because of the inclusion of boundary management zones that are intended to remain clear of prairie dogs. Zinc phosphide poses a lower secondary poisoning risk to scavengers than other rodenticides because residues are not retained at consequential levels in carcasses (Bell and Dimmick 1975, Marsh 1987, Matschke et al. 1992). The Grassland-wide alternative would also allow for the use of anticoagulant rodenticides in the boundary management zone after three applications of zinc phosphide prove ineffective. Direct poisoning by anticoagulant rodenticides may occur because songbirds may eat poisoned grain baits when they have access to them (Apa et al. 1991, Vyas et al. 2013). The use of zinc phosphide, however, generally does not result in poisoning in songbirds because prairie dogs tend to consume more of the bait, making it less available to birds, and because the birds typically avoid the zinc phosphide baits (Apa et al. 1991). In addition to colony removal, the Preferred, Proposed Action and Grassland-wide Alternatives allow for use of rodenticides for density control in colonies that contribute to the acreage objectives for conservation, thus increasing potential exposure of mountain plover. However, for all alternatives, seasonal restrictions on rodenticide use limit exposure of mountain plover to rodenticides to fall and winter months, and the presence of associated species must be considered prior to use of rodenticides outside of the boundary management zone.

Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives and can pose a risk to mountain plover through intentional or accidental shooting. The No Action and Prairie Dog Emphasis alternatives have the most limitations on recreational shooting and thus the greatest protections for mountain plover from this activity, with a year-round shooting prohibition in MA 3.63 and in Category 2 areas. The Preferred Alternative and Proposed Action offer the next highest level of protections, with a seasonal recreational shooting restriction in MA 3.67 from February 1 through August 15. The Grassland-wide Alternative does not include any recreational shooting restrictions and has a higher potential for loss of individual birds.

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

Sylvatic plague appears to be the biggest indirect threat to prairie dogs and associated species. The 2017 plague event that occurred on Thunder Basin reduced active prairie dog colony acres from 75,000 acres to 1,100 over the course of one year. The unpredictable nature of plague and its mortality complicates efforts to manage for prairie dogs (Cully et al. 2006) and associated species as a result. Plague mitigation is proposed to continue under all alternatives and may impact mountain plover. The primary plague prevention product is deltamethrin, which poisons plague-carrying fleas (Seery et al. 2003). Deltamethrin has been shown to be an effective tool in treating prairie dogs by reducing flea infestations up to 50-80% in some cases and minimizing the potential of plague (Maestas and Britten 2019, Roth 2019). In addition, fipronil has been shown to be around 94% effective in treating fleas on small mammals (Roth 2019). Both deltamethrin and fipronil appear to exhibit residual effects for 10-12 months on prairie dogs (Eads et al. 2019). Fipronil is considered toxic to birds and fish species, and as a result, there could be indirect impacts to mountain plover that forage and nest in treated areas (Gibbons et al. 2015). Deltamethrin is considered to be less toxic to birds, however, it can kill insects around areas of use. In addition, Deltamethrin has been shown to reduce mountain plover nest survival, possibly due to reduced insect food availability, which can result in greater energy expenditure for foraging (Dinsmore 2013). The reduction in potential foraging opportunities and nest survival may impact mountain plover where deltamethrin is used. As a result, plan components were developed to restrict the use of plague mitigation tools in prairie dog colonies where it may pose a risk to species associated with prairie dog habitat.

Cumulative Effects

In addition to proposed activities in each alternative, other actions contribute to potential impacts to the mountain plover. A summary of cumulative effects are provided below.

Fire suppression – Wildland fire suppression has resulted in the loss of a historically common disturbance that temporarily provided shortgrass and bare ground conditions for mountain plover breeding and nesting on portions of the TBNG (Augustine and Skagen 2014). Further suppression of wildfire, or lack of prescribed fire, could contribute to additional constraints on available habitat for plovers.

Range management – Because mountain plover prefers to breed and nest in highly disturbed habitat, it benefits from very intense grazing and browsing that reduces vegetation cover (Augustine and Derner 2015). Historic ungulate grazers such as bison were nomadic and created a heterogeneous mosaic of intensely grazed and ungrazed areas across the landscape. Contemporary livestock grazing regimes differ because they typically aim to avoid high levels of soil and vegetation disturbance to the extent possible by implementing a more moderate grazing presence in any given area over time (Colorado Division of Wildlife 2003, Dinsmore 2003). In other words, typical livestock grazing practices favor taller vegetation and less bare ground than was common historically and does not provide suitable habitat for breeding and nesting mountain plovers (Graul 1980). While some research has shown that mountain plovers may nest in areas subject to heavy grazing by livestock (Uresk 2017), short-term targeted, grazing does not provide comparably suitable habitat relative to prairie dog colonies or recent fire (Augustine and Derner 2015).

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). Increases in temperature could result in greater heat stress to mountain plover chicks and nests, especially because mountain plovers nest in unprotected locations (Dreitz et al. 2012). Extreme precipitation events during the breeding season could result in lower rates of nest survival (Dinsmore et al. 2002). On the other hand, if climate change results in longer or more frequent droughts, the potential limits to vegetation growth and the facilitation of prairie dog colony expansion could result in benefits to mountain plover. Drought has been linked to higher rates of nest survival and adult survival in certain systems because of enhanced habitat conditions (Dinsmore et al. 2002, Dinsmore 2008, Dreitz et al. 2012).

Plan Components

Plan components developed for burrowing owl and for other species will directly and indirectly reduce potential impacts (see Table E-17). In addition, the plan components listed below reduce the overall threats to the species by maintaining the availability of burrowing owl habitat on the grassland, along with sufficient distribution of habitat within the species' range.

Table E-17. Plan components that support mountain plover habitat availability and suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat availability – Loss of exclusive breeding season habitat in prairie dog colonies because of decline in size or total area of prairie dog colonies	*Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 3.63, Standards and Guidelines, General, 1 (NA)*: Standard F.65b in Chapter 1 adopts the Black-tailed Prairie Dog Conservation Assessment and Management Strategy (Strategy), which contains the existing area targets for prairie dog colonies. Control of prairie dogs is generally not allowed under the Strategy if composite colony area is below targets. The Strategy also directs use of sylvatic plague management tools to prevent collapse of prairie dog colonies during plague epizootics and translocation to support regrowth of prairie dog colonies that have been impacted by plague. General standard 1 for MA 3.63 supports the composite colony area targets contained in the Strategy by prohibiting	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-ADM-GL-07 (PA)*: GPA-FW-ADM-GL-07 stipulates that habitat value for species associated with prairie dog colonies, including mountain plover, will be considered prior to lethal control in prairie dog colonies outside of boundary management zones. *Ch. 1, Standards and Guidelines, F.62 (PA)*: Guideline F.62 stipulates managing for individual colonies greater than 80 acres in size.	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-ADM-GL-11 (GW)*: GPA-FW-ADM-GL-11 stipulates that habitat value for species associated with prairie dog colonies, including mountain plover, will be considered prior to lethal control in prairie dog colonies outside of boundary management zones. *GPA-FW-FWRP-GL-01 (GW)*: GPA-FW-FWRP-GL-01 stipulates managing for individual colonies up to 1,000 acres in size, with an emphasis on colonies of 200 to 500 acres to optimize habitat	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is prohibited when composite colony area does not sum to the targets. *GPA-FW-ADM-GL-07 (PDE)*: GPA-FW-ADM-GL-07 stipulates that habitat value for species associated with prairie dog colonies, including mountain plover, will be considered prior to lethal control in prairie dog colonies outside of boundary management zones. *Ch. 1, Standards and Guidelines, F.62 (PDE)*: Guideline F.62 stipulates managing for individual colonies greater than 80 acres in size.	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-12 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the objective. 7,500 acres of colonies is the minimum threshold for use of rodenticides in MA 3.67 outside of boundary management zones in all circumstances except density control. *Ch. 1, Standards and Guidelines, H.1 (Preferred)*: Standard H.1 in Chapter 1 provides for consideration of impacts to nesting, breeding, and denning habitat for associated species in prairie dog colonies outside of MA 3.67 before control of those colonies may occur. *GPA-MA3.67-FWRP-ST-15 (Preferred); GPA-MA3.67-FWRP-GL-16 (Preferred)*: GPA-MA3.67-FWRP-ST-15 stipulates that prairie dog density control is not allowed in MA 3.67 when composite colony area is less than 7,500, unless the best available scientific information indicates that density control will achieve site-specific objectives and maintain habitat requirements for associated

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	activities that would inhibit increases in the prairie dog population in MA 3.63 until the colonies could support a sustainable black-footed ferret population.*Ch. 1, Standards and Guidelines, F.62 (NA)*: Guideline F.62 stipulates managing for individual colonies greater than 80 acres in size.	*FWRP-ST-12 (PA)*: GPA-MA3.67-FWRP-ST-12 prohibits prairie dog density control in more than 50% of the area of an individual colony when composite colony area is smaller than the target. *GPA-FW-FWRP-GL-02 (PA)*: GPA-FW-FWRP-GL-02 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics.	heterogeneity for mountain plover. *GPA-FW-FWRP-ST-06 (GW)*: GPA-FW-FWRP-ST-06 prohibits prairie dog density control in more than 50% of the area of an individual colony when composite colony area is smaller than the target. *GPA-FW-FWRP-GL-04 (GW)*: GPA-FW-FWRP-GL-04 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-FW-FWRP-GL-03 (PDE)*: GPA-FW-FWRP-GL-03 directs the use of sylvatic plague control tools where practical and effective to prevent collapse of prairie dog colonies during plague epizootics.	species. GPA-MA3.67-FWRP-GL-16 indicates that density control in MA 3.67 should not occur in more than 50 percent of the area of any individual colony and should not occur more than every other year. *Ch. 1, Standards and Guidelines, F.62 (Preferred)*: Guideline F.62 in Chapter 1stipulates managing for individual colonies greater than 80 acres in size. *GPA-FW-FWRP-GL-02 (Preferred); GPA-MA3.67-FWRP-O-08 (Preferred); GPA-MA3.67-FWRP-ST-18 (Preferred)*: GPA-FW-FWRP-GL-02 allows the use of plague mitigation tools in prairie dog colonies anywhere in the plan area. GPA-MA3.67-FWRP-ST-18 mandates that an integrated approach to plague management will be used in MA 3.67 annually. GPA-MA3.67-FWRP-O-08 states that the Forest Service intends to develop a plague management plan within 3 years of plan amendment approval.
Habitat suitability – Risk of being shot in prairie dog colonies open to shooting	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.		Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	
Habitat suitability – Possible impacts because of decline in insect prey base after use of deltamethrin in prairie dog colonies	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to mountain plovers.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to mountain plovers.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to mountain plovers.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to mountain plovers.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to mountain plovers.

Determination of Effects

With all activities combined, along with resource protection measures and plan components, all alternatives have the effects determination, "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 TBNG and throughout its range. In addition, existing plan components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for mountain plover habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species' habitat on the TBNG.

The rationale for effects determinations to all alternatives is based on the availability of mountain plover habitat in and adjacent to the proposed action area, along with sufficient distribution of habitat within the species' range. Additional rationale to support the effects determinations include:

- The alternatives would amend the management plan in a way that retains a persistent amount and distribution of prairie dog colonies such that they will continue to provide for the needs of mountain plover. At 10,000 ac of colonies, the acreage objective for prairie dog colony extent, the expected bird density yields approximately 80-250 birds, and at 7,500 ac of colonies, this yields approximately 60-190 birds. All alternatives are expected to provide sufficient distribution on the TBNG and within the range of the species.
- The 10,000 acres has been found to be adequate for provision of habitat to ensure continued viability of species closely associated with prairie dogs, including Regional Forester's Sensitive Species and a preliminary list of potential species of conservation concern. This objective is greater than both the mean and median for prairie dog colony extent in management area 3.63 since development of the grassland plan in 2001, even if only years prior to the 2016 expansion and subsequent sylvatic plague epizootic are considered. The grassland has not been successful in maintaining prairie dog colonies that total more than 10,000 acres in this management area in many years due to the introduced disease sylvatic plague. The new requirement to use plague mitigation tools in management area 3.67 on an annual basis is intended to reduce impacts from sylvatic plague, decrease the likelihood of major plague events, and help promote conservation of 10,000 acres of colonies.
- The alternatives would manage and maintain active prairie dog colonies at a level which is expected to be biologically sustainable, and less likely to trend towards a boom/bust cycle unfavorable to prairie dog dependent species including mountain plover.

- Plover have persisted through two previous plague outbreaks and concurrent lethal control measures.
- 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.
- Habitat (mostly within management area 3.63/3.67) is located among consolidated NFS land, and outside of boundary management zones. Thus, the Forest Service has taken reasonable measures to ensure that proposed management actions would retain adequate habitat, are implementable and can be achieved with limited conflicts with other resource and management objectives.

Overall, potential direct and indirect effects under this alternative, when combined with the cumulative effects generated by other activities listed above would not result in a decrease in viability for this species.

Northern Harrier (*Circus hudsonius)*

Introduction

Northern harrier is a widespread and abundant raptor across the Northern hemisphere. Northern harrier is an open habitat generalist, preferring wetlands and marshes when available, but also occurring in grasslands and shrubland habitat across the drier western landscapes of North America. Northern harriers typically hunt rodents, passerine birds, and waterfowl, but also scavenge for food. Preferred foraging habitat generally consists of thick vegetation conducive to the occurrence of riparian, grassland, and shrubland birds and small mammals. Nest sites are also usually located in tall, thick vegetation in wet areas. While the species appears to be secure throughout its range, some threats to the species exist, including degradation of native wetland and grassland habitats and habitat fragmentation because of land use conversion for row-crop agriculture and livestock grazing. Overgrazing and the use of insecticides and rodenticides have reduced prey availability and as a result reduced the amount of suitable habitat for the species. In addition, secondary poisoning is common because of the use of rodenticides and lead ammunition on potential prey species.

Range-wide Information, Distribution and Abundance

Northern harriers are well distributed and relatively abundant and known to occur in North America and throughout Eurasia. The North American subspecies *C. c. hudsonius* breeds throughout Canada, the northern United States, and the Great Plains and intermountain regions of the United States. Non-breeding and winter use occurs extensively throughout the remainder of the United States, Mexico, and the Caribbean, and extending southward through Central America to northern Colombia (Smith et al. 2011.

Life History and Habitat

Northern harrier is an open habitat generalist in both breeding and wintering seasons. Where available, northern harriers prefer wetlands, marshes, and pastures for breeding and nesting, but in the drier, western portions of their range, they will inhabit upland prairies, drained marshlands, croplands, cold desert shrub-steppe, and riparian woodlands. Northern harriers generally occupy locations with dense vegetation conditions suitable for small mammalian and avian prey.

Northern harriers hunt a variety of rodents, passerine birds, waterfowl, reptiles, and amphibians, and they also opportunistically scavenge nearly all types of carrion. Northern harriers hunt by flying low over the ground, listening for movements in the vegetation, and surprising prey. Females more often hunt for small mammals in denser vegetation within the vicinity of the nest, while males more often hunt for birds. Breeding males provide food to the females during incubation, and breeding pairs will often engage in aerial transfer of prey. Northern harriers build their nests on the ground in dense, tall, undisturbed vegetation, usually in wet areas (Smith et al. 2011).

Population Trends and Threats

Northern harrier populations declined somewhat in the 20th century, likely as a result of reforestation of much of the northeastern United States, and secondary poisoning from organochloride pesticides, including DDT. The species remains widespread and abundant overall, despite continued concern about populations in the eastern and Great Plains portions of its range because of continued reforestation, degradation of wetlands, and the loss of native grassland to monoculture cropland and uniform livestock grazing (Smith et al. 2011). Conversion of prairie to cropland and livestock grazing can reduce populations of preferred prey by shortening vegetative structure (Pain et al. 1997, Littlefield and Johnson 2005). Secondary poisoning by lead ammunition or pesticides remains a potentially significant cause of mortality among northern harriers, because they scavenge shot and poisoned carcasses (Peterson et al. 2001). Lead poisoning has been well documented in northern harriers (Martin et al. 2008, Pain et al. 2009), and poisoning from anticoagulant rodenticides has been documented in other species of harrier (e.g., *Circus aeruginosus*; López-Perea et al. 2019).

Species Status in the Plan Area

Northern harriers do not depend on prairie dog colonies for prey or habitat. Northern harrier generally occupy locations with vegetation conditions suitable for small mammalian and avian prey.

Distribution, Abundance and Population Trend in the Plan Area

On the TBNG, northern harrier habitat associations have not been studied, but northern harriers likely most often use sagebrush and riparian vegetation for nesting and foraging. Dependence on these habitats, however, has not been shown, and northern harriers will not likely be affected by small changes in the overall availability of these habitats.

Environmental Consequences

Direct and Indirect Effects

All alternatives are considered to have similar impacts to this species. Recreational shooting and secondary poisoning from contaminated prey would be the primary activities to cause potential impacts to the species. The Grassland-wide Alternative (Alternative 3) proposes the use of anticoagulants, which could indirectly impact the species more than alternatives that limit rodenticides to zinc phosphide baits since they may scavenge on contaminated prairie dogs.

Northern harrier also may scavenge dead or dying prairie dogs and be susceptible to secondary poisoning by lead ammunition used for recreational shooting, however, the likelihood is very low.

Cumulative Effects to All Alternatives

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on the TBNG, it could reduce the availability of prey (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will indirectly benefit northern harrier by reducing or eliminating potential impacts (see Table E-18). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-18. Plan components that support northern harrier habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management.	*GPA-FW-ADM-ST-05 (PA)*: *GPA-FW-ADM-ST-05* prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Determination of Effects

With all current activities combined, along with resource protection measures and plan components, all alternatives have an effects determination of "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 TBNG and throughout its range. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for northern harrier habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species' habitat on the TBNG.

The rationale for effects determinations to all alternatives is based on the availability of foraging and nesting habitat in and adjacent to the TBNG, along with sufficient distribution of habitat within the species' range. There are detections of northern harrier on the grassland and the species is considered well distributed within its range. Primary impacts of the alternatives include those activities that would cause mortality.

Rationale to support the effects determinations for all alternatives include:

- Northern harriers use dense vegetated areas (probably mostly sagebrush, woody draws and riparian areas on the TBNG) and open, wet marshy areas for nesting and foraging. They have no association with prairie dog colonies for nesting, and foraging behavior on prairie dog colonies is uncommon.
- No substantive effect (secondary poisoning) from zinc phosphide are expected in any alternatives.
- Use of anticoagulants in the Grassland-wide alternative could lead to mortality to individuals from secondary poisoning; however, those effects would only occur in small areas and to a few individuals. Anticoagulant use would be uncommon, occur only after three years of zinc phosphide use in an area, and is not likely to occur across the Grassland at any given time. Therefore, it is expected that mortality could occur to a few individuals in the Grassland-wide Alternative (Alternative 3) during any given application, but would but would not apply to the larger population across the grasslands.
- Northern harriers could be shot accidentally if they are in the vicinity of prairie dog colonies and recreational shooters are present. Effects would be localized and very infrequent. No pertinent difference among alternatives.

- Use of lead ammunition for recreational shooting in prairie dog colonies could cause secondary lead poisoning to individuals, but effects would be localized. No pertinent difference among alternatives.

Sagebrush Sparrow (*Artemisiospiza nevadensis*)

Introduction

Sagebrush sparrow is a small passerine bird. Sagebrush sparrows breed in the sagebrush steppe region of the western United States and migrate in winter to the southwestern United States. Sagebrush sparrow was separated taxonomically from the closely related Bell's sparrow (*Artemisiospiza belli*) in 2013, and population trend data is generally unavailable for sagebrush sparrow. Population trend data for the prior combined species, sage sparrow (*Artemisiospiza belli*), is unreliable and does not show trends. Despite the lack of knowledge regarding sagebrush sparrow populations, agencies and organizations often assign the species a priority conservation status due to its reliance on sagebrush habitat, which faces loss and fragmentation across the western United States. Sagebrush sparrows breed and nest at sites dominated by big sagebrush (*Artemisia tridentata* ssp.).

Sagebrush sparrow very infrequently inhabits the TBNG. The TBNG lies at the extreme eastern edge of the sagebrush sparrow's range. Because of the species' dependence on sagebrush, the breeding population on the TBNG could be negatively affected by loss or fragmentation of sagebrush habitat. Primary threats to sagebrush on the TBNG include wildfire and energy development. However, existing management direction is in place to protect sagebrush habitat from these and any other potential threats.

Range-wide Information, Distribution and Abundance

The sagebrush sparrow is widespread in shrub-steppe habitats from the northern edges of the Great Basin to the chaparral and sagebrush scrub in northern Mexico (Martin and Carlson 1998). In 2013, based on U.S. Geological Survey's North American Breeding Bird Survey data, Partners in Flight estimated that sage sparrow (i.e., combined populations of the currently recognized sagebrush sparrow and Bell's sparrow, prior to the taxonomic split) had a global population of approximately 4,000,000 individuals and a Wyoming population of approximately 400,000 individuals. Because Bell's sparrow does not occur in Wyoming, historical sage sparrow population estimates for Wyoming are most likely equivalent to an estimate for sagebrush sparrow.

Life History and Habitat

The sagebrush Sparrow is a sagebrush obligate associated with shrublands dominated by big sagebrush (*Artemisia tridentata* sspp.) with perennial bunchgrasses (Martin and Carlson 1998). Sagebrush sparrows build an open cup nest, usually placed within a sagebrush shrub or on the small branches at the periphery, and occasionally on the ground beneath a shrub (Paige and Ritter 1999). Where available, the species will nest in several different species of shrub, and a dense shrub canopy appears to be more important than shrub species (Martin and Carlson 1998). During the breeding and nesting season, each nesting pair occupies a territory that typically does not overlap adjacent territories. Territory sizes can vary widely on the order of one to over 15 acres, depending on population density and the continuity of habitat (Wiens et al. 1985, Martin and Carlson 1998). This species can be a brown-headed cowbird (*Molothrus ater*) host; it will often abandon nest sites as a result (Paige and Ritter 1999). Sagebrush sparrows generally forage on the ground underneath the shrub canopy, eating a variety of small insects, fruits, and plants (Martin and Carlson 1998).

Population Trends and Threats

The U.S. Geological Survey North American Breeding Bird Survey provides population trend data for sagebrush sparrow ranging back to the mid-20th century. Estimates of recent trends from survey-wide and Wyoming-specific North American Breeding Bird Survey data may have deficiencies and should be viewed with caution.

Threats to sagebrush sparrow populations may occur as a result of the fragmentation and removal of sagebrush habitat. Oil and gas development, powerlines, roads, fences and the introduction of noxious weeds may negatively impact the extent and continuity of sagebrush habitat (Holmes and Johnson 2005). Wildland fire also has an impact on the ecological integrity of sagebrush habitat due to the relatively long recovery time of sagebrush vegetation structure on the landscape (Baker 2006). Climate change may increase the frequency and severity of wildland fire activity in sagebrush habitat (Paige and Ritter 1999).

Species Status in the Plan Area

Sagebrush sparrow do not depend on prairie dog colonies and prefer sagebrush vegetation for nesting and foraging habitat.

Distribution, Abundance and Population Trend in the Plan Area

Sagebrush sparrow is uncommon on the TBNG. The TBNG lies on the far eastern edge of the sagebrush sparrow's range. Fewer than 40 total sightings of the species are recorded in the University of Wyoming's Wyoming Natural Diversity Database and the North American Breeding Bird Survey. These sightings range from 1971 to 2017 and are scattered across the TBNG. The citizen science bird observation database, eBird, does not include any sightings of sagebrush sparrow on the TBNG (https://ebird.org/; Sullivan et al. 2009).

Environmental Consequences

Direct and Indirect Effects – All Alternatives

All alternatives are considered to have similar impacts to this species. Recreational shooting would pose little risk to the species, as would rodenticide use. The primary impact to this species would occur from allowing prairie dog expansion, thereby limiting sagebrush sparrow preferred habitat.

Cumulative Effects to All Alternatives

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on the TBNG, it could reduce the availability of foraging and nesting habitat (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will indirectly benefit sagebrush sparrow by reducing or eliminating potential impacts (see Table E-19). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-19. Plan components that support sagebrush sparrow habitat availability

Threats	Habitat availability – Loss of exclusive breeding season habitat in sagebrush-dominated sites because of expansion of prairie dog colonies
No Action Alternative	*GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.
Proposed Action Alternative	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.
Grassland-wide Alternative	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.

Threats	Habitat availability – Loss of exclusive breeding season habitat in sagebrush-dominated sites because of expansion of prairie dog colonies
Prairie Dog Emphasis Alternative	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is allowed when composite colony area is greater than the targets. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.
Preferred Alternative	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-11 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the objective. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.

Determination of Effects

With all current activities combined, along with resource protection measures and plan components, all alternatives have an effects determination of "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 TBNG and throughout its range. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for sagebrush sparrow habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species' habitat on the TBNG.

The rationale for effects determinations is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species' range. There are detections of sagebrush sparrow on the TBNG; however, the species is understudied. Primary impacts of the alternatives include those activities that would allow prairie dogs to expand, thereby limiting sagebrush sparrow preferred habitat. Additional rationale to support the effects determinations includes:

- Breeds and nests in undisturbed sagebrush. Extreme growth of prairie dog colonies could cause a small reduction in total available habitat (all observed historical prairie dog occupancy is approximately 8% of greater sage-grouse core on the TBNG; acreage ojectives are far lower than this proportion and not all core is suitable habitat).
- Sagebrush sparrow do not forage in prairie dog colonies. Very minimal chance that individuals could consume rodenticides and experience non-target poisoning.
- Sagebrush sparrow do not occupy prairie dog colonies. Recreational shooting poses little risk.

Black-tailed Prairie Dog (*Cynomys ludovicianus*)

Introduction

Black-tailed prairie dog is a colonial, burrowing rodent that ranges from southern Canada to northern Mexico along the western reaches of the Great Plains. Black-tailed prairie dogs are highly dependent on line-of-sight predator detection and intraspecific warning calls, and as a result, they prefer to occupy flat upland sites with low or recently disturbed vegetation. Within and around colonies, prairie dogs create and perpetuate their preferred habitat conditions by clipping vegetation to short and sometimes denuded conditions. Such habitat modification has created a habitat niche to which several other species have evolved dependencies, including grassland birds that rely on the burrows and shortgrass and predators that use prairie dogs as a prey base. Prairie dog colonies are dynamic, social communities containing territorial, within-colony family groups called coteries. Inter-colony and inter-coterie migration is common among prairie dogs, and colony connectivity is critical to maintenance of genetic diversity in prairie dog populations. Colonies are somewhat fluid on the landscape, commonly growing and declining in response to population pressure, predation, and weather or climatic events.

Black-tailed prairie dog has experienced population declines over the course of the 20th century as a result of broad-scale shooting and trapping (intentional and accidental), habitat conversion or loss and the introduction of the sylvatic plague, an epizootic disease in prairie dogs. Prairie dogs are herbivorous and tend to reduce the availability of grass forage for livestock, and ranchers have engaged in eradication campaigns since Euro-American settlement of the Great Plains. After reducing prairie dog populations, landscape-scale poisoning efforts abated somewhat in the 1970s with the imposition of Federal protections for the black-footed ferret (*Mustela nigripes*), an obligate prairie dog predator. Despite this abatement, prairie dog populations faced the additional threat of the non-native sylvatic plague, caused by the bacterium *Yersinia pestis*, which has spread throughout the black-tailed prairie dog range and is persistent within colonies, causing periodic epizootics. Plague and poisoning continue today and have resulted in a reduced and fragmented black-tailed prairie dog population across its range, with some cases of local extirpation.

Despite these threats and the associated 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. For this reason, in 2004 and 2009, the U.S. Fish and Wildlife Service found black-tailed prairie dog not in imminent danger of extinction or becoming at risk of extinction and not warranting Federal protections under the Endangered Species Act (USFWS 2004, USFWS 2008).

On the TBNG, prairie dog colonies have experienced three landscape-scale plague epizootics since 2001. Most recently, colonies expanded rapidly during a drought before collapsing in an epizootic during 2017 and 2018 to historic population lows, with 250 acres in 3.63 and 625 acres mapped grassland-wide. In 2019, prairie dogs inventory surveys showed a positive path to recovering, 1,065 acres were mapped in 3.63 and 2,438 acres throughout the TBNG (see Table E-6). Colony area is highly variable from year-to-year as a result of plague. In addition, the desire among many livestock producers to remove colonies from the landscape can lead to intense management of colony location and size, via the use of rodenticides, translocation, vegetation management, and plague control. In summary, the persistence of the black-tailed prairie dog population on the TBNG is dependent to a large degree on anthropogenic management and the occurrence of plague.

Range-wide Information, Distribution and Abundance

Black-tailed prairie dog is a Great Plains species, historically occurring from extreme southern Saskatchewan and Montana south through the western and central Great Plains to the desert grasslands of western Texas, New Mexico, southeastern Arizona, northeastern Sonora, and northern Chihuahua (Merriam 1902, Koford 1958). 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 east of the Rocky Mountains. The species was extirpated from Arizona and southwestern New Mexico by the mid-20th century as a result of several decades of widespread eradication efforts (Wuerthner 1997, Hale et al. 2013). Successful reintroduction efforts using translocation began in southwestern New Mexico in the mid-1990s and in southeastern Arizona in 2008 (Truett and Savage 1998, Hale et al. 2013). Two isolated populations remain extant in northern Mexico, but the relict colonies in Sonora were once believed extirpated and the population in Chihuahua has endured considerable declines (Avila-Flores et al. 2012, Moreno-Arzate et al. 2013). 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). The range-wide colony area estimate by the U.S. Fish and Wildlife Service is approximately 2.4 million acres, reduced from approximately 80 to 104 million acres historically (74 FR 63347; Virchow and Hygnstrom 2002). The most recent Wyoming-specific colony area estimates are from 2015 (McDonald et al. 2015) and is approximately 225,000 acres, which constitutes nearly 10 percent of the U.S. Fish and Wildlife Service range-wide colony area estimate (74 FR 63351). Earlier aerial surveys from 1997 and 1998 showed approximately 330,000 acres of black-tailed prairie dog colonies across the species' range in Wyoming (Sidle et al. 2001).

Life History and Habitat

Black-tailed prairie dogs are a colonial, burrowing rodent (Hoogland 2006). They are diurnal and primarily forage on the leaf bases of grasses, but will eat several other types of plants found in grasslands (Koford 1958, Hansen and Gold 1977, Uresk 1984, Krueger 1986). Prairie dogs are highly social within colonies. The species is critically reliant on line-of-sight predator detection and auditory intraspecific communication to indicate danger. Prairie dog colonies serve as a prey base for a host of avian and mammalian predators. To facilitate predator detection, prairie dogs prefer to colonize flat areas with short vegetation and few visual barriers, and they will clip tall vegetation, even when not using it for foraging (Hoogland 2006). Colonies thus cause changes in vegetation structure, and changes in vegetation composition can occur over time (Detling 1998, Fahnestock et al. 2003). Colonies often have higher ratios of forbs to grasses and bare ground to vegetation than surrounding areas, and these ratios increase with the age of the colony (Archer et al. 1987, Fahnestock et al. 2003). Because colonies constitute an enduring disturbance to grassland vegetation and large-scale creator of subterranean cover, several species, including some predators and breeding migratory birds, have evolved to rely on the burrows and the short-stature and bare ground conditions created by colonies. Black-footed ferret (*Mustela nigripes*) is an obligate predator, while mountain plover (*Charadrius montanus*) and burrowing owl (*Athene cunicularia*) are near-obligate dependents on the vegetative characteristics and burrows within active colonies (Kotliar et al. 1999).

Black-tailed prairie dog habitat includes shortgrass and mixed-grass prairie of the Great Plains, with some interface with tallgrass prairie at the eastern edge of the species' range (Osborn 1942, Bonham and Lerwick 1976, Coppock et al. 1983). Black-tailed prairie dogs most frequently colonize areas with low vegetative stature and minimal slope, including areas with past disturbance, such as burned, grazed, or mowed areas, and the areas surrounding range improvements (Licht and Sanchez 1993, Milne-Laux and Sweitzer 2006, Augustine et al. 2008, Northcott et al. 2008, Archuleta 2014). The species prefers fine to medium textured soils (Merriam 1902, Thorp 1949, Koford 1958), presumably because burrows and other structures tend to retain their shape and strength better in finer-textured soils than in coarse, loose soils.

Colonies can vary widely in population, density, and area. Prairie dog densities vary on the order of fewer than 5 to nearly 30 individuals per acre within colonies, with average densities of approximately 10 individuals per acre before young are born in the spring, and approximately 20 individuals per acre after juveniles first emerge from their burrows (Hoogland 2006). Colonies can shrink, grow, and remain static in response to myriad variables, including disease, weather, climate, and anthropogenic control (Koford 1958, King 1959, O'Meilia et al. 1982). Disease, predation, and severe forage shortages can cause population declines within colonies and may cause contraction of colonies (Koford 1958, Davidson et al. 2012), while die-offs can occur as a result of epizootic sylvatic plague outbreaks and anthropogenic control efforts, such as poisoning (Forrest and Luchsinger 2006, Pauli et al. 2006).Conversely, colonies expand under force of crowding when forage is limited within a colony; that is, a colony with high prairie dog population density and inadequate forage will cause individuals to seek out new territories beyond the edges of the active colony (Koford 1958, Garrett et al. 1982). Proximity to habitat with few visual barriers and good forage and soils facilitates colony expansion (Koford 1958, Milne-Laux and Sweitzer 2006). Expanding colonies can grow 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). In suitable habitat, 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). However, colonies may not expand when surrounded by topographic, hydrologic, or vegetative barriers (Koford 1958). In cases of high population density and low expansion potential, reproductive rates generally fall and female prairie dogs may engage in infanticide to regulate colony population (Hoogland 2006).

Intra- and intercolony dispersal is a common occurrence, creating complexes of interconnected prairie dog colonies and subcolony family groups, called coteries (Hoogland 2006). Dispersal occurs in the spring amongst solitary, healthy individuals (Hoogland 2013). Migration between colonies and coteries may occur for a variety of reasons, but primarily results from a lack of close kin with whom to cooperate for predator avoidance, burrow construction, or territory defense and a biological instinct to avoid incest within coteries (Garrett et al. 1982, Garrett and Franklin 1988, Hoogland 2013). Males are more likely to disperse, and males typically disperse farther than females (Koford 1958, Garrett and Franklin 1988, Hoogland 2013). Most dispersal occurs to neighboring coteries, rather than to other colonies. Intercolony dispersal is common, however, individuals can travel up to 6 miles to reach another colony (Koford 1958, Knowles 1985, Milne 2004). The average intercolony dispersal distance is no more than 1 or 2 miles (Garrett and Franklin 1988, Roach et al. 2001, Milne 2004). Prairie dogs also occasionally disperse into abandoned or deceased colonies where empty burrows provide readily available habitat for initiation of a new colony (Knowles 1985). Intercolony dispersal improves genetic diversity of prairie dog populations and aids recovery of colonies that have experienced epizootic plague outbreaks or anthropogenic eradication efforts (Daley 1992, Roach et al. 2001, Trudeau et al. 2004).

Population Trends and Threats

The range-wide population of black-tailed prairie dogs declined sharply over the course of the 20th century. The U.S. Fish and Wildlife Service estimated an approximately 97 to 98 percent decline in the total area of black-tailed prairie dog colonies across their range since Euro-American settlement of the Great Plains (74 FR 63346-63347). Range-wide population estimates and long-term trends should be viewed with some caution, however. Early historical estimates of prairie dog extent did not distinguish between the five prairie dog species (i.e., *Cynomys gunnisoni*, *Cynomys leucurus*, *Cynomys ludovicianus*, *Cynomys mexicanus*, *Cynomys parvidens*) and range from 40 to 100 million acres for the western United States in the early 1900s (Anderson et al. 1986, Miller et al. 1994, Luce et al. 2003). Virchow and Hygnstrom (2002) and Vermeire et al. (2004) emphasize the likely exaggeration of many high-end historical estimates. Notwithstanding the variation and accuracy of historical estimates, the black-tailed prairie dog population has declined substantially since the 19th century. An aggregate of statewide estimates between the late 1990s and mid-2000s yielded an estimate of approximately 2.4 million acres of prairie dog colonies (74 FR 63346-63347). Local populations are variable in size from year-to-year due to the volatility of threats and the potential for rapid colony expansion (Koford 1958).

The primary causes of the decline in prairie dog populations have been anthropogenic control measures and the introduced disease, sylvatic plague. Plague has extirpated or substantially reduced black-tailed prairie dog populations since at least the 1940s (Cully and Williams 2001, Cully et al. 2010). Plague is now effectively endemic across the black-tailed prairie dog range, and plays a critical role in prairie dog population dynamics (Mize and Britten 2016). More detail regarding the relationship between plague and prairie dogs appears in the following section. Anthropogenic control efforts also contributed heavily to the decline in prairie dog populations. Poisoning of black-tailed prairie dogs began with Euro-American settlement of the western Great Plains in the late 19th century, long before the introduction of plague. Enmity of settlers toward prairie dogs resulted from prairie dogs' negative effects on agricultural productivity and their perceived degradation of the land and vegetation (Forrest and Luchsinger 2006). Prairie dogs and livestock tend to compete for forage on rangelands; increased colony occupation is negatively correlated with an area's carrying capacity for large herbivores (Uresk and Paulson 1988, Vermeire et al. 2004, Derner et al. 2006, Olson et al. 2016). Because of competition for forage, efforts evolved into state-sponsored eradication campaigns. States and the Federal government cooperated to poison prairie dogs until the imposition of Federal protections to prevent the extinction of the black-footed ferret in the 1970s (Forrest and Luchsinger 2006). Populations likely reached a low point in the 1960s as a result of eradication campaigns and have somewhat recovered since that time (74 FR 63346-63347). 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). Current poisoning efforts on prairie dogs are typically more localized with less severe impacts than the coordinated, broad-scale efforts that were common prior to the 1970s (74 FR 63361).

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 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).

Additional minor threats have included urbanization, agricultural development, and recreational shooting. Urbanization and agricultural development have caused some habitat loss and fragmentation, but these threats impact a relatively small portion of the species' range primarily along its eastern edge and the Colorado Front Range (74 FR 63352). Shooting of prairie dogs is a popular recreational activity, common on private, state, and Federal lands and often drawing hunters and tourists from regions outside of the species' range (Reeve and Vosburgh 2006). Shooting can create a localized threat to colonies over the short-term. Shooting decreases population densities and can eradicate very small colonies (Knowles 1987, Vosburgh and Irby 1998). Repeated shooting over several weeks or months generally causes increased vigilance among prairie dogs, resulting in less time spent foraging and causing deteriorated body condition and reduced reproductive output during the year following the shooting period (Pauli and Buskirk 2007). While colonies typically regrow after a season of shooting, shot colonies grow at lower rates than un-shot colonies and do not return to their previous population size within 1 year (Knowles 1987, Vosburgh 1996, Pauli and Buskirk 2007).

Despite the ongoing threats to black-tailed prairie dog, the species has proven highly resilient and has recovered slightly after the listing of the black-footed ferret caused cessation of broad-scale, government-coordinated poisoning campaigns (Forrest and Luchsinger 2006, 74 FR 63346-63348). The U.S. Fish and Wildlife Service has received several petitions to list black-tailed prairie dog as threatened since 1998. In 2000, the U.S. Fish and Wildlife Service initially found that the species was warranted for listing, due to apparent population declines and threats from poisoning, plague, shooting, and habitat loss (65 FR 5476-5488). In response, a wave of monitoring programs and research began. The U.S. Fish and Wildlife Service used the new information to determine twice, in 2004 and 2009 that the species did not warrant listing under the Endangered Species Act because of its ability to rebound after poisoning, plague, and shooting; this determination indicates no immediacy of extinction or becoming at risk of extinction (69 FR 51217-51226, 74 FR 63343-63366). Decisions regarding listing of black-tailed prairie dog remain controversial. Politics have been salient in listing decisions because of the historical and ongoing antagonism between prairie dogs and agricultural producers and their governments (Manes 2006, Miller and Reading 2012).

Sylvatic plague

The primary threat to black-tailed prairie dog is the introduced disease sylvatic plague, caused by the bacterium *Yersinia pestis*. Native to Asia, *Y. pestis* first entered North America in California around the end of the 19th century and spread eastward, hitting a current apparent range limit at the north-south meridian stretching from western North Dakota to western Texas (Mize and Britten 2016). Plague typically transmits among rodent species and to humans, in which infections are most often known as bubonic plague, via fleas (Antolin et al. 2002). Plague is now present and effectively naturalized across the range of black-tailed prairie dog (Mize and Britten 2016). While many rodents and other mammals can carry *Y. pestis* without experiencing plague symptoms, prairie dogs and several other species of rodent are highly susceptible to the disease (Antolin et al. 2002). Sylvatic plague can cause large-scale mortality events (i.e., epizootics) with over 99 percent mortality within prairie dog colonies (Cully 1989, Oldemeyer et al. 1993, Pauli et al. 2006). Plague was recorded in all U.S. prairie dog species by 1945, and began causing epizootics in those species by at least that same year (Cully and Williams 2001).

After an initial epizootic, plague remains present on the landscape and occurs cyclically in specific locations (Kosoy et al. 2017). Following an epizootic, prairie dog populations may persist or recover, but individual colony extirpation and permanent reductions in colony size and connectivity can also occur (Cully and Williams 2001, Cully et al. 2010, George et al. 2013). A small proportion of individual prairie dogs can be resistant to plague and survivors of outbreaks may either remain in an affected colony or disperse to neighboring unaffected colonies (Pauli et al. 2006, Jones et al. 2012). In an active colony located where plague has occurred at least once historically, *Y. pestis* persists even in the absence of an epizootic. These periods between epizootics are known as the disease's enzootic phase, during which prairie dog mortality rates are lower and more localized than those understood to constitute an epizootic (Hanson et al. 2007, Biggins et al. 2010, Matchett et al. 2010). Plague's enzootic phase in prairie dog colonies has been studied, but remains poorly understood. Theories for the persistence of plague include the persistence of *Y. pestis* non-virulently in prairie dogs, in the soil, or in non-susceptible, alternate host rodents, or that *Y. pestis* continues to transmit lethally within a colony, but at low rates, isolated within individual coteries (Eisen et al. 2008, Kosoy et al. 2017). The recurrence of epizootics in prairie dog colonies after an enzootic phase depends on vector population dynamics and the movement of the disease among and within colonies.

A critical variable in plague transmission is the abundance of fleas (Matchett et al. 2010, Russell et al. 2018; Brinkerhoff et al. 2010). Fleas are generally inefficient vectors for plague, and plague transmission rates increase with the number of fleas present per individual prairie dog (Lorange et al. 2005, Eisen et al. 2006, Thiagarajan et al. 2008, Tripp et al. 2009). Local weather is a significant determinant of the abundance of fleas, with precipitation and temperature interacting with both flea productivity and host body condition to potentially trigger plague epizootics, depending on flea species, host species, and climate (Russell et al. 2018). Mortality of some prairie dogs within coteries or colonies can also cause increases in flea abundance per remaining living prairie dog, potentially resulting in a positive feedback loop as plague kills additional prairie dogs (Biggins and Eads 2019).

Related to increases in vector populations, increased movement of plague across a prairie dog population may also contribute to the emergence of epizootics. The movement of *Y. pestis* across a prairie dog population is largely a function of colony spatial characteristics. Larger colony size and greater intercolony connectivity tend to increase the probability of experiencing an epizootic (Cully and Williams 2001, Collinge et al. 2005, Cully et al. 2010; George et al. 2013). Conversely, isolation of colonies by geographic barriers or by distances greater than dispersal ability has been shown to be correlated with decreased risk of epizootic (Collinge et al. 2005). However, within complexes of colonies, where intercolony dispersal may be common, intercolony distance does not affect the probability of an epizootic (Stapp et al. 2004). The presumed reason for the increased susceptibility of large, interconnected colonies is that they increase the potential for transmission because of the greater opportunities and incentives for intercolony dispersal of infected prairie dogs and increased populations of infected non-prairie dog hosts, including other rodents and mammalian and avian predators (Collinge et al. 2005, Cully et al. 2010). Indeed, increased abundance of some species of mice may trigger epizootics because they increase the transmission of plague from infected coteries to non-infected coteries within a colony (Stapp et al. 2009, Salkeld et al. 2010, Bron et al. 2019). Similarly, inter-coterie dispersal after partial mortality within a coterie may result in increased transmission rates across a colony (Biggins and Eads 2019).

Species Status in the Plan Area

The extent of black-tailed prairie dog colonies on the TBNG varies from year-to-year, as a result of plague epizootics, anthropogenic control efforts, recreational shooting, and natural growth and decline of colonies. Plague is currently the strongest determinant of reductions in colony area. The first records of large-scale plague epizootics on the TBNG are from 2001, though plague had been recorded in 1994 on the periphery of the TBNG (Byer 2001, Cully et al. 2010, Thiagarajan et al. 2008). Plague has caused three landscape-scale epizootics on the TBNG since 2001, with total colony area declines in the range of 80 to nearly 100 percent. Between these grassland-wide epizootics, plague exists within individual colonies, and can even cause epizootics within those colonies, but such smaller-scale plague events are restricted to isolated portions of the TBNG (Pauli et al. 2006, Cully et al. 2010).

Anthropogenic management and other human activities also have a smaller, but consequential impact on prairie dog populations on the TBNG. These activities have included plague control, prairie dog colony control, recreational shooting, and the use of prescribed fire and vegetation management to encourage prairie dog colony growth. For example, some use of the insecticide deltamethrin has occurred as a tool to reduce populations of fleas and prevent spread of plague. Anthropogenic control efforts have affected prairie dog colony area to a far lesser degree than plague since 2001, but have included the use of rodenticides and translocation. The proposed listing of black-tailed prairie dog under the Endangered Species Act triggered a remission in rodenticide use on the TBNG in 1999, with exceptions for cases of public health concerns (Byer 2001). Current management focuses on prairie dog conservation and the reintroduction of black-footed ferret in an approximately 50,900-acre area of the TBNG. The emphasis within that management area has been on the use of translocation prior to using rodenticides for any requested prairie dog control (USDA Forest Service 2015). However, grazing permittees and adjacent landowners often request the removal of colonies to prevent competition for forage for livestock use, and rodenticide use has regularly occurred on a limited basis, with increases in use as colonies grew after 2012. Recreational shooting has also occurred on the TBNG, but has likely minimally affected prairie dog populations in the management area. Shooting restrictions have been in place in high priority wildlife conservation areas including management area 3.63 on the TBNG since 2001, with the exception of lifting the shooting ban in 2017 and 2018 (USDA Forest Service 2002, USDA Forest Service 2015, USDA Forest Service 2017). As a result of limited use of control measures, colonies have typically grown in years between plague epizootics. The Forest Service engaged in some use of prescribed fire and other vegetation management such as mowing in an attempt to enhance habitat for prairie dogs and associated species from 2009 to 2012, and in 2015. Prescribed fire use during that time ranged from approximately 1,000 to 4,000 acres burned annually. The Forest Service has not used prescribed fire on the TBNG since 2015 and does not have plans to use prescribed fire at this time. Table E-20 shows patterns in prairie dog management efforts since 2010.

Table E-20. Prairie dog management on the TBNG. Summary of acres poisoned, dusted, burned, and translocated since 2009.

Year	Acres poisoned with zinc phosphide	Acres dusted with deltamethrin	Acres of prescribed burning to enhance wildlife habitat	Acres of translocation
2010	116	132	2,519	120
2011	734	1,997	4,045	166
2012	979	780	2,519	0
2013	1,557	3,000	0	0
2014	940	2,400	0	0
2015	1,384	1,002	942	0
2016	1,677	25	0	0
2017	2,239	0	0	0
2018	507	0	0	0
2019	112	38	0	0

Current prairie dog populations on the TBNG are very small; 2018 surveys returned historic lows for colony area due to a severe plague epizootic in 2017, with a recorded total of 625 acres (TBNG totals were likely somewhat larger than this, but the survey was limited to management area 3.63 and vicinity; Table E-6 footnote 1). Immediately prior to this epizootic, in 2016 and 2017, the TBNG experienced expansion of colonies during successive episodes of drought and flooding that led to high population pressure and dispersal (see Table E-6, Figure E-11, and Figure E-12). At current colony size, 2,348 as mapped in 2019, large areas of suitable, unoccupied habitat exist across the TBNG.

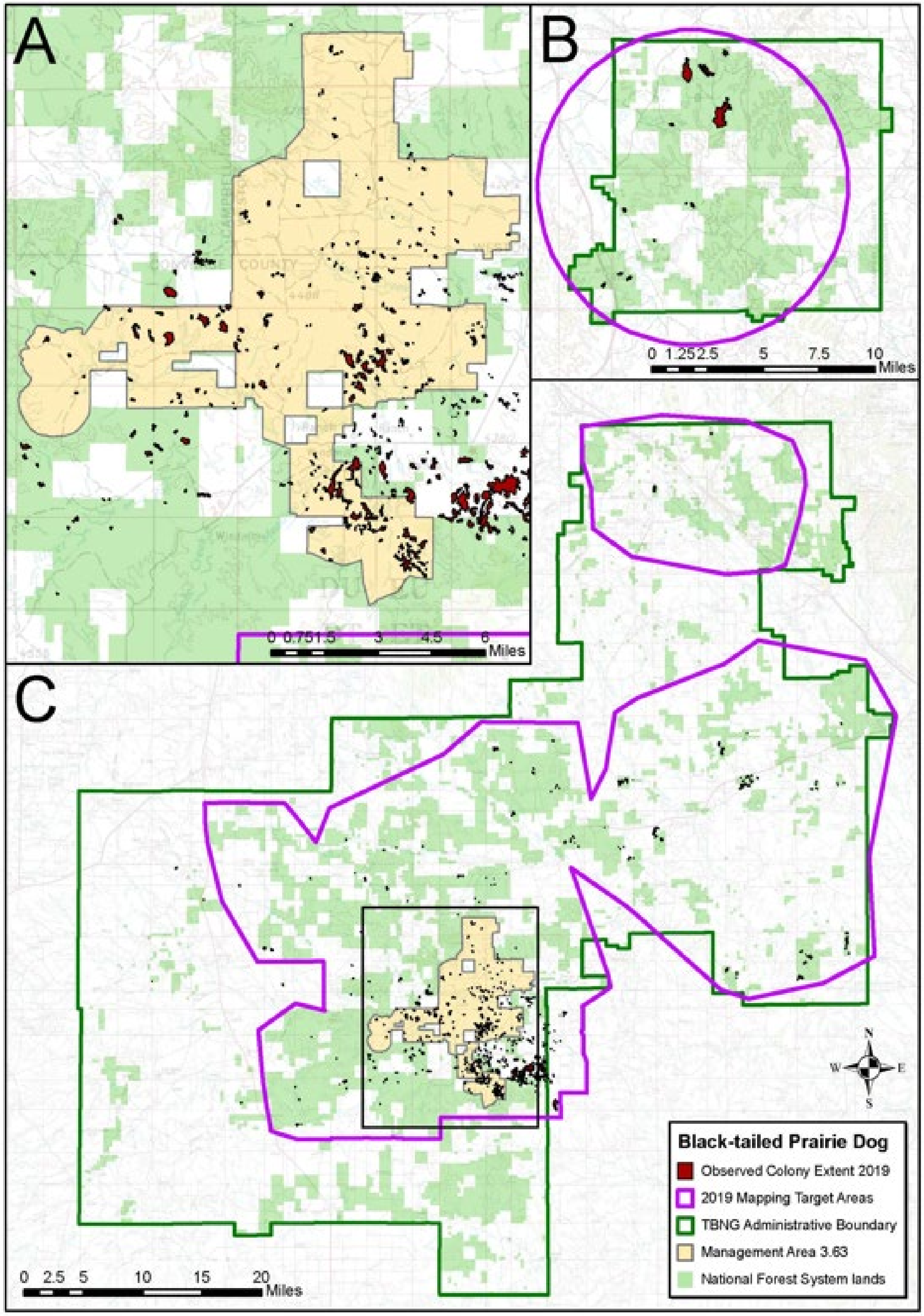

Figure E-12. Black-tailed prairie dog colony extent in 2019 on the Thunder Basin National Grassland and vicinity. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. The purple lines enclose the areas targeted for colony mapping surveys. Observation data were gathered by Great Plains Wildlife Consulting, Inc., for the Thunder Basin Grassland Prairie Ecosystem Association. Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of the species for the specified time period. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Distribution, Abundance and Population Trend in the Plan Area

The extent of black-tailed prairie dog colonies on the TBNG has varied over the past 2 decades. Recent colony acreage estimates come from surveys by the Forest Service and the Thunder Basin Grassland Prairie Ecosystem Association. Table E-6 shows cycles of overall colony growth and decline with three Grassland-wide plague epizootics in 2001/2002, 2005/2006, and 2017/2018. The epizootic that began in 2001 marks the first known occurrence of a large-scale epizootic on the TBNG (Cully et al. 2010). Since 2001, observed prairie dog colony area on the TBNG has ranged from less than 1,000 acres to nearly 50,000 acres. In most years, the total recorded area of active prairie dog colonies is likely less than the extent of active colonies.

Black-tailed prairie dog colonies have occupied areas across the TBNG, but the largest colonies and complexes of colonies on the TBNG have most frequently occurred in and around an area designated as management area 3.63, which encompasses approximately 50,900 acres and since 1981 has been managed as a high priority conservation area for prairie dogs with the goal of reintroducing black-footed ferret (USDA Forest Service 1981; Figure E-13). Colonies outside of management area 3.63 most commonly occupy the central and eastern portions of the TBNG. Colonies on state and private land in the area tend to cluster most heavily directly to the east of management area 3.63 and the central portion of the TBNG in general, stretching to Wyoming's eastern border (Keinath et al. 2008).

Habitat Requirements and Characteristics in the Plan Area

In general, black-tailed prairie dog tends to occupy flat, dry sites with low herbaceous vegetation to enhance visibility for predator detection (Hoogland 2006). On the TBNG, clayey, loamy, and saline upland ecological sites provide a suitable substrate for burrowing (Haufler et al. 2008). In 2015, the Forest Service modeled potential suitable prairie dog habitat on the TBNG using variables including soil, topography, hydrologic features, energy infrastructure, roads, vegetation, and previous prairie dog colony locations. The model showed that the total area of the TBNG with potential prairie dog habitat was 128,282 acres, or about one-quarter of the total area of the TBNG (USDA Forest Service 2015). This suitable habitat is largely permitted for livestock grazing throughout the year.

Once established, prairie dog colonies create and perpetuate suitable habitat and tend to expand into neighboring areas except when blocked by topographic, hydrologic, or vegetative barriers (Koford 1958). Colonies typically expand into neighboring suitable habitat, including areas where disturbances such as fire and ungulate grazing have created short-stature vegetation conditions (Milne-Laux and Sweitzer 2006, Northcott et al. 2008). Under high population pressure, such as when forage is scarce, prairie dogs may expand past barriers or into typically unsuitable habitat. Colonies under high population pressure on the TBNG will expand into areas with sagebrush cover, clipping the sagebrush to facilitate open lines of sight. In 2016 and 2017, colonies expanded into areas that had been shown as marginal or unsuitable in the 2015 habitat model (USDA Forest Service 2015).

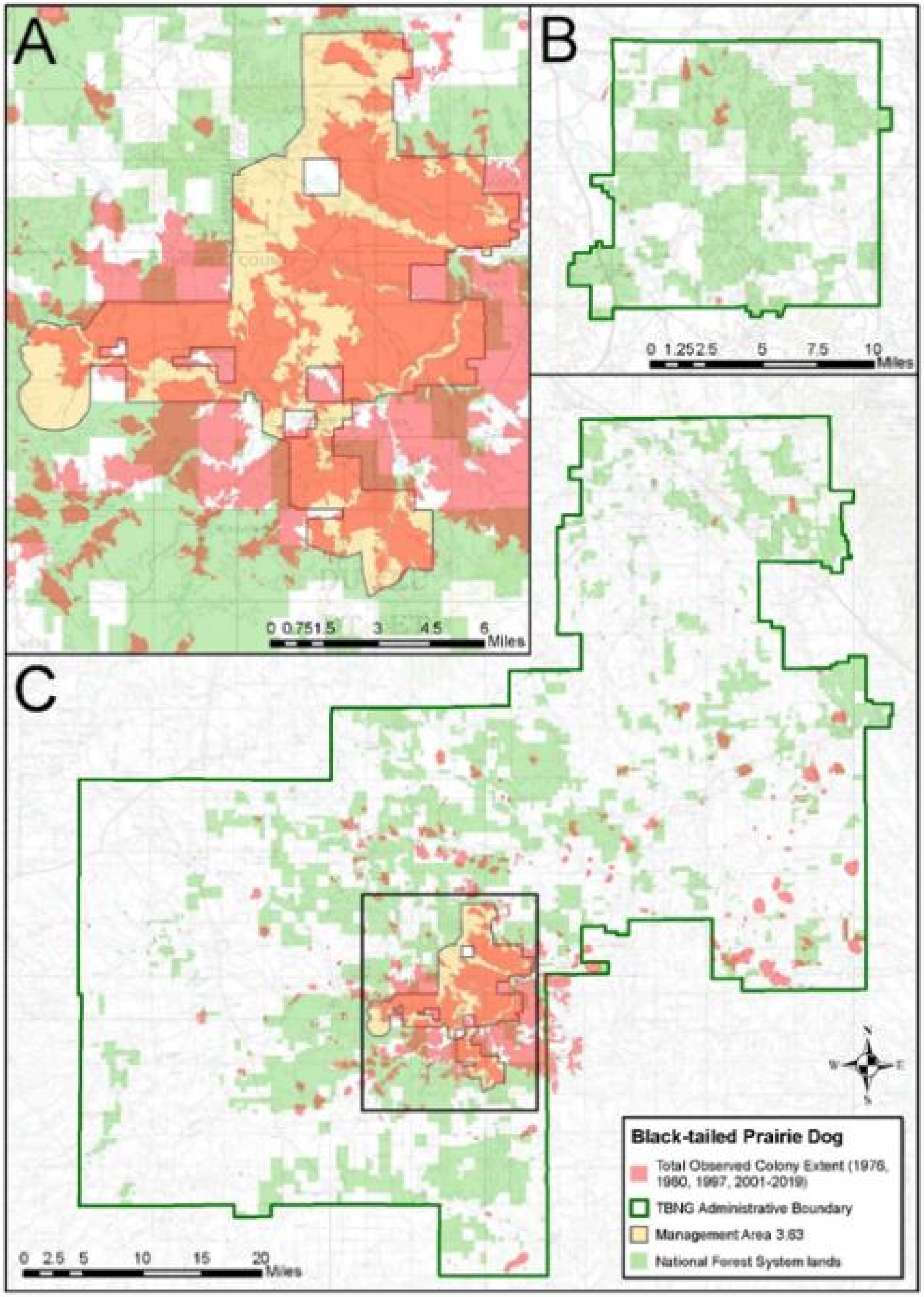

Figure E-13. Total black-tailed prairie dog colony extent on the Thunder Basin National Grassland and vicinity. The red shaded area delineates the combined extent of all historical and current prairie dog colonies observed in the area. Survey years include 1976, 1980, 1997, and 2001-2019. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data are from the local survey dataset maintained by the Douglas Ranger District, the Forest Service Enterprise Data Warehouse, and the Thunder Basin Grassland Prairie Ecosystem Association. Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of the species for the specified time period. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Environmental Consequences

Direct and Indirect Effects

Black-tailed prairie dog populations would be directly impacted by management activities used to constrain colony extent to the identified acreage objectives for prairie dog colony extent under each alternative, including alternate acreage objectives for drought management and density control. Populations are also directly impacted by sylvatic plague. Populations would be least impacted by the No Action Alternative (33,000 acres for prairie dog colony extent), followed by the Prairie Dog Emphasis Alternative (27,000 acres for prairie dog colony extent), the Grassland-wide Alternative (10,000-15,000 acreage range for prairie dog colony extent, with a 10,000 acre drought objective), and then the Proposed Action and Preferred Alternative (10,000 acre for prairie dog colony extent, with a 7,500 acre drought objective), proportional to acreage objectives described for each alternative. However, the acreage objectives in all alternatives are expected to allow for the species to maintain sufficient distribution.

The No Action Alternative limits use of rodenticides in Management Area 3.63 and Category 1 and 2 areas but allows use of rodenticides elsewhere on the TBNG. All action alternatives propose use of rodenticides for lethal control to maintain colony extent at acreage objectives. Lethal control is any direct attempt to manage the size or distribution of prairie dog colonies by killing prairie dogs. Lethal control on a broad-scale typically involves the use of rodenticides, including bait poisons and fumigants (Forrest and Luchsinger 2006). Current commonly used rodenticides in Wyoming include aluminum phosphide fumigant tablets, carbon and sodium nitrate gas cartridges, and grain baits infused with zinc phosphide or the anticoagulants chlorophacinone or diphacinone. These rodenticides generally cause in the range of 75 to 95 percent mortality within a colony (Forrest and Luchsinger 2006). Many of these poisons have use restrictions under the U.S. Environmental Protection Agency due to their potential for non-target poisoning (Witmer et al. 2016). In addition, some bait poisons become ineffective after multiple consecutive years of use because prairie dogs develop bait shyness (Sterner 1994). On the TBNG, lethal control using zinc phosphide has occurred since 1981 to control prairie dog colonies near the interface between Federal lands and state or private lands; fumigants and anticoagulants have not been permitted for use on the TBNG (USDA Forest Service 1981). The Forest Service curtailed rodenticide use on the TBNG in 1999, when the black-tailed prairie dog first came under consideration for listing under the Endangered Species Act (Byer 2001). All alternatives propose the continued use of zinc phosphide; the Grassland-wide Alternative also proposes use of fumigants and anticoagulant rodenticides, which could more effectively remove prairie dog colonies and prevent recolonization. The Preferred Alternative (Alternative 5) proposes the use of fumigants.

Sylvatic plague epizootics would continue to occur during implementation of any alternative, with limited management intervention available, and would cause contraction of prairie dog colonies and complexes until prairie dog populations recover. Black-tailed prairie dogs are very sensitive to sylvatic plague, a disease foreign to the evolutionary history of the species, and mortality often nears 100 percent during an epizootic. The cyclic nature of epizootics and the high rate of spread of plague during epizootics inhibits efforts to manage prairie dogs (Cully et al. 2006). Plague has resulted in active colony area declines ranging from 80 to nearly 100 percent across TBNG prairie dog population three times since 2001. Between large-scale epizootics, plague likely persists on TBNG in an enzootic phase. In some cases, epizootics have occurred within colonies, between the periods that are understood to constitute landscape-scale epizootics (Pauli et al. 2006). Colony area is highly variable from year-to-year as a result of plague. Though it is difficult to predict the magnitude of maximum and minimum colony extent on the TBNG, the plague cycle might be expected to regularly continue. All alternatives allow the use of plague mitigation tools such as application of deltamethrin and use of plague vaccine, and are likely to have similar levels of success protecting colonies from epizootics. The unpredictable nature of plague and its mortality complicates efforts to manage for prairie dogs (Cully et al. 2006) and associated species as a result. Deltamethrin has been shown to be an effective tool in treating prairie dogs by reducing flea infestations up to 50-80% in some cases and minimizing the potential of plague (Maestas and Britten 2019, Roth 2019). In addition, fipronil has been shown to be around 94% effective in treating fleas on small mammals (Roth 2019). Both deltamethrin and fipronil appear to exhibit residual effects for 10-12 months (Eads et al. 2019). Fipronil is considered toxic to birds and fish species, and as a result, there could be indirect impacts to species that depend on prairie dog habitat in treatment areas (Gibbons et al. 2015). Deltamethrin is considered to be less toxic to birds, however, it can kill insects around areas of use. This reduction in potential foraging could impact those species associated with prairie dog that forage and nest where deltamethrin is used. As a result, plan components were developed to restrict the use of deltamethrin and fipronil in prairie dog colonies where it may pose a risk to associated species.

While the No Action alternative generally emphasizes the growth of prairie dog colonies, changes in management direction toward increased use of prairie dog and plague control measures as proposed by the action alternatives could potentially decrease the volatility of colony size over time. It is possible that managing toward lower colony extents or use of density control as described in the Proposed Action and the Grassland-wide alternatives could maintain smaller colonies and limit the spread of sylvatic plague on the TBNG, but there is not currently scientific literature or monitoring data to demonstrate support for that hypothesis. Decreased management intervention would likely perpetuate the role of plague in colony size dynamics, thus, it is important to weigh the benefits and costs of black-tailed prairie dog management with the importance of providing well distributed habitat for at risk species on the grassland.

Recreational shooting can negatively affect black-tailed prairie dog because of its sensitivity to social disruption (Pauli and Buskirk 2007). However, studies have shown that populations are generally capable of recovering from low numbers once shooting abates, though reproductive rates are somewhat dampened relative to colonies that have not been subject to shooting (Knowles 1987, Vosburgh 1996, Pauli and Buskirk 2007). The State of Wyoming does not prohibit recreational shooting of black-tailed prairie dogs on adjacent state or private lands. Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives. The No Action and Prairie Dog Emphasis alternatives have the most limitations on recreational shooting and thus the greatest protections from this activity, with a year-round shooting prohibition in MA 3.63 and in Category 2 areas. The Proposed Action and Preferred Alternative (Alternative 5) offer the next highest level of protections, with a seasonal recreational shooting restriction in MA 3.67 from February 1 through August 15. The Grassland-wide Alternative does not include any recreational shooting restrictions and has a higher potential for loss of individuals. Lack of a year-round shooting prohibition under the Preferred Alternative (Alternative 5), Proposed Action and Grassland-wide Alternatives could limit the growth of prairie dog colonies when managing toward the 10,000 acreage objective.

In addition to lethal density control, collapsing burrows and levelling mounds may be used to limit prairie dog colony expansion or to restore areas with inactive burrows, and could result in a temporary loss of habitat or a decrease in habitat suitability.

Cumulative Effects to All Alternatives

In addition to proposed activities in each alternative, other actions contribute to potential impacts to the black-tailed prairie dog. A summary of cumulative effects are provided below.

Climate change and drought – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). Warmer winter temperatures could benefit prairie dogs, but if warmer temperatures and increased variability in precipitation patterns lead to more drought events, reduced forage quantity and quality could negatively affect prairie dog reproduction and body condition (Avila-Flores et al. 2012, Grassel et al. 2016, Stephens et al. 2018). Hot, dry conditions could additionally lead to increased flea abundance if prairie dog health diminishes (Eads et al. 2016, 2018), but overall plague risk likely varies with local ecosystem dynamics (Russell et al. 2018).

Plan Components

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

Table E-21. Plan components that support black-tailed prairie dogs and habitat availability and suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat availability – Loss of dispersal potential with use of vegetation barriers and other nonlethal management tools	*Ch. 1, Standards and Guidelines, F.23 (NA); Ch. 1, Standards and Guidelines, F.32 (NA); Ch. 1, Standards and Guidelines, F.34 (NA); Ch. 1, Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (NA); Ch. 2, Broken Hills GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (NA); Ch. 2, Cellers Rosecrans GA, Desired Conditions (NA); Ch. 2, Cellers Rosecrans GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (NA); GRSG-FM-ST-048*: These plan components encourage conditions that facilitate colony growth through vegetation management such as prescribed fire or targeted livestock grazing and by setting targets for low-structure grassland ecosystem in the Broken Hills and Cellers Rosecrans GAs.	*Ch. 1, Standards and Guidelines, F.34 (PA); Ch. 1, Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (PA); Ch. 2, Cellers Rosecrans GA, Desired Conditions (PA); GRSG-FM-ST-048*: These plan components encourage conditions that facilitate colony growth through vegetation management, including allowing opportunities for prescribed fire, and describing desired conditions for short-stature vegetation ecosystems among a mosaic of vegetation types in the Broken Hills and Cellers Rosecrans GAs.	*Ch. 1, Standards and Guidelines, F.34 (GW); Ch. 1, Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (GW); Ch. 2, Cellers Rosecrans GA, Desired Conditions (GW); GRSG-FM-ST-048*: These plan components encourage conditions that facilitate colony growth through vegetation management, including allowing opportunities for prescribed fire, and describing desired conditions for short-stature vegetation ecosystems among a mosaic of vegetation types in the Broken Hills and Cellers Rosecrans GAs.	*Ch. 1, Standards and Guidelines, F.23 (PDE); Ch. 1, Standards and Guidelines, F.32 (PDE); Ch. 1, Standards and Guidelines, F.34 (PDE); Ch. 1, Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (PDE); Ch. 2, Broken Hills GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (PDE); Ch. 2, Cellers Rosecrans GA, Desired Conditions (PDE); Ch. 2, Cellers Rosecrans GA, Standards and Guidelines, Wildlife, Black-tailed Prairie Dog (MIS), 2 (PDE); GRSG-FM-ST-048*: These plan components encourage conditions that facilitate colony growth through vegetation management such as prescribed fire or targeted livestock grazing and by setting targets for low-structure grassland ecosystem in the Broken Hills and Cellers Rosecrans GAs.	*Ch. 1, Standards and Guidelines, F.34 (Preferred); Ch. 1, Standards and Guidelines, G.6; Ch. 2, Broken Hills GA, Desired Conditions (Preferred); Ch. 2, Cellers Rosecrans GA, Desired Conditions (Preferred); GRSG-FM-ST-048*: These plan components encourage conditions that facilitate colony growth through vegetation management, including allowing opportunities for prescribed fire, and describing desired conditions for short-stature vegetation ecosystems among a mosaic of vegetation types in the Broken Hills and Cellers Rosecrans GAs.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Reductions in population size or health because of use of rodenticides or other lethal management tools	*Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 1, Standards and Guidelines, H.1 (NA); Ch. 3, MA 3.63, Standards and Guidelines, General, 1 (NA)*: Standard F.65b in Chapter 1 adopts the Black-tailed Prairie Dog Conservation Assessment and Management Strategy (Strategy), which contains the existing area targets for prairie dog colonies. Control of prairie dogs is generally not allowed under the Strategy if composite colony area is below targets. General standard 1 for MA 3.63 supports the composite colony area targets contained in the Strategy by prohibiting activities that would inhibit increases in the prairie dog population in MA 3.63 until the colonies could support a sustainable black-footed ferret population. Guideline H.1 in Chapter 1 additionally supports the colony area targets by limiting the use of rodenticides to situations in which public health, damage to facilities, and persistent encroachment are concerns. *Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits the use of fumigants in prairie dog colonies on the Grassland. *Ch. 1, Standards and Guidelines, F.64*: Standard F.64 prohibits activities that would alter water flow regimes and flood prairie dog burrows.	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-MA3.67-FWRP-ST-12 (PA)*: GPA-MA3.67-FWRP-ST-12 prohibits prairie dog density control in more than 50% of the area of an individual colony when composite colony area is smaller than the target. *GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits the use of anticoagulant rodenticides and fumigants on the Grassland. *Ch. 1, Standards and Guidelines, F.64*: Standard F.64 prohibits activities that would alter water flow regimes and flood prairie dog burrows.	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-FWRP-ST-06 (GW)*: GPA-FW-FWRP-ST-06 prohibits prairie dog density control in more than 50% of the area of an individual colony when composite colony area is smaller than the target. *GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides and fumigants except in boundary management zones after three consecutive applications of zinc phosphide. *Ch. 1, Standards and Guidelines, F.64*: Standard F.64 prohibits activities that would alter water flow regimes and flood prairie dog burrows.	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is prohibited when composite colony area does not sum to the targets. *GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05prohibits the use of anticoagulant rodenticides and fumigants on the Grassland. *Ch. 1, Standards and Guidelines, F.64*: Standard F.64 prohibits activities that would alter water flow regimes and flood prairie dog burrows.	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-12 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the objective. 7,500 acres of colonies is the minimum threshold for use of rodenticides in MA 3.67 outside of boundary management zones in all circumstances except density control. *GPA-MA3.67-FWRP-ST-15 (Preferred); GPA-MA3.67-FWRP-GL-16 (Preferred)*: GPA-MA3.67-FWRP-ST-15 stipulates that prairie dog density control is not allowed in MA 3.67 when composite colony area is less than 7,500, unless the best available scientific information indicates that density control will achieve site-specific objectives and maintain habitat requirements for associated species. GPA-MA3.67-FWRP-GL-16 indicates that density control in MA 3.67 should not occur in more than 50 percent of the area of any individual colony and should not occur

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
					more than every other year. *GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides. *GPA-FW-ADM-ST-05 (Preferred)*: GPA-FW-ADM-ST-05 prohibits use of fumigants except in boundary management zones, 1-mile buffers around residences, and within ¼-mile of non-Federal land after two consecutive applications of zinc phosphide. *Ch. 1, Standards and Guidelines, F.64*: Standard F.64 prohibits activities that would alter water flow regimes and flood prairie dog burrows.
Habitat suitability – Reductions in population size or health because of shooting	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies.	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.			composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	
Habitat suitability – Reductions in population size or health because of sylvatic plague	*Ch. 1, Standards and Guidelines, F.65b (NA)*: The strategy adopted by standard F.65b directs the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-FW-FWRP-GL-02 (PA)*: GPA-FW-FWRP-GL-02 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-FW-FWRP-GL-04 (GW)*: GPA-FW-FWRP-GL-04 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-FW-FWRP-GL-03 (PDE)*: GPA-FW-FWRP-GL-03 directs the use of sylvatic plague control tools where practical and effective to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-FW-FWRP-GL-02 (Preferred); GPA-MA3.67-FWRP-O-08 (Preferred); GPA-MA3.67-FWRP-ST-18 (Preferred)*: GPA-FW-FWRP-GL-02 allows the use of plague mitigation tools in prairie dog colonies anywhere in the plan area. GPA-MA3.67-FWRP-ST-18 mandates that an integrated approach to plague management will be used in MA 3.67 annually. GPA-MA3.67-FWRP-O-08 states that the Forest Service intends to develop a plague management plan within 3 years of plan amendment approval.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Loss of genetic diversity within colonies as a result of loss of connectivity of colonies with changes in colony distribution	*Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 2, Broken Hills GA, Objectives, Wildlife, Black-tailed Prairie Dog (MIS), 3 (NA); Ch. 2, Broken Hills GA, Objectives, Wildlife, Black-tailed Prairie Dog (MIS), 4 (NA); Ch. 2, Cellers Rosecrans GA, Objectives, Wildlife, Black-tailed Prairie Dog (MIS), 3 (NA); Ch. 2, Cellers Rosecrans GA, Objectives, Wildlife, Black-tailed Prairie Dog (MIS), 4 (NA); Ch. 3, MA 3.63, Desired Conditions (NA)*: The strategy adopted by standard F.65b states a need to manage for prairie dog colony complexes on the Grassland to support future reintroductions of black-footed ferrets. The desired conditions for MA 3.63 additionally describe a landscape with large colony complexes suitable for black-footed ferret reintroductions. The set of objectives for black-tailed prairie dog management in the Broken Hills and Cellers Rosecrans GAs aim to improve and expand colony complexes.	*Ch. 3, MA 3.67, Desired Conditions (PA)*: The desired conditions for MA 3.67 describe a landscape with intercolony distances of 4.5 miles or less where possible to develop prairie dog colony complexes.	*GPA-MA3.67-FWRP-GL-12 (GW)*: This guideline directs management for at least one complex of at least 1,500 acres of prairie dog colonies in MA 3.67.	*Ch. 2, Broken Hills GA, Objectives, Wildlife, Black-tailed Prairie Dog (MIS), 3 (PDE); Ch. 2, Cellers Rosecrans GA, Objectives, Wildlife, Black-tailed Prairie Dog (MIS), 3 (PDE); Ch. 3, MA 3.67, Desired Conditions (PDE); GPA-MA3.67-FWRP-GL-08 (PDE)*: GPA-MA3.67-FWRP-GL-08 directs management for prairie dog colony complexes where possible and at least two complexes of at least 4,500 acres in MA 3.67. The desired conditions for MA 3.67 describe a landscape with large colony complexes. The objectives for black-tailed prairie dog management in the Broken Hills and Cellers Rosecrans GAs aim to develop and maintain colony complexes in MA 3.67.	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-12 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. The Preferred Alternative does not direct management for prairie dog complexes; however, management for an objective of 10,000 acres of colonies in MA 3.67 is expected to result in colony spatial configurations allowing for common intercolony dispersal of prairie dogs.

Determination of Effects

With all activities combined, along with resource protection measures and plan components, all alternatives have an effects determination of, "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 TBNG and throughout its range. In addition, existing plan components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for prairie dog habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species' habitat on the TBNG.

The rationale for effects determinations to all alternatives is based on the availability of foraging and denning habitat on the TBNG, along with sufficient distribution of habitat within the species' range. There are numerous detections of black-tailed prairie dog on the TBNG and the species is well-distributed. Additional rationale to support the effects determinations for all alternatives includes:

- Based on historical evidence, an acreage objective of 10,000 acres for prairie dog colony extent would support a viable long-term population. Since 2001, total prairie dog colony extent on the TBNG has varied from less than 1,000 acres to over 50,000 acres, and black-tailed prairie dogs continue to persist, especially in and around management area 3.63.
- Use of plague management tools such as application of deltamethrin and fipronil would be allowed under all alternatives to move toward and maintain acreage objectives.
- A stable acreage objective of prairie dog colonies fosters social support to keep prairie dogs abundant on the landscape and minimizes conflict between competing uses. Recommendations from the stakeholder collaborative are considered and would be considered moving forward.
- Vegetation management tools and translocation are available tools encouraged for use to expand prairie dog colonies when necessary to move toward acreage objectives.
- Habitat (mostly within management area 3.63/3.67) is located among consolidated NFS land and outside of boundary management zones. Thus, the Forest Service has taken reasonable measures to ensure that proposed management actions would retain adequate habitat, are implementable, and can be achieved with limited conflicts with other resource and management objectives.
- U.S. Fish and Wildlife Service decisions not to list black-tailed prairie dogs under the Endangered Species Act were largely based on the ability of prairie dogs to reproduce prolifically and rebound rapidly after plague events.

- 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.

Overall, potential direct and indirect effects when combined with the cumulative effects generated by other activities listed above would not result in a decrease in viability for this species.

Swift Fox (*Vulpes velox*)

Introduction

Swift fox is a small canid that occupies the shortgrass and mixed-grass prairies of the western Great Plains of North America. Swift fox live in underground burrows in areas with gentle topography and short vegetation to aid in predator detection. Swift fox are generalist meso-predators that typically eat small mammals and insects. Swift fox populations declined significantly with Euro-American settlement in the 1800s and early 1900s as a result of widespread trapping for the fur trade and incidental poisoning during predator control campaigns aimed at wolves (*Canis lupus*) and coyotes (*Canis latrans*). Swift fox was extirpated in much of the northern part of its range but has since recovered with the regulation of trapping and the improvement of predator control techniques for coyotes. Predation by coyotes and land-use change from native prairie to agriculture remain moderate range-wide threats for swift fox.

The U.S. Fish and Wildlife Service found swift fox warranted for listing under the Endangered Species Act in 1995 due to apparently low populations and threats from land-use change, predation, lack of regulations for conservation, and prairie dog control programs that limit the prey base. This finding stimulated an effort by states within the swift fox range to establish a regulatory structure and monitoring and conservation program for the species. These efforts and a revelation that swift fox was more widely distributed than originally believed led U.S. Fish and Wildlife Service to remove swift fox from the Endangered Species Act candidate list in 2001. The swift fox range is expanding in many northern states and Canada, and reintroduction efforts in areas where the species was extirpated have proven successful.

On TBNG, swift fox largely inhabits black-tailed prairie dog colonies because colonies provide an abundant prey base and denning habitat. Prairie dog colonies provide burrows and attract other potential food sources such as mice. Swift fox populations on TBNG have been observed to grow and decline as prairie dog colony extent grows and declines. Causes of decline in prairie dog populations include outbreaks of sylvatic plague or anthropogenic control measures intended to reduce prairie dogs.

Range-wide Information, Distribution and Abundance

Swift fox historically occupied shortgrass and mixed-grass prairies from northern Texas to southern Canada (Scott-Brown et al. 1987). Its range covered 12 Great Plains states and southern Manitoba, Saskatchewan, and Alberta. The species' present range is approximately 44 percent of its estimated historical range in the United States and 3 percent of its historical range in Canada (Sovada et al. 2009). By the early 1900s in the United States, swift fox was extirpated from Iowa, Kansas, Minnesota, Montana, North Dakota, Nebraska, and Oklahoma, but it has since recovered across much of that area. Currently, swift fox is nearly continuously distributed from eastern Wyoming south throughout eastern Colorado, western Kansas, the Oklahoma Panhandle, and eastern New Mexico, with scattered, isolated populations in Montana, South Dakota, and Nebraska (Sovada et al. 2009). Populations remain extirpated in Iowa and Minnesota, extremely low in Texas, and, though individuals have been observed in North Dakota, no breeding populations have been documented in that state (Sovada et al. 2009, Schwalm et al. 2012). Swift fox was completely extirpated from Canada by the 1930s, but reintroduction programs in the 1980s and 1990s have established a stable population in southeastern Alberta and southwestern Saskatchewan (Pruss et al. 2008; Cullingham and Moehrenschlager 2013). Canada currently contains approximately 2 percent of the species' range (Pruss et al. 2008). The occupied range continues to expand, as swift fox repopulate suitable habitat on the northern, eastern, and southern edges of the range (Sovada et al. 2009). Range-wide abundance estimates are not available.

Life History and Habitat

Typical swift fox habitat consists of shrublands and mixed-grass prairie with flat or gently sloping topography. Swift fox select for areas with short vegetation throughout their range to facilitate predator detection (Sasmal et al. 2011, Gese and Thompson 2014). Swift fox are a meso-predator vulnerable to predation by several types of larger carnivores, especially coyotes and golden eagles (*Aquila chrysaetos*) (Moehrenschlager et al. 2007, Gese and Thompson 2014). Where short-statured vegetation is unavailable, swift fox utilize a mixture of non-native and atypical habitat throughout portions of their range, including shrublands and agricultural croplands (Kahn et al. 1997, Sasmal et al. 2011). Habitat in Wyoming, for example, though generally consisting of shortgrass prairie, also includes grasslands with a higher shrub component, including sagebrush (*Artemisia* spp.), greasewood (*Sarcobatus vermiculatus*), and saltbush (*Atriplex gardneri*) (Olson 2000). Shrubby areas may offer increased abundance of small mammalian prey (Gese and Thompson 2014). Within sagebrush shrub communities, swift fox typically use areas of lower-growing shrubs (generally less than 30 centimeters tall) more often than areas with taller shrubs (Olson 2000, Cudworth and Grenier 2013).

Across their range, swift fox utilize areas recently disturbed by fire, grazing, or prairie dogs to maintain areas of short-statured vegetation for preferred denning habitat (Thompson et al. 2008, Sovada et al. 2009). For example, in some areas, swift fox often uses prairie dog (*Cynomys* spp.) colonies, where colonies offer both short-statured vegetation and abundant prey (Uresk and Sharps 1986, Russell 2006, Dowd Stukel 2011, Sasmal et al. 2011; Nicholson et al. 2006). Swift fox populations have been shown to decline in some cases when prairie dog populations decline (Sharps 1989), indicating a local dependence on prairie dogs, especially in the absence of alternative prey (Kotliar et al. 1999). On the other hand, swift fox may avoid prairie dog colonies seasonally or when the abundance of larger predators such as coyotes is particularly high on colonies (Dowd Stukel 2011, Sasmal et al. 2011).

Swift fox live in underground burrows ("dens"), which are used year-round for pup-rearing and refuge. To enhance predator detection, den sites are typically characterized by well-drained, loamy soils and flat terrain, sloping plains, or hill tops (Olson 2000). Swift fox territories range from less than 400 acres to nearly 8,000 acres depending on quality of habitat and period within the mating cycle (Dark-Smiley and Keinath 2003, Lebsock et al. 2012).

Population Trends and Threats

Swift fox densities and distribution declined dramatically in the late 19th and early 20th centuries due to large-scale hunting and trapping for pelt trade and poisoning as a result of broad predator control campaigns targeted at wolves and coyotes (Scott-Brown et al. 1987, Kahn et al. 1997, Sovada et al. 2009). Populations in the northern Great Plains were largely extirpated by the 1930s, and the eastern edge of the range contracted greatly with land-use change. However, since the mid-20th century, swift fox populations have grown and reoccupied some portions of their former range (Sovada et al. 2009). In addition, reintroduction efforts have created genetically healthy, growing populations in Canada, Montana, and South Dakota (Ausband and Foresman 2007, Cullingham and Moehrenschlager 2013, Sasmal et al. 2013, Sasmal et al. 2016).

Though less directly influential on populations than predator control and the fur trade, the loss of native grazers, predators, and fire regimes has negatively affected swift fox. Native grazers including prairie dogs and bison (*Bison bison*) provide both habitat and a prey base (Sovada et al. 2009). Apex predators such as wolves compete with dominant meso-predators such as coyotes, and thus can prevent coyotes from overwhelming swift fox populations (Ritchie and Johnson 2009, Levi and Wilmers 2012). Coyotes prey upon and compete for prey with swift fox (Karki et al. 2007). Wolves also kill large ungulates, allowing swift fox to scavenge carrion (Sovada et al. 2009, Sivy et al. 2018). Prairie dogs, bison, and wolves were subject to broad-scale extirpation campaigns upon Euro-American settlement of the Great Plains to facilitate conversion of the land to row-crop agriculture and livestock grazing (Forrest and Luchsinger 2006, Sovada et al. 2009). Euro-American settlement also resulted in widespread fire suppression efforts, which may have negatively affected the availability of swift fox habitat in disturbed grasslands (Thompson et al. 2008).

Land-use change to row-crop agriculture and urban areas has resulted in some fragmentation of the swift fox range, but genetic diversity has been retained, likely as a result of population expansion since the mid-20th century, driven by the species' relatively high dispersal ability (Cushman et al. 2013, Schwalm et al. 2014). Swift fox are also somewhat adaptable to agricultural practices that allow for the persistence of a prey base within a pasture or field setting (Kamler et al. 2007). Some populations in the southern portion of the range are more susceptible to fragmentation than others because of geographical circumstances, and retaining connectivity across the landscape will likely be an important conservation consideration going forward (Schwalm et al. 2014).

Swift fox population declines in the 20th century have led to government efforts to protect the species. Because of its extirpation and later reintroduction in Canada, swift fox has received strong protections under the Federal Species at Risk Act in Canada since 1998 (Pruss et al. 2008). In the United States in 1995, the U.S. Fish and Wildlife Service found swift fox warranted for listing under the Endangered Species Act, but precluded by higher priority listing actions (60 FR 31663-31666). This finding stimulated the congregation of state agencies each potentially affected state to develop a conservation and monitoring plan for the species and prevent its listing under the Endangered Species Act. The agencies established the Swift Fox Conservation Team, which has met regularly to discuss monitoring results and update strategies. The agencies have been largely successful in monitoring swift fox populations and facilitating reintroductions and expansions of the population in many areas (Dowd Stukel 2011). The states were able to show a broader swift fox distribution than originally believed, and the newly implemented conservation plan allowed the U.S. Fish and Wildlife Service to remove swift fox from the list of Endangered Species Act candidate species in 2001 (66 FR 1298).

Species Status in the Plan Area

Across TBNG, swift fox have historically occurred most extensively in the area designated as management area 3.63. Management area 3.63 encompasses approximately 50,900 continuous acres of NFS land on the TBNG and is managed to support large complexes of prairie dog colonies under current management direction (USDA Forest Service 2015).

The extent of black-tailed prairie dog colonies on the TBNG has varied widely since consistent monitoring of colony area began in 2001. The extent of prairie dog colonies has varied with both lethal management activities under the plan and outbreaks of sylvatic plague. Three landscape-scale plague outbreaks have occurred on TBNG in 2001, 2005, and 2017. Recent growth and decline of prairie dog colonies on TBNG has been extreme. The Forest Service understands 2017 and 2018 to represent the maximum and minimum area of prairie dog colony extent on the TBNG since the Forest Service has managed it; measured colony extent on NFS lands during those years was more than 48,000 acres in 2017 and less than 700 acres in 2018 (note that surveys focused on management area 3.63 and vicinity and did not capture the full extent or colonies across the TBNG).

Wildland fires occur on TBNG, though the extent to which swift fox use burned areas relative to unburned areas on TBNG is unknown. Most fires on TBNG occur in July and August, after the wetter late-spring months. These fires burn primarily in grass and sagebrush fuel types, with some fires occurring in ponderosa pine stands on ridgetops. Grass fires are generally flashy and wind-driven. Ignition usually occurs during dry thunderstorm events, as a result of human activity, or due to sparks created by the railroad. The TBNG and nearby state and private lands have experienced an average of 22 fire starts per year since 2001, burning an average of approximately 3,050 acres per year across the landscape. It is unknown what proportion of these fires occurred in grassland, rather than sagebrush or forest. The maximum acreage burned on TBNG in any 1 year since 2001 was 4,259, in 2010. In addition to wildland fires, the Forest Service conducted an average of approximately 356 acres of prescribed burning in grassland habitat between 2009 and 2015 to improve habitat for black-tailed prairie dog and associated species; the Forest Service has not implemented prescribed burns since that time.

Current canid control methods on TBNG include live trapping and aerial gunning of coyotes. Swift fox are released if found caught in a live trap. Rather than a threat, coyote control may serve as a boon to swift fox populations because coyotes often prey upon swift fox (Karki et al. 2007, Parker et al. 2019). While canid control has historically caused substantial levels of direct, unintended swift fox mortality, more recent predator control methods can largely avoid killing swift fox (Young 2016).

Livestock grazing is ubiquitous on TBNG. It remains unknown whether livestock grazing improves swift fox habitat on TBNG by maintaining certain vegetation structure.

Distribution, Abundance and Population Trend in the Plan Area

Swift fox research on TBNG is limited. The Forest Service has monitored swift fox populations on the TBNG in various years since 1995. Parker et al. (2019) explored potential trophic drivers of swift fox populations on the TBNG using Forest Service abundance data.

Swift fox occupy the TBNG year-round. The majority of swift fox observations on the TBNG are clustered in management area 3.63 (Figure E-14). Forest Service swift fox survey data indicate that swift fox populations generally increased through 2016 and 2017. The Forest Service observed greater than 300 individual swift fox in both 2016 and 2017 on TBNG. The Forest Service observed 44 separate dens in 2016 and 47 separate dens in 2017. In 2017, prairie dog colonies on the TBNG collapsed as a result of an outbreak of sylvatic plague, and swift fox populations declined dramatically from 2017 to 2018 (Parker, R. A., unpublished data). Current swift fox population numbers are low relative to those observed over the past decade.

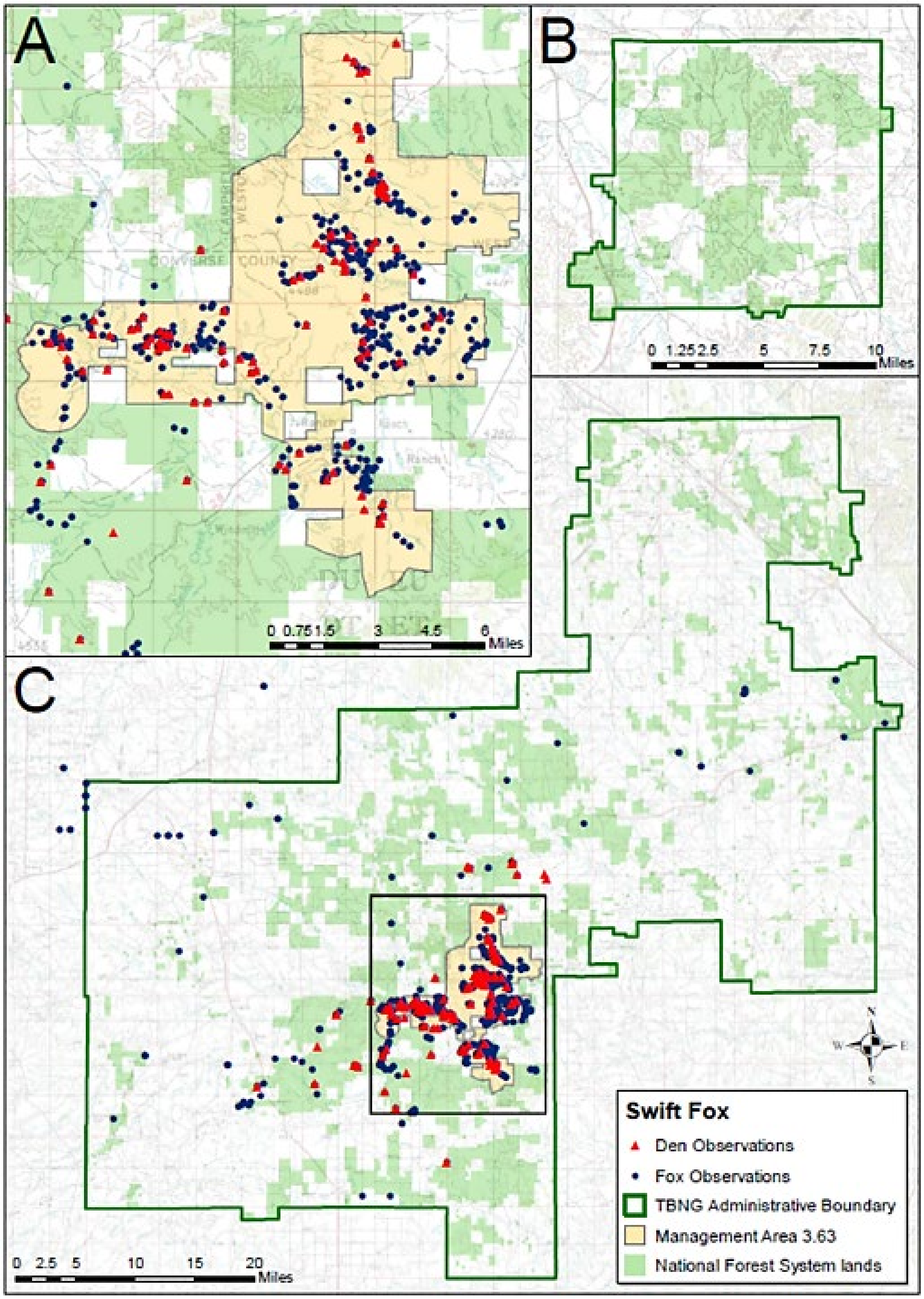

Figure E-14. Swift fox observations on the Thunder Basin National Grassland and nearby lands. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1986, 1995, 1996, 1998, 2003, 2005-2007, and 2009-2018. Observation data are from the local survey dataset maintained by the Douglas Ranger District, the Forest Service Enterprise Data Warehouse, and the Wyoming Natural Diversity Database. Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of the species on the Thunder Basin National Grassland. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Habitat Requirements and Characteristics in the Plan Area

Swift fox occurs most frequently in and around prairie dog colonies on TBNG, as these provide a large prey base and short-stature vegetation, and they occur in gentle topography that allows for the detection of threats. Parker et al. (2019) observed that swift fox population numbers on the TBNG tend to track the extent of black-tailed prairie dog colonies. Swift fox likely prey on other small mammals and insects, and may prefer areas burned or grazed by livestock for short-stature vegetation, but no studies have examined swift fox habitat relationships specific to TBNG outside of prairie dog colonies. Though swift fox may use sagebrush habitat in other portions of its range in Wyoming (Olson 2000), the species apparently does not often use sagebrush-dominated sites on TBNG.

Environmental Consequences

Direct Effects – Habitat Availability

Swift fox populations have been shown to track black-tailed prairie dog populations on the TBNG, and prairie dog colonies provide habitat for swift fox on the TBNG. Therefore, swift fox would be directly impacted by management activities used to constrain colony extent to the identified acreage objectives for prairie dog colony extent under each alternative, including alternate acreage objectives for drought management and density control. Populations would be least impacted by the No Action alternative (33,000 acreage objective for prairie dog colony extent), followed by the Prairie Dog Emphasis Alternative (27,000 acreage objective for prairie dog colony extent), the Grassland-wide Alternative (10,000-15,000 acreage objective range for prairie dog colony extent, with a 10,000 acre drought objective), and lastly, the Preferred Alternative and Proposed Action (10,000 acreage objective for prairie dog colony extent, with a 7,500 acre drought objective), proportional to acreage objectives described for each alternative. However, the acreage objectives in all alternatives are expected to allow for the species to maintain sufficient distribution.

Sylvatic plague epizootics would continue to occur during implementation of any alternative, with limited management intervention available, and would cause contraction of prairie dog colonies and complexes until prairie dog populations recover, thus limiting available habitat for swift fox. Outbreaks of sylvatic plague can cause extremely rapid contraction of active prairie dog colony acreage, resulting in rapid loss of prey base and areas with short-stature vegetation.

Indirect Effects – Habitat Suitability

The continued use of rodenticides and recreational shooting of prairie dogs may impact swift fox. Swift fox may scavenge prairie dog carcasses after a colony has been poisoned using rodenticides (Vyas et al. 2017) and as a result, rodenticides may pose a risk of secondary poisoning to swift fox. Anticoagulant rodenticides, in particular, remain potent within prairie dog carcasses for up to two weeks, causing high risk to predators and scavengers if the carcasses are not removed from the environment (Ruder et al. 2011, Witmer et al. 2016). Currently, zinc phosphide rodenticides have been used to poison prairie dogs on TBNG (USDA Forest Service 1981). Contrary to anticoagulants, zinc phosphide poses a lower secondary poisoning risk to scavengers because residues are not retained at consequential levels in carcasses (Bell and Dimmick 1975, Marsh 1987, Matschke et al. 1992).

Recreational shooting of prairie dogs can also pose a risk to swift fox as individuals may be shot. Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives. The No Action and Prairie Dog Emphasis alternatives have the most limitations on recreational shooting and thus the greatest protections from this activity, with a year-round shooting prohibition in MA 3.63 and in Category 2 areas. The Preferred Alternative and Proposed Action offers the next highest level of protections, with a seasonal recreational shooting restriction in MA 3.67 from February 1 through August 15. The Grassland-wide Alternative does not include any recreational shooting restrictions and has a higher potential for loss of individuals. In additional to accidental shooting, swift fox may ingest led shot from prairie dog carcasses, leading to secondary poisoning.

Because black-tailed prairie dogs provide the primary prey base for swift fox on the TBNG, the contraction of prairie dog colonies by anthropogenic control or plague shrinks the prey base and causes increases in vegetation height that may make swift fox more vulnerable to predation.

Cumulative Effects to All Alternatives

In addition to proposed activities in each alternative, other actions contribute to potential impacts to the swift fox. A summary of cumulative effects are provided below.

Fire suppression – Wildland fire suppression has resulted in the loss of a historically common disturbance that temporarily provided shortgrass conditions for swift fox on portions of TBNG (Thompson et al. 2008).

Predation – On TBNG, coyotes and golden eagles may prey on swift fox (Karki et al. 2007, Moehrenschlager et al. 2007). In general, swift fox compete with coyotes on TBNG. Coyotes and golden eagles may be more abundant on than off prairie dog colonies on the TBNG.

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). Increased incidence of hot days during the late spring can lead to declines in nest success (Steenhof et al. 1997, Kochert et al. 2019). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of prey because of a loss of forage for small mammalian herbivores (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for swift fox and other species will directly and indirectly reduce potential impacts (see Table E-22). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-22. Plan components that support swift fox habitat availability and suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat availability – Loss of denning habitat, foraging habitat, and prey base in prairie dog colonies because of decline in size or total area of prairie dog colonies	*Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 3.63, Standards and Guidelines, General, 1 (NA)*: Standard F.65b in Chapter 1 adopts the Black-tailed Prairie Dog Conservation Assessment and Management Strategy (Strategy), which contains the existing area targets for prairie dog colonies. Control of prairie dogs is generally not allowed under the Strategy if composite colony area is below targets. The Strategy also directs use of sylvatic plague management tools to prevent collapse of prairie dog colonies during plague epizootics and translocation to support regrowth of prairie dog colonies that have been impacted by plague. General standard 1 for MA 3.63 supports the composite colony area targets contained in the Strategy by prohibiting activities that would inhibit increases in the prairie dog population in MA 3.63 until the colonies could support a sustainable black-footed ferret population.	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-ADM-GL-07 (PA)*: GPA-FW-ADM-GL-07 stipulates that habitat value for species associated with prairie dog colonies, including swift fox, will be considered prior to lethal control in prairie dog colonies outside of boundary management zones. *GPA-FW-FWRP-GL-02 (PA)*: GPA-FW-FWRP-GL-02 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-ADM-GL-11 (GW)*: GPA-FW-ADM-GL-11 stipulates that habitat value for species associated with prairie dog colonies, including swift fox, will be considered prior to lethal control in prairie dog colonies outside of boundary management zones. *GPA-FW-FWRP-GL-04 (GW)*: GPA-FW-FWRP-GL-04 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is prohibited when composite colony area does not sum to the targets. *GPA-FW-ADM-GL-07 (PDE)*: GPA-FW-ADM-GL-07 stipulates that habitat value for species associated with prairie dog colonies, including swift fox, will be considered prior to lethal control in prairie dog colonies outside of boundary management zones. *GPA-FW-FWRP-GL-03 (PDE)*: GPA-FW-FWRP-GL-03 directs the use of sylvatic plague control tools where practical and effective to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-12 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the objective. 7,500 acres of colonies is the minimum threshold for use of rodenticides in MA 3.67 outside of boundary management zones in all circumstances except density control. *Ch. 1, Standards and Guidelines, H.1 (Preferred)*: Standard H.1 in Chapter 1 provides for considering impacts to nesting, breeding, and denning habitat for associated species in prairie dog colonies outside of MA 3.67 before control of those colonies may occur. *GPA-FW-FWRP-GL-02 (Preferred); GPA-MA3.67-FWRP-O-08 (Preferred); GPA-MA3.67-FWRP-ST-18 (Preferred)*: GPA-FW-FWRP-GL-02 allows the use of plague mitigation tools in prairie dog colonies anywhere in the plan area.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
		during plague epizootics.			GPA-MA3.67-FWRP-ST-18 mandates that an integrated approach to plague management will be used in MA 3.67 annually. GPA-MA3.67-FWRP-O-08 states that the Forest Service intends to develop a plague management plan within 3 years of plan amendment approval.
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.
Habitat suitability – Risk of direct poisoning by fumigants used in prairie dog colonies	*Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of burrow fumigants in prairie dog colonies.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05prohibits use of fumigants.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08prohibits use of fumigants except in boundary management zones after three consecutive applications of zinc phosphide.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05prohibits use of fumigants.	*GPA-FW-ADM-ST-05 (Preferred)*: GPA-FW-ADM-ST-05 prohibits use of fumigants except in boundary management zones, 1-mile buffers around residences, and within ¼-mile of non-Federal land after two consecutive applications of zinc phosphide.
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.		F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	

Determination of Effects

With all proposed activities combined, along with resource protection measures and plan components, all alternatives have an effects determination of, "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 TBNG and throughout its range. In addition, existing plan components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for swift fox habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

This species also meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts or substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for this species' habitat on the TBNG.

The rationale for effects determinations to all alternatives is based on the availability of foraging and denning habitat in and adjacent to the TBNG, along with sufficient distribution of habitat within the species' range. There are numerous detections of swift fox on the TBNG and the species is well-distributed. Primary impacts of the alternatives include those activities that would decrease available habitat and cause potential mortality. Additional rationale to support the effects determinations for all alternatives includes:

- Swift fox often den in and around prairie dog colonies on TBNG, but will den elsewhere and prey on a diversity of small vertebrates. Swift fox prefer short-stature vegetation around dens but do not rely exclusively on prairie dogs for habitat. They can dig their own dens.
- Acreage objectives in action alternatives will reduce overall prey availability relative to the No Action alternative, but swift fox do not rely solely on prairie dogs as prey. While population numbers have been observed to track fluctuations in prairie dog colony extent, acreage objectives would provide a sufficient prey base for the swift fox population. The swift fox population has rebounded and persisted through two previous landscape-wide epizootics.
- Plague control methods can be used at any time in any colony. Deltamethrin has regularly been used in the past and plague control may benefit swift fox by reducing the probability of landscape-wide prairie dog population collapse.
- Secondary poisoning from zinc phosphide is not expected. Use of anticoagulant rodenticides in the Grassland-wide alternative may lead to secondary poisoning in swift fox, but those effects would only occur in small areas and to a few individuals.
- Recreational shooting would have a less effect on swift fox in alternatives 1, 2, and 4 because of year-round and seasonal shooting prohibitions in management area 3.63/3.67 and Category 2 areas. However, individuals may still be shot accidentally outside of restricted areas or

timeframes. There is higher potential for loss of individuals in the Grassland-wide alternative because shooting is not restricted in management area 3.67 at any time. In addition, swift fox may ingest led shot from prairie dog carcasses leading to secondary poisoning.

Overall, potential direct and indirect effects under this alternative, when combined with the cumulative effects generated by other activities listed above would not result in a decrease in viability for this species.

Effects Analysis – Potential Species of Conservation Concern

A preliminary list of potential species of conservation concern (SCC) for the TBNG was generated using the criteria in the 2012 Planning Rule (36 CFR 219.9, FSH 1909.12_ 20, 23.13) (described in greater detail in Section V of the TBNG Potential Species of Conservation Concern Evaluation document).

The following section analyzes the effects of the plan amendment on potential species of conservation concern in greater detail. The focus of this analysis is to determine if adverse impacts or lessened protections for each species rise to the level of "substantial" (81 Federal Register 90726). A substantial adverse impact would be an impact that causes the viability of the species on the TBNG to be lost. Similarly, a substantially lessened protection would result if the plan amendment removes or lessens a protection necessary to maintain a viable population of that species on the TBNG. Isolated impacts or mortality among individuals of a species are not considered substantial unless viability across the plan area is lost.

Overall, seven wildlife species were shown to rely on prairie dogs for food or habitat and have the potential to be affected by the plan amendment through changes to the size, distribution, or total extent of prairie dog colonies (see Table E-23). Burrowing owl (*Athene cunicularia*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), McCown's longspur (*Rhynchophanes mccownii*), mountain plover (*Charadrius montanus*), and swift fox (*Vulpes velox*) rely to varying degrees on prairie dog colonies for prey and habitat on the TBNG. Black-tailed prairie dog itself is another species whose population viability will depend largely on the direction contained in the plan amendment. In contrast to these seven species, Brewer's sparrow (*Spizella breweri*), grasshopper sparrow (*Ammodramus savannarum*), greater sage-grouse (*Centrocercus urophasianus*), sagebrush sparrow (*Artemisiospiza nevadensis*), and sage thrasher (*Oreoscoptes montanus*) are grassland and sagebrush bird species that may be affected by losses in available habitat if prairie dog colonies grow to extremely large sizes. Ten additional species, though they do not rely on prairie dog colonies for survival and will not likely be impacted by changes in the size or distribution of prairie dog colonies in the plan area, may sometimes use prairie dogs as prey. The use of some types of rodenticides or lead ammunition for recreational shooting of prairie dogs could result in non-target poisoning to individuals of these 10 species. These species include bald eagle (*Haliaeetus leucocephalus*), California gull (*Larus californicus*), merlin (*Falco columbarius*), northern harrier (*Circus cyaneus*), peregrine falcon (*Falco peregrinus*), plains hog-nosed snake (*Heterodon nasicus*), prairie rattlesnake (*Crotalus viridis*), ring-billed gull (*Larus delawarensis*), short-eared owl (*Asio flammeus*), and Swainson's hawk (*Buteo swainsoni*). Three final species, chestnut-collared longspur (*Calcarius ornatus*), long-billed curlew (*Numenius americanus*), and thirteen-lined ground squirrel (*Ictidomys tridecemlineatus*), likely often inhabit prairie dog colonies and could experience unintended mortality as a result of recreational shooting or the use of rodenticides.

Table E-23. Summary of habitat and rationale for effects determinations for all alternatives for the preliminary list of potential species of conservation concern

Class	Common Name	Status	Habitat Features	Possible Impacts from Plan Amendment	Determination for All Alternatives
Bird	Bald Eagle	Potential SCC	Nests in forested areas adjacent to rivers and large bodies of water, although a small number are found nesting along smaller drainages and lakes; opportunistic forager and will take waterfowl and other birds, small and mid-sized mammals, and carrion	May sometimes use prairie dogs as prey. The use of some types of rodenticides or lead ammunition for recreational shooting of prairie dogs could result in non-target poisoning to individuals.	No substantial adverse impacts and no substantially lessened protections anticipated.
Bird	Brewer's Sparrow	Sensitive, Potential SCC	Sagebrush obligate species	Grassland and sagebrush bird species that may be affected by losses in available habitat if prairie dog colonies grow to extremely large sizes.	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for more information.
Bird	Burrowing Owl	Sensitive, Potential SCC	Open terrain such as grasslands, prairies, shrub-steppe, and deserts, preferring well-draining or gently sloping areas with low vegetation and a high percentage of bare ground, where active and inactive prairie dog colonies exist, due to dependence on previously excavated by mammals to provide nesting and forage habitat.	Rely on prairie dogs for food or habitat. Potential to be affected by changes to the size, distribution, or total extent of prairie dog colonies.	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for more information.
Bird	California Gull	Potential SCC	Shorebird generalist. Will inhabit a variety of conditions near water.	May sometimes use prairie dogs as prey. The use of some types of rodenticides or lead ammunition for recreational shooting of prairie dogs could result in non-target poisoning to individuals.	No substantial adverse impacts and no substantially lessened protections anticipated.
Bird	Chestnut-collared Longspur	Sensitive, Potential SCC	Open tracts of shortgrass and mixed-grass prairie; may use prairie dog colonies as habitat	Often inhabit prairie dog colonies and could experience unintended mortality as a result of recreational shooting or the use of rodenticides	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for more information.
Bird	Dickcissel	Potential SCC	Grassland obligate species that breeds primarily in open prairie grasslands		No substantial adverse impacts and no substantially lessened protections anticipated.

Class	Common Name	Status	Habitat Features	Possible Impacts from Plan Amendment	Determination for All Alternatives
Bird	Ferruginous Hawk	Sensitive, Potential SCC	Open lower-elevation grassland, shrub-steppe, and desert habitats and tends to avoid croplands, forests, and narrow canyons; in winter, concentrates in grasslands where prairie dog colonies exist	Rely on prairie dogs for food or habitat. Potential to be affected by changes to the size, distribution, or total extent of prairie dog colonies.	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for analysis.
Bird	Golden Eagle	Potential SCC	Nest in trees, and nests are especially concentrated in cottonwood galleries along riparian corridors; opportunistic forager for fish, other birds and mammals, including prairie dogs	Rely on prairie dogs for food or habitat. Potential to be affected by changes to the size, distribution, or total extent of prairie dog colonies.	No substantial adverse impacts and no substantially lessened protections anticipated.
Bird	Grasshop-per Sparrow	Sensitive, Potential SCC	Broad array of open grassland habitat types, including prairie dog colonies	Grassland and sagebrush bird species that may be affected by losses in available habitat if prairie dog colonies grow to extremely large sizes.	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for analysis.
Bird	Greater Sage-grouse	Sensitive, Potential SCC	Sagebrush obligate species that depends on large areas of contiguous sagebrush	Grassland and sagebrush bird species that may be affected by losses in available habitat if prairie dog colonies grow to extremely large sizes.	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for analysis.
Bird	Long-billed curlew	Sensitive, Potential SCC	Breeding habitat comprised of sparsely-vegetated shortgrass or mixed-grass prairie environments, often dominated by Wire Grass and Mountain Timothy, with low vegetation (≤ 10–30 cm) and topography that is flat or gently sloping; winter habitat comprised of coastal estuaries, mudflats, salt marshes, wetlands, flooded fields, agricultural fields and pastures, and a variety of manmade waterbodies	Often inhabit prairie dog colonies and could experience unintended mortality as a result of recreational shooting or the use of rodenticides	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for analysis.
Bird	McCown's Longspur	Sensitive, Potential SCC	Large tracts of open, semi-arid, shortgrass prairie and heavily-grazed mixed-grass rangeland with low and sparse vegetation, extensive bare ground, and little ground litter, including prairie dog colonies	Rely on prairie dogs for food or habitat. Potential to be affected by changes to the size, distribution, or total extent of prairie dog colonies.	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for analysis.

Class	Common Name	Status	Habitat Features	Possible Impacts from Plan Amendment	Determination for All Alternatives
Bird	Merlin	Potential SCC	Typically associated with woody draws, rocky outcrops and cliff habitat.	May sometimes use prairie dogs as prey. The use of some types of rodenticides or lead ammunition for recreational shooting of prairie dogs could result in non-target poisoning to individuals.	No substantial adverse impacts and no substantially lessened protections anticipated.
Bird	Mountain Plover	Sensitive, Potential SCC	Open terrain such as grasslands, prairies, shrub-steppe, and deserts, preferring well-draining or gently sloping areas with low vegetation and a high percentage of bare ground, and in some parts of range, where active and inactive prairie dog colonies exist	Rely on prairie dogs for food or habitat. Potential to be affected by changes to the size, distribution, or total extent of prairie dog colonies.	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for analysis.
Bird	Northern Harrier	Sensitive, Potential SCC	Typically associated with wetlands, marshes, or thicker vegetation in open habitats	May sometimes use prairie dogs as prey. The use of some types of rodenticides or lead ammunition for recreational shooting of prairie dogs could result in non-target poisoning to individuals.	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for analysis.
Bird	Peregrine Falcon	Potential SCC	Typically associated with cliff habitat.	May sometimes use prairie dogs as prey. The use of some types of rodenticides or lead ammunition for recreational shooting of prairie dogs could result in non-target poisoning to individuals.	No substantial adverse impacts and no substantially lessened protections anticipated.
Bird	Ring-billed Gull	Potential SCC	Shorebird generalist. Will inhabit a variety of conditions near water.	May sometimes use prairie dogs as prey. The use of some types of rodenticides or lead ammunition for recreational shooting of prairie dogs could result in non-target poisoning to individuals.	No substantial adverse impacts and no substantially lessened protections anticipated.
Bird	Sagebrush Sparrow	Sensitive, Potential SCC	Sagebrush-obligate species that breeds preferentially in arid shrub lands dominated by Big Sagebrush	Grassland and sagebrush bird species that may be affected by losses in available habitat if prairie dog colonies grow to extremely large sizes.	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for analysis.
Bird	Sage Thrasher	Potential SCC	Sagebrush-obligate species that breeds preferentially in arid shrub lands dominated by Big Sagebrush	Grassland and sagebrush bird species that may be affected by losses in available habitat if prairie dog colonies grow to extremely large sizes.	No substantial adverse impacts and no substantially lessened protections anticipated.

Class	Common Name	Status	Habitat Features	Possible Impacts from Plan Amendment	Determination for All Alternatives
Bird	Short-eared Owl	Potential SCC	Open habitat including: intermountain, prairie, and coastal grasslands, sagebrush steppe, marshes, arctic tundra, and shrub-steppe plateaus	May sometimes use prairie dogs as prey. The use of some types of rodenticides or lead ammunition for recreational shooting of prairie dogs could result in non-target poisoning to individuals.	No substantial adverse impacts and no substantially lessened protections anticipated.
Bird	Swainson's Hawk	Potential SCC	Open grasslands, shrub-steppe, and prairies, as well as agricultural areas where crop height does not greatly exceed that of native grasses	May sometimes use prairie dogs as prey. The use of some types of rodenticides or lead ammunition for recreational shooting of prairie dogs could result in non-target poisoning to individuals.	No substantial adverse impacts and no substantially lessened protections anticipated.
Bird	Upland Sandpiper	Potential SCC	Open grasslands, moderately tall, dense vegetation for nest concealment		No substantial adverse impacts and no substantially lessened protections anticipated.
Bird	Black-tailed Prairie Dog	Sensitive, Potential SCC	Short statured grassland and bare ground; flat areas with short vegetation and few visual barriers	Potential to be affected by changes to the size, distribution, or total extent of prairie dog colonies.	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for analysis.
Mammal	Swift Fox	Sensitive, Potential SCC	Short-grass and mid-grass prairies with flat or gently sloping topography; utilizes previously excavated burrows by other mammals for denning habitat	Rely on prairie dogs for food or habitat. Potential to be affected by changes to the size, distribution, or total extent of prairie dog colonies.	No substantial adverse impacts and no substantially lessened protections anticipated. See Sensitive Species section for analysis.
Mammal	Thirteen-lined Ground Squirrel	Potential SCC	Open areas with short grass and well-drained loamy or sandy soils for burrows	Often inhabit prairie dog colonies and could experience unintended mortality as a result of recreational shooting or the use of rodenticides	No substantial adverse impacts and no substantially lessened protections anticipated.
Reptile	Plains Hog-nosed Snake	Potential SCC	Grasslands with sandy or gravelly areas for burrowing; however, open brush land and woodland, farmlands, canyon bottoms, scrub brush, and floodplains	May sometimes use prairie dogs as prey. The use of some types of rodenticides or lead ammunition for recreational shooting of prairie dogs could result in non-target poisoning to individuals.	No substantial adverse impacts and no substantially lessened protections anticipated.
Reptile	Prairie Rattlesnake	Potential SCC	Plains, foothills, scarp woodlands, and granite or limestone outcrops; including prairie dog colonies	May sometimes use prairie dogs as prey. The use of some types of rodenticides or lead ammunition for recreational shooting of prairie dogs could result in non-target poisoning to individuals.	No substantial adverse impacts and no substantially lessened protections anticipated.

Bald Eagle (*Haliaeetus leucocephalus*)

Introduction

Bald eagle is a large raptor native to North America. Bald eagle breeding and winter habitat typically consists of forested areas near large bodies of water. Bald eagle nest and roost in large trees and snags, and in the winter will gather in communal roosts at sites with readily available prey. Preferred prey consists of fish and waterfowl, and migrating bald eagle will often follow waterfowl migrations or fish spawning runs. Bald eagle are adaptable to a variety of overwintering habitats and occur across the United States during the non-breeding season. Where preferred prey are not available, bald eagle will readily scavenge carrion of all types or steal food from other predators.

Bald eagle populations declined sharply in the mid-20th century as a result of over-hunting and secondary poisoning from the insecticide DDT. Bald eagle received species-specific Federal protections in the United States beginning in 1940, but populations did not recover until the ban of DDT for agricultural use in the 1970s. Bald eagle was delisted under the Endangered Species Act in 2007, because of the recovery of its population numbers and distribution across its historical range. Bald eagle continue to face significant amounts of mortality due to secondary poisoning, especially through lead shot. Other significant causes of mortality include poaching, electrocution on powerlines, and collisions with automobiles as bald eagles scavenge roadkill.

Range-wide Information, Distribution and Abundance

The breeding range of bald eagle extends from Alaska through much of Canada and the Great Lakes Region. Localized breeding occurs in the Snake River Basin, Great Plains, and coastal regions in the United States. During the non-breeding season, bald eagles occur from southern Alaska and southern Canada to northern and coastal Mexico.

Life History and Habitat

Bald eagle preferred breeding habitat consists of forested areas of relatively open canopy containing larger trees and snags adjacent to large bodies of water. Bald Eagles typically nest in mature and old-growth forest with some habitat edge, usually within approximately 2 miles of water, with suitable foraging opportunities (Sherrod et al. 1976, Buehler 2000). Pairs usually use live trees for the nest site and adjacent snags for perching (Herrick 1924, Gerrard et al. 1975, Swenson et al. 1986, Anthony and Isaacs 1989, Wood et al. 1989, Livingston et al. 1990). They usually place the nest in the top quarter of a tree, just below the crown (Swenson et al. 1986). Bald eagles select very large trees for nesting in order that the limbs are capable of holding the nest. Nests are large and consist primarily of sticks. Nest building generally begins 1 to 3 months prior to egg-laying, with pairs fledging one brood per season.

In the western portions of its range, bald eagle usually roosts in coniferous trees (Hansen et al. 1980, Anthony et al. 1982, Keister and Anthony 1983), except in some riparian zones (Shea 1973, Servheen 1975). Roost trees range in diameter from approximately 12 to 43 inches and in height from approximately 49 to 197 feet (Stalmaster 1987). Roost trees can be much farther from aquatic foraging areas (e.g., greater than approximately 6 miles) than nest trees (Hansen et al. 1980, Harmata 1984, Keister et al. 1985). Bald eagles often congregate at communal roosts during the winter. Winter roosts are generally protected from the wind and near good foraging habitat (Buehler 2000). Bald eagles will use the same winter roost sites annually, and sites are protected under the Bald and Golden Eagle Protection Act (Buehler 2000; 16 U.S.C. 668 et seq.).

Bald eagle is an opportunistic forager that eats a variety of mammalian, avian, and reptilian prey, but it generally prefers fish over other food types. It often scavenges when available and captures its own prey only as a last resort. While hunting, it typically perches on large trees close to water (Buehler 2000).

Population Trends and Threats

Bald eagles became rare in the mid- to late 1900s in the contiguous United States because of shooting, trapping, and widespread non-target poisoning by agricultural pesticides (primarily DDT), which significantly lowered reproductive success (Buehler 2000). The species became federally protected in the United States under the Bald and Golden Eagle Protection Act and preceding acts in 1940, and was listed and protected under the Endangered Species Act and preceding acts in 1967. However, populations did not rebound until the ban of the use of DDT in agriculture in the United States in 1972, and numbers are now stable to increasing. Legal protections from take, active restoration of habitats, and enhanced reproductive success following the DDT ban all contributed to the species' recovery (72 FR 37346-37372).

Bald eagle is currently secure throughout its range due to a now abundant and widespread population in North America (Buehler 2000). Short-term population trends across the range are stable or increasing (Sauer et al. 2017). Despite its recovery, the species is susceptible to a number of continuing threats, particularly environmental contaminants such as lead or other pesticides, human disturbance to nests or roosts, shooting, and habitat loss resulting from timber harvest in some parts of the country or the decline of prey bases, especially salmon runs in winter and migratory habitat. Human development and disturbance near the nest site, particularly recreation and shoreline activity during nesting season and loss of nest sites in large trees, are risk factors (Buehler 2000). Since the early 1980s, greater than one-quarter of bald eagle mortalities have resulted from poisoning, with nearly two-thirds of poisonings caused by ingestion of lead (Russell and Franson 2014). Much lead poisoning likely results from scavenging on shot waterfowl, big game, or varmint carcasses that the shooter has not recovered (Pattee and Hennes 1983). Other significant causes of death include secondary poisoning by organophosphate insecticides, electrocution on powerlines, collisions with automobiles while feeding on roadkill, and intentional shooting by humans, which together accounted for more than 1,300 known bald eagle mortalities between 1982 and 2013 (Russell and Franson 2014).

Species Status in the Plan Area

On the TBNG, bald eagles do not depend on prairie dog colonies for prey or habitat.

Distribution, Abundance and Population Trend in the Plan Area

Bald eagles use TBNG for both nesting (infrequently) and winter roosting. Several communal winter roosts exists across the TBNG, and wintering bald eagles generally feed on carrion, including livestock, ungulates, or small mammals killed by other predators or humans. Bald eagles very infrequently nest on the TBNG, and typically use large cottonwood trees in riparian corridors. Bald eagles may feed on dead or dying prairie dogs after lethal control or recreational shooting occurs in a prairie dog colony, and secondary poisoning from anticoagulant rodenticides or ingestion of lead ammunition could cause mortality in individuals.

Pesticide and other chemical poisoning, including PCBs, mercury, and lead, continue to negatively affect the species in many portions its range (Andreotti et al. 2018, Barnes et al. 2019), but none known to have exerted population effects on bald eagle in North America (Dement et al. 1986, Stone and Okoniewski 1988, Peakall et al. 1990).

Environmental Consequences

Direct and Indirect Effects

Recreational shooting and secondary poisoning from contaminated prey would be the primary activities to cause potential mortality to the species.

Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives, but limits to recreational shooting exist in specific locations. Effects of recreational shooting include bald eagles getting shot and killed or ingesting lead while scavenging, leading to secondary poisoning. The No Action and Prairie Dog Emphasis alternatives have the most limitations on recreational shooting and thus the greatest protections for bald eagle from this activity, with a year-round shooting prohibition in MA 3.63 and in Category 2 areas. The Proposed Action and Preferred Alternative offer the next highest level of protections, with a seasonal recreational shooting restriction in MA 3.67 from February 1 through August 15. The Grassland-wide Alternative does not include any recreational shooting restrictions.

The Grassland-wide alternative would also allow for the use of anticoagulant rodenticides in the boundary management zone after three applications of zinc phosphide prove ineffective. Anticoagulant rodenticides remain potent within prairie dog carcasses for up to 2 weeks, causing risk to predators and scavengers such as bald eagles if the carcasses are not removed from the environment (Ruder et al. 2011, Witmer et al. 2016).

Cumulative Effects

Electrocution – Electrocution on powerlines is a significant cause of mortality of bald eagle across its range (Russell and Franson 2014, O’Neil 1988), and could be associated with energy development on the TBNG, as has been shown for golden eagles (Phillips and Beske 1981).

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of prey (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for bald eagle and other species will directly and indirectly reduce potential impacts (Table E-24). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-24. Plan components that support bald eagle habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Determination of Effects

Bald eagle meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for bald eagle habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations for all alternatives is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species' range.

Additional rationale to support the effects determinations include:

- Bald eagles nest in tall trees near water and are a very uncommon breeder on TBNG. Several winter roosts exist on the TBNG. Roosts and nests would not be affected by prairie dog colony expansion or contraction.
- Secondary poisoning from zinc phosphide is not expected in any alternatives.
- In the Grassland-wide Alternative, mortality to individuals could occur from secondary poisoning from anticoagulants; however, those effects would only occur in small areas and to a few individuals. Anticoagulant use would be uncommon, occur only after 3 years of zinc phosphide use in an area, and is not likely to occur across the TBNG at any given time. Therefore, it is expected that mortality could occur to a few individuals in this alternative during any given application, but would but would not apply to the larger population across the TBNG.
- There is potential for shooting of other animals in the vicinity of prairie dog colonies during recreational shooting activities, and bald eagle could occasionally be shot. Effects would be localized and very infrequent.
- Use of lead ammunition for recreational shooting in prairie dog colonies could cause secondary lead poisoning to individual eagles, but effects would be localized.

California Gull (*Larus californicus*)

Introduction

California gull is a medium-sized seabird of western North America. California gulls breed on islands in inland freshwater or saline lakes, reservoirs, rivers, and wetlands. Wintering habitat spans the Pacific coast from southern British Columbia to southern Mexico. California gulls are extreme diet generalists and will eat all types of small vertebrates and arthropods, carrion, and garbage. Few California gulls occur on the TBNG because breeding habitat is extremely limited. California gulls occasionally use the TBNG as migratory habitat or for foraging when breeding on reservoirs in the vicinity. California gulls have no direct habitat relationships with prairie dog colonies, but may feed on dead or dying prairie dogs in colonies that have been subject to recreational shooting or lethal control. For this reason, the potential for secondary poisoning by lead ammunition or anticoagulant rodenticides exists.

Range-wide Information, Distribution and Abundance

The breeding range of California gull extends from the southern Northwest Territories through Alberta and Saskatchewan southward through the northern Great Plains and portions of the shrub-steppe region the Great Basin, Columbia River Basin, Snake River Basin, and western Wyoming, northern Utah, and northern Colorado. California Gull migrates through much of the western United States and western Canada to winter along the Pacific Coast from Vancouver to southern Mexico. California gull is abundant throughout its range (Winkler 1996).

Life History and Habitat

California gull breeds on islands in freshwater or saltwater lakes, reservoirs, or rivers. Foraging habitat extends widely from island breeding sites, and includes any landscape type, ranging from open native landscapes, to urban areas and landfills. Wintering habitat includes a variety of marine habitats along the Pacific Coast, including beaches, rocky coasts, estuaries, river deltas, and coastal waters (Winkler 1996).

California gull is an opportunistic feeder and extreme diet generalist, and depending on where a breeding colony is located, its diet during the breeding season may include small mammals, fish, birds, carrion, garbage, and a variety of invertebrates (Winkler 1996).

Population Trends and Threats

The range-wide California gull population is very large. The species has a large range, and populations appear to be secure (Lepage, Birdlife International 2019). Though California gull population numbers are difficult to estimate due to their colonial and gregarious nature, some sources estimate population growth in the twentieth century as a result of increased habitat availability in agricultural areas and reservoirs and increased availability of food in urban areas in the form of garbage (Winkler 1996).

California gulls are generally not considered agricultural pests because they may consume insect pests, and they are not often harassed or shot by farmers. However, California gull populations are susceptible to frequent human and animal disturbances at nesting sites and to the degradation of suitable nesting habitats as a result of inundation, vegetative growth, or draining of wetlands. Limited analyses of pesticide contamination has indicated little or no threat of mortality. The ingestion of or entanglement in plastic while foraging at landfills is a significant source of mortality to individuals (Winkler 1996).

Species Status in the Plan Area

California gulls do not depend on prairie dog colonies and often prefer habitat near water.

Distribution, Abundance and Population Trend in the Plan Area

California gull occurs very infrequently on the TBNG and primarily uses the area as migratory habitat. Observations from the citizen science birding database eBird shows that reservoirs near the TBNG may host breeding populations of California gull (https://ebird.org/; Sullivan et al. 2009). No research has examined California gull habitat and occurrence on the TBNG specifically.

Environmental Consequences

Direct and Indirect Effects

All alternatives are considered to have similar impacts to this species. Recreational shooting would be the primary activity to cause potential mortality to the species. Gulls may scavenge dead or dying prairie dogs and be susceptible to secondary poisoning by lead ammunition or anticoagulant rodenticides.

Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives, but limits to recreational shooting exist in specific locations. Effects of recreational shooting include California gulls getting shot and killed or ingesting lead while scavenging, leading to secondary poisoning. The No Action and Prairie Dog Emphasis alternatives have the most limitations on recreational shooting and thus the greatest protections for bald eagle from this activity, with a year-round shooting prohibition in MA 3.63 and in Category 2 areas. The Proposed Action and Preferred Alternative offers the next highest level of protections, with a seasonal recreational shooting restriction in MA 3.67 from February 1 through August 15. The Grassland-wide Alternative does not include any recreational shooting restrictions.

The Grassland-wide alternative would also allow for the use of anticoagulant rodenticides in the boundary management zone after three applications of zinc phosphide prove ineffective. Anticoagulant rodenticides remain potent within prairie dog carcasses for up to 2 weeks, causing risk to predators and scavengers such as California gulls if the carcasses are not removed from the environment (Ruder et al. 2011, Witmer et al. 2016).

Cumulative Effects to All Alternatives

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of prey because of a loss of forage (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will directly and indirectly reduce potential impacts to California gull (Table E-25). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-25. Plan components that support California gull habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management. *Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of grain-bait rodenticides in prairie dog colonies from January 1 to September 30 to protect migratory birds from consumption of poisoned baits.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide. *Ch. 1, Standards and Guidelines, H.2 (GW)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Determination of Effects

California gull meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for California gull habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations for all alternatives is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species' range.

Additional rationale to support the effects determinations include:

- California gulls are very infrequent inhabitants of TBNG and not associated with prairie dog habitat. They likely breed on reservoirs in the vicinity and may forage during breeding season or migrate through TBNG.
- Secondary poisoning from zinc phosphide is not expected in any alternative.
- Mortality due to secondary poisoning from anticoagulants in the Grassland-wide Alternative (Alternative 3) could occur; however, those effects would only occur in small areas and to a few individuals. Anticoagulant use would be uncommon, occur only after 3 years of zinc phosphide use in an area, and is not likely to occur across the TBNG at any given time. Therefore, it is expected that mortality could occur to a few individuals in the Grassland-wide Alternative (Alternative 3) during any given application, but would but would not apply to the larger population across the TBNG.
- There is potential for shooting of other animals in the vicinity of prairie dog colonies during recreational shooting activities, and California gull could occasionally be shot. Effects would be localized and very infrequent.
- Use of lead ammunition for recreational shooting in prairie dog colonies could cause lead poisoning to individuals, but effects would be localized.

Dickcissel (*Spiza americana*)

Introduction

Dickcissel is a grassland bird that prefers tall, dense grasses and forbs for nesting and breeding habitat. The core of the breeding range is in the mixed-grass and tallgrass prairies of the central United States, though the species will wander and breed widely across the Great Plains region in an annually shifting distribution. Despite loss of native grassland across its breeding range, the species has proven adaptable to change, successfully nesting in a variety of different agricultural pastures and crop fields. Dickcissel nonetheless faced large declines in the mid-20th century, likely due to large-scale eradication efforts on the species' wintering grounds in South America, where it is a pest to grain farmers. Current range-wide populations appear stable.

Range-wide Information, Distribution and Abundance

Dickcissel is a common North American grassland obligate bird species with its core breeding habitat in the central Great Plains of the United States. Dickcissel breeds most abundantly in Illinois, Iowa, Kansas, Missouri, Oklahoma, and eastern Nebraska. Within this core range, dickcissel is abundant and adaptable to changes in habitat conditions. Dickcissel are known for their nomadic movements and during the breeding season will move beyond the core breeding range in search of extensive grassland habitat (Temple 2002). Dickcissel is a long distance migrant, wintering in Central America and the northern part of South America. In Wyoming, dickcissel breeds in northwestern Great Plains grasslands and irrigated hayfields in the northeastern corner of the state where it can be both a migrant and summer resident (Faulkner 2010, Orabona et al. 2016).

Life History and Habitat

Dickcissel occupy a broad spectrum of grassland and savanna habitats including lightly grazed pastures, hayfields, agricultural land, and prairies. The core breeding range lies in the mixed-grass and tallgrass prairies of the central United States. Breeding and non-breeding habitats are similar and are characterized by dense, tall grasses and abundant forbs (Fritcher et al. 2004, Elliot and Johnson 2017, Jones et al. 2017, Port and Schottler 2017). Tall grasses are important for concealment from predators and protection from inclement weather both during nesting and post-fledging (Jones et al. 2017). In addition, a high density of potential perches allows singing males to be able to attract females during the breeding season (Temple 2002).

Dickcissel breeds between April and May, and tends to remain in its breeding range until migration begins in September or October (Terres 1980, Hilty and Brown 1986). Dickcissels typically locate their nests in dense ground vegetation or sometimes trees and shrubs (Temple 2002). Nesting territories can vary from less than half an acre to over 3.5 acres, depending on the density of dickcissel in an area (Temple 2002). The species feed on small insects, spiders, seeds, and grains (Terres 1980).

Population Trends and Threats

Data from the U.S. Geological Survey North American Breeding Bird Survey indicate that Dickcissel populations declined by greater than 30 percent from the 1960s though the late 1970s, but then stabilized in the 1980s (Temple 2002). In recent decades, North American Breeding Bird Survey data show the downward trend continuing, though at a more moderate pace, with some populations appearing to stabilize in the last 15 years. Survey-wide data show a slight, but statistically insignificant increase in population from 2005 to 2015 of 0.74 percent annually. Survey sample sizes for Wyoming are not large enough to show trends, but data for the Badlands and Prairies Bird Conservation Region (Pavlacky et al. 2017), which encompasses northeastern Wyoming, show a significant population decline of 3.6 percent annually from 1968 to 2015 and an insignificant decline of 3.58 percent from 2005 to 2015. In the core breeding range, North American Breeding Bird Survey data show long-term declines in the tallgrass prairie region in Illinois, Iowa, and Missouri, with more stable populations in the mixed-grass prairie in Kansas, Nebraska, and Oklahoma (Sauer et al. 2017).

As is the case with many grassland bird species, conversion of grasslands and savannas to agricultural lands has been a primary threat. The resulting habitat fragmentation and interruptions to historical disturbance regimes change the mosaic of vegetation structure and composition across grassland landscapes. However, dickcissel seem to have adapted to these changes to some extent and readily exploit agricultural landscapes, able to take advantage of a variety of different grassland vegetation communities (Temple 2002). Dickcissel have relatively small nesting territories and may be able to tolerate high levels of habitat fragmentation. Dickcissel are sometimes treated as an agricultural pest, and ongoing poisoning, hunting, and trapping on their wintering grounds in South America pose considerable threats to the range-wide population (Besser et al. 1970, Basili and Temple 1995, 1999a, 1999b).

Species Status in the Plan Area

Dickcissel do not depend on prairie dog colonies and prefer tall, dense grasses and forbs for nesting and breeding habitat.

Distribution, Abundance and Population Trend in the Plan Area

Dickcissel is a very uncommon breeder on the TBNG. The TBNG lies at the extreme edge of the species' range. The tall, dense vegetative conditions suitable for dickcissel nesting and brood-rearing are typically absent on the TBNG due to regular livestock grazing, except in rare cases where above average precipitation results in quick grass growth. Because prairie dogs clip and eat grass, prairie dog colonies are generally mutually exclusive with densely vegetated breeding habitat for dickcissel, and growth of prairie dog colonies could result in reductions in suitable habitat for dickcissel, when dickcissel breeds on the TBNG.

Environmental Consequences

Direct and Indirect Effects – All Alternatives

All alternatives are considered to have similar impacts to this species. Recreational shooting would pose little risk to the species, as would rodenticide use. The primary impact to this species would occur from allowing prairie dog expansion, thereby limiting dickcissel preferred habitat.

Cumulative Effects to All Alternatives

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on the TBNG, it could reduce the availability of foraging and nesting habitat (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will directly and indirectly reduce potential impacts to dickcissel (Table E-26). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-26. Plan components that support dickcissel habitat availability

Threats	Habitat availability – Loss of breeding season habitat in mixed-grass prairie sites with relatively tall vegetation because of expansion of prairie dog colonies
No Action Alternative	*Ch. 1, Standards and Guidelines, F.8; Ch. 1, Standards and Guidelines, F.17; Ch. 1, Standards and Guidelines, I.5; Ch. 2, Spring Creek GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Spring Creek GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1; Ch. 2, Upton Osage GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Upton Osage GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1*: These plan components as a whole provide for the maintenance of healthy mixed-grass or high-structure vegetation ecosystems on the Grassland among a mosaic of other vegetation types. Guidelines F.8, F.17, and I.5 in Chapter 1 restrict livestock grazing to provide for high-structure grassland vegetation on portions of the Grassland. The objectives and guidelines listed from Chapter 2 prescribe high-structure grassland vegetation in the Spring Creek and Upton Osage GAs.
Proposed Action Alternative	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *Ch. 1, Standards and Guidelines, F.8; Ch. 1, Standards and Guidelines, F.17; Ch. 1, Standards and Guidelines, I.5; Ch. 2, Spring Creek GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Spring Creek GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1; Ch. 2, Upton Osage GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Upton Osage GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1*: These plan components as a whole provide for the maintenance of healthy mixed-grass or high-structure vegetation ecosystems on the Grassland among a mosaic of other vegetation types. Guidelines F.8, F.17, and I.5 in Chapter 1 restrict livestock grazing to provide for high-structure grassland vegetation on portions of the Grassland. The objectives and guidelines listed from Chapter 2 prescribe high-structure grassland vegetation in the Spring Creek and Upton Osage GAs.
Grassland-wide Alternative	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *Ch. 1, Standards and Guidelines, F.8; Ch. 1, Standards and Guidelines, F.17; Ch. 1, Standards and Guidelines, I.5; Ch. 2, Spring Creek GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Spring Creek GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1; Ch. 2, Upton Osage GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Upton Osage GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1*: These plan components as a whole provide for the maintenance of healthy mixed-grass or high-structure vegetation ecosystems on the Grassland among a mosaic of other vegetation types. Guidelines F.8, F.17, and I.5 in Chapter 1 restrict livestock grazing to provide for high-structure grassland vegetation on portions of the Grassland. The objectives and guidelines listed from Chapter 2 prescribe high-structure grassland vegetation in the Spring Creek and Upton Osage GAs.

Threats	Habitat availability – Loss of breeding season habitat in mixed-grass prairie sites with relatively tall vegetation because of expansion of prairie dog colonies
Prairie Dog Emphasis Alternative	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is allowed when composite colony area is greater than the targets. *Ch. 1, Standards and Guidelines, F.8; Ch. 1, Standards and Guidelines, F.17; Ch. 1, Standards and Guidelines, I.5; Ch. 2, Spring Creek GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Spring Creek GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1; Ch. 2, Upton Osage GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Upton Osage GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1*: These plan components as a whole provide for the maintenance of healthy mixed-grass or high-structure vegetation ecosystems on the Grassland among a mosaic of other vegetation types. Guidelines F.8, F.17, and I.5 in Chapter 1 restrict livestock grazing to provide for high-structure grassland vegetation on portions of the Grassland. The objectives and guidelines listed from Chapter 2 prescribe high-structure grassland vegetation in the Spring Creek and Upton Osage GAs.
Preferred Alternative	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-11 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the objective. *Ch. 1, Standards and Guidelines, F.8; Ch. 1, Standards and Guidelines, F.17; Ch. 1, Standards and Guidelines, I.5; Ch. 2, Spring Creek GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Spring Creek GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1; Ch. 2, Upton Osage GA, Objectives, Wildlife, Plains Sharp-tailed Grouse (MIS), 2; Ch. 2, Upton Osage GA, Standards and Guidelines, Wildlife, Plains Sharp-tailed Grouse (MIS), 1*: These plan components as a whole provide for the maintenance of healthy mixed-grass or high-structure vegetation ecosystems on the Grassland among a mosaic of other vegetation types. Guidelines F.8, F.17, and I.5 in Chapter 1 restrict livestock grazing to provide for high-structure grassland vegetation on portions of the Grassland. The objectives and guidelines listed from Chapter 2 prescribe high-structure grassland vegetation in the Spring Creek and Upton Osage GAs.

Determination of Effects

Dickcissel meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for dickcissel habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations to all alternatives is based on the availability of foraging and nesting habitat in and adjacent to the proposed action area, along with sufficient distribution of habitat within the species' range. Additional rationale to support the effects determinations for all alternatives include:

- Dickcissel uses medium to tall grasses and other dense vegetation for breeding and nesting. TBNG is at the edge of its breeding range. Growth of prairie dog colonies could cause a reduction in total available habitat; however, the species is somewhat adaptable to disturbances and local changes in vegetation structure/tall and mixed-grass availability. Acreage objectives in alternatives may limit potential for loss of habitat due to prairie dog colony growth.
- It is very unlikely for dickcissel to forage in prairie dog colonies. There is a very minimal chance that individuals occupying prairie dog colonies could consume rodenticides and experience non-target poisoning.
- Dickcissel are very unlikely to occupy prairie dog colonies. Recreational shooting poses little risk.

Golden Eagle (*Aquila chrysaetos*)

Introduction

Golden eagle is a large, Holarctic grassland and shrubland raptor. Golden eagle is an apex predator across its range. Small mammals, especially leporids and rodents, are the preferred prey of golden eagle, but it is somewhat diverse in diet, ranging from a wide variety of avian species to canids, ungulates, and occasionally reptiles and fish. Golden eagles nest primarily in cliffs and rocky outcrops, but will readily use trees where rocky substrates are not available.

A large proportion of the global golden eagle population occurs in western North America. The North American population has been apparently stable over the past half-century, with localized declines observed where human-caused disturbances such as urbanization or cultivation have reduced the availability of prey or suitable nest sites. Golden eagles are somewhat sensitive to human activity, and their reproductive success tends to track the availability of preferred prey, which usually consists of rabbits or large rodents. In addition, golden eagles are prone to human-caused mortality, especially through collisions with automobiles, electrocution on powerlines, and lead poisoning.

Range-wide Information, Distribution and Abundance

Golden eagle is widely distributed throughout the northern hemisphere. In North America, golden eagle is a year-round resident across most of the western continental United States and parts of coastal Alaska. Golden eagles can overwinter as far north as the Arctic where prey is plentiful, but generally migrate southward in September and October. Breeding is rare in the eastern United States, but golden eagles may overwinter locally across much of the region. Where they are resident, golden eagles tend to occupy a single territory year-round (Kochert et al. 2002).

Golden eagle is widespread and abundant across its historical range (Kochert et al. 2002). Western North America likely hosts on the order of one half of the global population (Rosenberg et al. 2016). A 1970s survey produced a population estimate of 4,174 nesting pairs of golden eagles across the State of Wyoming (Phillips et al. 1984), though this is likely an overestimate due to survey biases toward high-quality habitat (Patla et al. 2017). A 2010 to 2011 survey of eastern Wyoming and the Wyoming and Bighorn Basins yielded golden eagle nesting densities of one pair per 64.1 square miles (Olson et al. 2015). Winter state-wide surveys produced estimates of approximately 9,000 to 14,000 individual golden eagles in Wyoming in 1972 and 1973 (Wrakestraw 1972, Higby 1975). In general, golden eagle occur at greater densities in the northwestern Great Plains than in the intermountain and Rocky Mountain regions (Millsap et al. 2013).

Life History and Habitat

Golden eagles inhabit a variety of open and semi-open habitats, such as sagebrush communities, riparian areas, grasslands, and oak savanna (Knight et al. 1979, Fischer et al. 1984, Hayden 1984, Estep and Sculley 1989). The suitability of an area generally depends on the abundance of mammalian prey and nest sites; prey and nesting site availability ultimately determine nesting density (Hunt et al. 1995).

Breeding and wintering habitat includes tundra, shrublands, grasslands, woodland-brushlands, open coniferous forests, farmland, and riparian habitats (Kochert 1972, Baglien 1975, Kochert 1986, Menkens and Anderson 1987). Golden eagles tend to avoid urban, agricultural, and forested areas (Millsap 1981, Fischer et al. 1984, Craig et al. 1986, Marzluff et al. 1997). However, areas grazed by livestock do not appear to be limiting (Thelander 1974).

Golden eagles nest in pairs and may use multiple, alternate nest sites within a territory. Resident pairs will add material to nests year-round. New nest construction usually begins 1 to 3 months prior to egg-laying.

Although the species primarily nests on cliffs, it will also often use trees, and occasionally nest on the ground (Call 1978). Observed nesting densities range from one pair per approximately 20 to 70 square miles over regional survey areas (Phillips et al. 1984, Olson et al. 2015). At the nest scale, nearest neighboring occupied nests range from a minimum of less than 1 to over 25 miles away. Pairs are territorial and defend home range boundaries from conspecifics (Kochert et al. 2002).

Golden eagles hunt while soaring, perching, or flying low along the ground (Kochert et al. 2002). Golden eagles primarily forage on small mammals but also consume birds, juvenile ungulates including livestock, canids, mustelids, carrion, and infrequently reptiles, fish, or large insects (Olendorff 1976, Gregg et al. 1979, Bloom and Hawks 1982). Mammals generally constitute approximately 80 to 85 percent of the biomass consumed by golden eagles, and among mammals, leporids and sciurids are the most preferred prey (Olendorff 1976, Bedrosian et al. 2017). Golden eagle nest success has been shown to be tightly correlated with leporid populations (Gregg et al. 1979, Jenkins and Joseph 1984, Bates and Moretti 1994, Steenhof et al. 1997, McIntyre and Adams 1999, Preston et al. 2017). Such a relationship has also been found for voles (*Myodes* spp., *Microtus* spp.) (Tjernberg 1983, Moss et al. 2012). No such relationship has been found for other major prey species, such as ground squirrels (e.g., *Cynomys* spp., *Urocitellus* spp.) (Gregg et al. 1979). Golden eagles are typically less specialized in diet than other aridland raptors and are able to diversify their diets when the primary prey base declines (Gregg et al. 1979, Steenhof and Kochert 1988).

Population Trends and Threats

Golden eagles populations across western North America are stable overall, with likely local breeding population declines due to human-caused disturbances (Kochert and Steenhof 2002). Comprehensive aerial surveys of the northwestern Great Plains and Rocky Mountain and intermountain regions showed stable populations between 2006 and 2012, and analysis of these survey data against long-term U.S. Geological Survey North American Breeding Bird Survey data show likewise stable golden eagle populations in Canada and the United States since the late 1960s (Millsap et al. 2013, Nielson et al. 2014). However, localized population declines have occurred at long-term study sites in the last quarter of the 20th century in southwestern Idaho, northeastern Colorado, and southern California (Kochert and Steenhof 2002). In addition, recent autumn migration counts in the intermountain region have reported some significant declines in migrating golden eagle numbers (Hoffman and Smith 2003, Farmer et al. 2008, Smith et al. 2008). Because of their apparent stability in population, golden eagle is not federally listed for protection under the Endangered Species Act in the United States or the Species at Risk Act in Canada. Golden Eagle has been protected from take, however, under the Bald and Golden Eagle Protection Act in the United States since 1962 (16 U.S.C. 668 et seq.).

Key threats to this species include prairie dog control, sylvatic plague, rodenticide use, recreational shooting and hunting, electrocution, energy development and infrastructure, and climate change. Observed local golden eagle population declines are likely the result of loss of nesting habitat or prey base or potential mortality as a result of human activity. While no single factor has caused large impacts to the golden eagle range-wide, individual habitat loss and mortality factors could be cumulatively impactful because the species has very low reproductive rates (Nielson et al. 2016). Loss of habitat and prey base can occur as a result of land-use change, including urbanization and cultivation for agriculture, which can result in reduced availability of nesting and perching structures and eradication of the prey base (Boeker 1974, Beecham and Kochert 1975, Craig et al. 1986, Nielson et al. 2016). Golden eagles are sensitive to human activity near nesting sites, including the use of off-highway vehicles (Steenhof et al. 2014). In addition, loss of shrub habitat in the intermountain region as a result of fire and the invasion of cheatgrass (*Bromus tectorum*) has resulted in reduced jackrabbit (*Lepus* spp.) populations, and associated declines in golden eagle reproductive success (Kochert et al. 1999).

Potential mortality primarily results from electrocution on powerlines and collisions with automobiles, especially while feeding on roadkill, which have constituted well over half of observed golden eagle deaths since the mid-1970s. Golden eagles are also at substantial risk of mortality from intentional gunshot or secondary poisoning from lead, which together constitute an additional one-fifth to one-quarter of golden eagle deaths (Russell and Franson 2014). Golden eagles are particularly susceptible to powerline electrocution because they often perch or nest on power poles throughout the open landscapes of the western United States, where alternate, natural perches are rare, and because their large wingspan can increase the probability of spanning wires in distribution lines (Harness and Wilson 2001, Mojica et al. 2018, O'Neil 1988). Secondary lead poisoning poses a high risk to golden eagles because they often scavenge on shot carcasses of both small and large game (Stauber et al. 2010, Katzner et al. 2018, Crandall et al. 2019). Secondary pesticide and rodenticide poisoning occasionally occurs in golden eagles but is not prevalent because the species does not often feed on fish or waterfowl in western North America; however, mid-20th century declines in golden eagles in the eastern United States, where golden eagles often prey on birds, were likely the result of such poisoning, and subsequent recoveries resulted from the decreased use of organochlorines since the 1970s (Farmer et al. 2008). Additional substantial human-caused mortality can result from collisions with wind turbines (Beston et al. 2016, Hunt et al. 2017, Watson et al. 2018a, Watson et al. 2018c).

Species Status in the Plan Area

Golden eagles nest across the TBNG in open habitats. Shrubland and mixed- or shortgrass prairie constitute over 98 percent of the total area of TBNG (USDA Forest Service 2012). Trees, some isolated cliffs and rock outcrops, and artificial nesting platforms provide suitable nesting sites across the TBNG. As a result, prey base availability is the primary restriction on habitat suitability for golden eagle. No wind energy development currently exists on TBNG, but four large surface coal mines currently occupy roughly 10,000 acres of TBNG at any given time. Where coal mines disrupt nesting territories, artificial nesting structures and nest relocations mitigate impacts to golden eagle reproduction (Phillips and Beske 1981, Postovit et al. 1982). In addition, current management direction prohibits surface activity for oil and gas well development and extraction within 0.25 miles of golden eagle nest sites year-round and within 0.5 miles during the nesting season, generally averting negative impacts on reproduction (USDA Forest Service 2002).

Distribution, Abundance and Population Trend in the Plan Area

Golden eagles are relatively abundant across much of the TBNG (Figure E-15). Nesting golden eagles are year-round residents on TBNG, and additional migratory individuals often pass through or stay on the TBNG during the fall and winter (Phillips and Beske 1981, Bedrosian et al. 2018b). Golden eagles in the Powder River Basin have been shown to nest at relatively high densities, with surveys from 1981 to 1989 showing an average of 2.7 miles between nests and a landscape-scale density of one nest per 27.8 square miles (Phillips and Beske 1990). Nesting density was highest along riparian corridors, with some nests within 1.5 miles of one another (Phillips and Beske 1981). The Forest Service has surveyed golden eagle nests on TBNG for several decades. Available survey data are insufficient to show local population trends. The Forest Service found at least 40 active or alternate nests in active territories in 2005 and 2008 during fairly comprehensive surveys of the grassland on the Douglas Ranger District. The current population is very low, with zero active nests among 31 known golden eagle nest sites in the central and northeastern portions of TBNG (Bedrosian et al. 2018a, Orabona 2019). Bedrosian et al. (2018a) observed two active nests during surveys in the central portion of TBNG in 2018, but both were located on private lands adjacent to TBNG (Figure E-15).

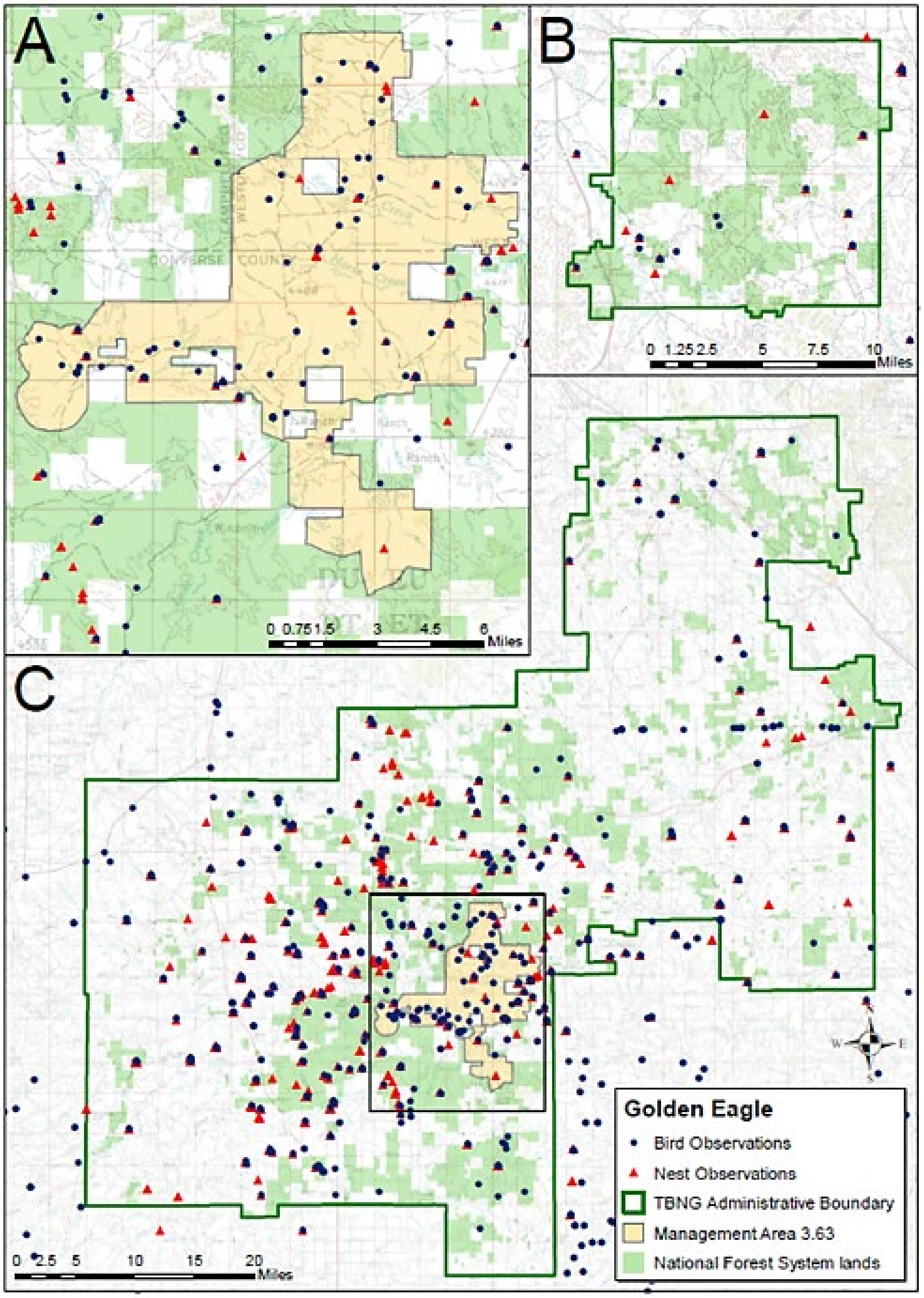

Figure E-15. Golden eagle bird and nest observations on the Thunder Basin National Grassland and vicinity. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1970, 1974, 1978, 1980-1982, 1984-1992, and 1994-2019. Observation data are from the local survey dataset maintained by the Douglas Ranger District, the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of the species on the Thunder Basin National Grassland. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Habitat Requirements and Characteristics in the Plan Area

Golden eagles are present on TBNG year-round. Among breeding pairs, incubation can begin as early as late-February, most eggs have hatched by late-May, and young have fledged by mid-August (Phillips and Beske 1990). In northeastern Wyoming, golden eagles often nest in trees, especially deciduous trees and large ponderosa pines (*Pinus ponderosa*), because cliffs suitable for nesting are somewhat uncommon (Menkens and Anderson 1987, Phillips and Beske 1990). Golden eagles on the TBNG nest in high concentrations in cottonwoods (*Populus deltoides*) along riparian corridors, especially Antelope Creek and the Dry Fork of the Cheyenne River (Phillips and Beske 1981). Golden eagles can also successfully nest on artificial nesting platforms constructed in existing territories as mitigation measures for habitat loss around coal mines or other industrial development (Phillips and Beske 1990). Because of the relative paucity of suitable nesting sites, golden eagle territories in the area typically do not contain alternate nests (Phillips and Beske 1981). Golden eagles generally have a somewhat variable diet on TBNG, including jackrabbits, cottontail rabbits (*Sylvilagus* spp.), black-tailed prairie dogs and other ground squirrels (e.g., *Ictidomys tridecemlineatus*), greater sage-grouse (*Centrocercus urophasianus*) and other birds, and small canids and ungulates (Phillips and Beske 1981); however, no comprehensive dietary analyses have been carried out on the TBNG.

The Antelope Creek and Cheyenne River riparian corridors run through Management Area 3.63, which is currently managed for the conservation of black-tailed prairie dogs and associated wildlife species (USDA Forest Service 2015). The high densities of nesting eagles in this central portion of the TBNG likely rely to some degree on prairie dog colonies in that area as a large proportion of their prey base. Surveys by Orabona (2019) and preliminary observations in the study by Bedrosian et al. (2018a) indicate that the golden eagle breeding population across much of the TBNG declined precipitously in response to a crash in the prairie dog population due to a landscape-scale sylvatic plague epizootic among prairie dog colonies. This information suggests that prairie dogs may be an important prey item for nestling golden eagles on a large proportion of TBNG. However, information regarding leporid populations was not available from those surveys, and further information may be necessary to assess the degree of dependence of golden eagles on prairie dog colonies in the area (Bedrosian et al. 2018a).

Environmental Consequences

Direct Effects – Habitat Availability

Direct effects to golden eagles would include removal or degradation of localized available habitat resulting from establishment of boundary management zones or other prairie dog control activities, which decrease available habitat patch size, contiguity, structure and quality for prairie dogs. Habitat availability would remain unchanged under the no action alternative, but would decrease under each of the action alternatives proportional to the acreage objectives for prairie dog colony extent and the size of the boundary management zone. Drought acreage objectives that may be put in place under the Preferred Alternative, Proposed Action and Grassland-wide Alternatives would further limit habitat availability during drought conditions. In addition, occurrences of sylvatic plague can decrease habitat availability, since plague causes contraction of prairie dog colonies and complexes and decreases the availability of prairie dogs as prey sources if recolonization of plagued-out areas does not occur within a few years.

Direct and Indirect Effects – Habitat Suitability

Indirect effects would include accidental poisoning from rodenticides, potential mortality from recreational shooting, along with naturally occurring events, such as sylvatic plague.

The continued use of rodenticides and limited recreational shooting of prairie dogs may impact golden eagles. Golden eagles may scavenge prairie dog carcasses after a colony has been poisoned using rodenticides (Vyas et al. 2017) and as a result, rodenticides may pose a risk of secondary poisoning. All alternatives would allow the continued use of zinc phosphide for prairie dog control, and the action alternatives are likely to use zinc phosphide more frequently than the no action alternative because of the inclusion of boundary management zones that are intended to remain clear of prairie dogs. The Grassland-wide alternative would also allow for the use of anticoagulant rodenticides in the boundary management zone after three applications of zinc phosphide prove ineffective. Anticoagulant rodenticides remain potent within prairie dog carcasses for up to 2 weeks, causing high risk to predators and scavengers if the carcasses are not removed from the environment (Ruder et al. 2011, Witmer et al. 2016). Contrary to anticoagulants, zinc phosphide poses a lower secondary poisoning risk to scavengers because residues are not retained at consequential levels in carcasses (Bell and Dimmick 1975, Marsh 1987, Matschke et al. 1992).

Golden eagle populations were observed to decline substantially in correlation with a drop in prairie dog numbers after a sylvatic plague epizootic (Bedrosian et al. 2018a, Orabona 2019). Prairie dog management and sylvatic plague epizootics can cause regular contraction or eradication of prairie dog colonies across the landscape. Anthropogenic control measures usually include the use of rodenticides, translocation of groups of prairie dogs, and the creation of visual, topographic, or hydrologic barriers to which prairie dogs may have an aversion (USDA Forest Service 2015). Sylvatic plague has been active in prairie dog colonies on TBNG since at least the 1990s, and has caused three landscape-wide epizootics since 2001. Some rodenticides may pose a risk of secondary poisoning to golden eagles. Anticoagulant rodenticides, in particular, remain potent within prairie dog carcasses for up to two weeks, causing high risk to predators and scavengers if the carcasses are not removed from the environment (Ruder et al. 2011, Witmer et al. 2016). Currently, zinc phosphide rodenticides have been used to poison prairie dogs on TBNG (USDA Forest Service 1981). Contrary to anticoagulants, zinc phosphide poses minimal secondary poisoning risk to scavengers because residues are not retained at consequential levels in carcasses (Bell and Dimmick 1975, Marsh 1987, Matschke et al. 1992).

Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives and can pose a risk to golden eagles. Golden eagles may be shot and killed directly and may also scavenge on the carcasses of shot prairie dogs. This can result in the ingestion of lead ammunition, which can lead to the accumulation of harmful concentrations of lead in both adults and fledglings (Wayland et al. 2003, Pauli and Buskirk 2007, Stauber et al. 2010, Russell and Franson 2014, Katzner et al. 2018). A study of lead poisoning in ferruginous hawks and other raptors on the TBNG showed that shooting did not result in considerable levels of lead poisoning in those birds; however, the study coincided with a period of sylvatic plague outbreak that decreased prairie dog densities at a time when leporids were abundant, and new shooting regulations on TBNG during that time had reduced the number of shooters relative to previous years (Stephens et al. 2005). The No Action and Prairie Dog Emphasis alternatives have the most limitations on recreational shooting and thus the greatest protections for golden eagle from this activity, with a year-round shooting prohibition in MA 3.63 and in Category 2 areas. The Preferred Alternative and Proposed Action offer the next highest level of protections, with a seasonal recreational shooting restriction in MA 3.67 from February 1 through August 15, but effects to individuals may still occur in late August and September. The Grassland-wide Alternative does not include any recreational shooting restrictions and has a higher potential for loss of individual hawks.

All proposed activities listed in this section can indirectly affect golden eagles by limiting available habitat for prairie dogs or contaminating food sources.

Cumulative Effects to All Alternatives

In addition to proposed activities in each alternative, other actions contribute to potential impacts to the golden eagle:

Electrocution – Electrocution on powerlines is a significant cause of mortality of golden eagles across much of its range (Russell and Franson 2014, Mojica et al. 2018, O'Neil 1988). Electrocution has been observed as a cause of mortality of golden eagles on the TBNG, especially in association with energy development (Phillips and Beske 1981).

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). Increased incidence of hot days during the late spring can lead to declines in nest success (Steenhof et al. 1997, Kochert et al. 2019). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of prey because of a loss of forage for small mammalian herbivores (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for golden eagle and other species will directly and indirectly reduce potential impacts (Table E-27). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-27. Plan components that support golden eagle habitat availability and suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat availability – Loss of breeding season foraging habitat and prey base in prairie dog colonies because of decline in total area of prairie dog colonies	*Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 3.63, Standards and Guidelines, General, 1 (NA)*: Standard F.65b in Chapter 1 adopts the Black-tailed Prairie Dog Conservation Assessment and Management Strategy (Strategy), which contains the existing area targets for prairie dog colonies. Control of prairie dogs is generally not allowed under the Strategy if composite colony area is below targets. The Strategy also directs use of sylvatic plague management tools to prevent collapse of prairie dog colonies during plague epizootics and translocation to support regrowth of prairie dog colonies that have been impacted by plague. General standard 1 for MA 3.63 supports the composite colony area targets contained in the Strategy by prohibiting activities that would inhibit increases in the prairie dog population in MA 3.63 until the colonies could support a sustainable black-footed ferret population.	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-FWRP-GL-02 (PA)*: GPA-FW-FWRP-GL-02 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-FWRP-GL-04 (GW)*: GPA-FW-FWRP-GL-04 allows the use of sylvatic plague control tools to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is prohibited when composite colony area does not sum to the targets. *GPA-FW-FWRP-GL-03 (PDE)*: GPA-FW-FWRP-GL-03 directs the use of sylvatic plague control tools where practical and effective to prevent collapse of prairie dog colonies during plague epizootics.	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-12 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the objective. 7,500 acres of colonies is the minimum threshold for use of rodenticides in MA 3.67 outside of boundary management zones in all circumstances except density control. *GPA-FW-FWRP-GL-02 (Preferred); GPA-MA3.67-FWRP-O-08 (Preferred); GPA-MA3.67-FWRP-ST-18 (Preferred)*: GPA-FW-FWRP-GL-02 allows the use of plague mitigation tools in prairie dog colonies anywhere in the plan area. GPA-MA3.67-FWRP-ST-18 mandates that an integrated approach to plague management will be used in MA 3.67 annually. GPA-MA3.67-FWRP-O-08 states that the Forest Service intends to develop a plague management plan within 3 years of plan amendment approval.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Determination of Effects

Golden eagle meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for golden eagle habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations for all alternatives is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species' range.

Additional rationale to support the effects determinations includes:

- Golden eagle can rely on prairie dogs considerably as a prey source. As a result, any reductions in prairie dog numbers could impact golden eagles.
- Secondary poisoning from zinc phosphide is not expected in any of the alternatives.
- Mortality due to secondary poisoning from anticoagulants in the Grassland-wide Alternative (Alternative 3) may occur; however, those effects would only occur in small areas and to a few individuals. Anticoagulant use would be uncommon, occur only after 3 years of zinc phosphide use in an area, and is not likely to occur across the TBNG at any given time. Therefore, it is expected that mortality could occur to a few individuals in the Grassland-wide Alternative (Alternative 3) during any given application, but would but would not apply to the larger population across the TBNG.
- There is potential for shooting of other animals in the vicinity of prairie dog colonies during recreational shooting activities, and individuals could occasionally be shot. Effects would be localized and very infrequent.
- Use of lead ammunition for recreational shooting in prairie dog colonies could cause lead poisoning to individuals, but effects would be localized.

Merlin (*Falco columbarius*)

Introduction

Merlin is a small bird of prey widespread across the Northern Hemisphere. Merlins are habitat and prey generalists. Merlin typically nest in trees, cliffs, or other elevated locations, such as tall buildings. Merlin hunt birds from the air, and will also hunt bats, rodents, insects, or other small prey. Merlin will occasionally scavenge carrion. Merlin populations declined in the mid-20th century in North America due to the use of organochlorine insecticides in agriculture. The ban of the insecticide DDT resulted in a population rebound in the 1980s and 1990s, and the breeding range is still expanding in many parts of the northern United States. Merlin appear adaptable to disturbance and face few known population-level threats.

Range-wide Information, Distribution and Abundance

Merlin are found across the Northern Hemisphere, breeding in the northern latitudes in Canada, Russia, and the northern United States. Merlin overwinter in the southern and coastal United States, Mexico, and Central and South America, the Mediterranean, the Middle East, and southern China. During the breeding season, merlin are widespread across northern North America (Warkentin et al. 2005).

Merlin are widely distributed and are considered a species of least concern by the International Union for Conservation of Nature, with a globally stable population trend (Lepage, Birdlife International 2019). Using U.S. Geological Survey North American Breeding Bird Survey data, the Partners in Flight Science Committee estimated the global population of merlin to be 3,200,000 birds (Partners in Flight 2019).

Life History and Habitat

Merlin forage in open to semi-open areas during the breeding season and will use a variety of habitats, including conifer, deciduous, and mixed-wood forests and woodlands with forest openings, riparian woodlands, shrub-steppe, prairie, and urban or suburban areas with trees. Merlin are typically generalists in selection of elevated nest sites, nesting in abandoned magpie (*Pica* spp.), crow (*Corvus* spp.), hawk (*Buteo* spp.), or tree squirrel (family *Sciuridae*) nests, as well as natural tree cavities, tree cavities excavated by woodpeckers (family *Picidae*), and cliff ledges. During migration, merlin stop in grasslands, open forests, and coastal areas. They winter in similar habitat across the western United States and southern United States, along the Pacific coast to Alaska, and along the Atlantic coast to southern New England (Warkentin et al. 2005).

Merlin eat mostly birds, typically catching them in midair during high-speed attacks. Prey are generally small to medium-sized birds in the range of 1 to 2 ounces. Merlin often specialize on hunting a small number of the most abundant species in an area. Common prey include horned lark (*Eremophila alpestris*), house sparrow (*Passer domesticus*), Bohemian waxwing (*Bombycilla garrulous*), dickcissel (*Spiza americana*), least sandpiper (*Calidris minutilla*), dunlin (*Calidris alpina*), and other shorebirds. Other prey include large insects such as dragonflies, bats caught at cave openings, nestling birds, and small mammals (Warkentin et al. 2005). Though they prefer aerial hunting, merlin sometimes scavenge dead or dying prey (McIntyre et al. 2009).

Population Trends and Threats

Merlin populations are stable and appear to have increased between 1966 and 2015, according to U.S. Geological Survey North American Breeding Bird Survey data (Sauer et al. 2017). Data from sites monitored by HawkWatch International in western North America also indicate increasing population trends since the early 1980s (Farmer 2008). Local survey data from several states in the northern United States and from the United Kingdom similarly report stable or expanding populations and range and an increase in incidences of breeding in urban areas (Ewing et al. 2011, Cava et al. 2014). This population and breeding range growth reflects merlin's recovery from widespread declines in the 1960s due to pesticide contamination. Threats to merlin from non-target poisoning from some environmental contaminants continue to exist, but this is no longer an impactful threat to merlin populations (Warkentin et al. 2005). Mercury poisoning has recently been documented in merlin, and while lead poisoning has been observed, it is very infrequent (Pain et al. 1995, Bourbour et al. 2019). Merlin is susceptible to bioaccumulation of organochlorine pesticides, including DDT, and eggshell thinning affected reproductive success in merlin populations in the mid- to late-20th century, when use of such pesticides was widespread (Warkentin et al. 2005).

Species Status in the Plan Area

Merlin do not depend on prairie dog colonies for prey or habitat.

Distribution, Abundance and Population Trend in the Plan Area

On TBNG, merlin are relatively rare, but have been observed breeding on the landscape. Merlin are likely habitat and prey generalists on TBNG and the population does not face significant threats in the area. Merlin may occasionally scavenge poisoned prairie dogs and mortality to individuals could result from non-target poisoning, though non-target lead and anticoagulant poisoning in merlin has not been frequently documented in the literature.

Environmental Consequences

Direct and Indirect Effects – All Alternatives

All alternatives are considered to have similar impacts to this species. Recreational shooting and secondary poisoning from contaminated prey would be the primary activities to cause potential mortality to the species. The Grassland-wide Alternative (Alternative 3) proposes the use of anticoagulants, which could indirectly impact the species since they may scavenge on contaminated prairie dogs; however, this foraging behavior is uncommon.

Merlin may scavenge dead or dying prairie dogs and be susceptible to secondary poisoning by lead ammunition used for recreational shooting; however, this foraging behavior is uncommon.

Cumulative Effects to All Alternatives

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of prey (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will directly and indirectly reduce potential impacts to merlin (see Table E-28). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-28. Plan components that support merlin habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Determination of Effects

Merlin meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for merlin habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations for all alternatives is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species' range. There are few detections of merlin on the TBNG; however, the species is considered well distributed within its range. Primary impacts of the alternatives include those activities that would cause potential mortality. Additional rationale to support the effects determinations includes:

- Merlin likely nest in woody draws, riparian areas, cliffs, rocky outcrops and other areas not associated with prairie dog colonies.
- Merlin are usually aerial hunters and are very infrequent scavengers. No substantive effects from zinc phosphide (secondary poisoning) are expected from any of the alternatives. Mortality to merlin from limited use of anticoagulants in the Grassland-wide Alternative (Alternative 3) could occur very infrequently due to secondary poisoning to the rare individual that scavenges a dead or dying prairie dog. However, those effects would only occur in small areas and to a few individuals. Anticoagulant use would be uncommon, occur only after 3 years of zinc phosphide use in an area, and is not likely to occur across the TBNG at any given time. Therefore, it is expected that mortality could occur to a few individuals in Grassland-wide Alternative (Alternative 3) during any given application, but would but would not apply to the larger population across the TBNG.
- There is potential for shooting other animals in the vicinity of prairie dog colonies during recreational shooting activities, and merlin could occasionally be shot. Effects would be localized and very infrequent. There is no pertinent difference among alternatives.
- Use of lead ammunition for recreational shooting in prairie dog colonies could cause secondary lead poisoning to individuals, but effects would be localized and extremely infrequent because merlin don't often scavenge. No pertinent difference among alternatives.

Peregrine Falcon (*Falco peregrinus*)

Introduction

Peregrine falcon is a medium-sized bird of prey widespread across the world. Peregrine falcons are habitat and prey generalists. Preferred nesting sites are located on cliffs, tall buildings, bridges, rocky outcrops, tall trees near open areas, or on the ground in arctic tundra. In the winter, peregrine falcons inhabit any open area where prey is available. Prey primarily consist of birds, because the peregrine falcon specializes in aerial hunting. However, other prey and carrion are sometimes consumed. Peregrine falcons faced widespread, precipitous declines in numbers in the mid-20th century in North America as a result of non-target poisoning by agricultural insecticides, which greatly hampered reproductive success. A strong recovery occurred in the 1980s and 1990s with the banning of the use of DDT for agricultural use in the United States, active reintroduction efforts, and Federal protections under the Endangered Species Act.

Range-wide Information, Distribution and Abundance

Peregrine falcon is found on every continent except Antarctica. The species formerly occurred extensively across North America, but declines during the early part of the 20th century have resulted in reduced abundance and local extirpations. Currently, during the breeding season, the species is found across western and eastern North America, with scattered, localized breeding in the Great Plains and Rocky Mountains. Peregrine Falcons occur at higher densities in the Arctic and in coastal areas than in interior North America. Most Peregrine Falcons migrate out of North America for the winter to Central and South America, though many overwinter along the Pacific coast and in the southwestern United States (White et al. 2002, Faulkner 2010).

Life History and Habitat

Peregrine falcon is a habitat generalist across its range, using a wide variety of natural habitats and urban areas for nesting and foraging. Historically, peregrine falcon breeding and nesting habitat was typically associated with cliffs, which allowed utilization of large volumes of adjacent open space for aerial hunting maneuvers. Cliffs are usually anywhere from 25 to 1,300 feet high, and nest sites are typically approximately one-third of the way down the cliff face. In the arctic tundra, the species often nests on the ground. Peregrine falcons may use abandoned northern raven (*Corvus corax*), bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), red-tailed hawk (*Buteo jamaicensis*), or cormorant (family *Phalacrocoracidae*) nests. Since the recovery of the population, peregrine falcons now often use tall buildings or bridges in urban areas for nest sites. Males typically select a few possible nest ledges at the beginning of each breeding season, and the female chooses from these potential sites. Nest building consists only of a ritualized scraping of the nest ledge to create a depression in the sand, gravel, or other substrate of the nest site.

Population Trends and Threats

Peregrine falcons faced steep declines from the 1940s to the 1970s as a result of secondary poisoning from the organochlorine pesticide DDT, which persists in the environment, enters animal organisms, especially those associated with water, and can accumulate in apex predators. DDT caused a large decline in reproductive success in peregrine falcons because of eggshell thinning (Hickey and Anderson 1968, Peakall et al. 1975, Cade et al. 1988, White et al. 2002). The ban of this pesticide in the United States, in addition to active reintroduction efforts and Federal protections under the Endangered Species Act, resulted in the recovery of peregrine falcon, which is now widespread and abundant across the world (White et al. 2002, 64 FR 46543-46558). The species has not fully recovered and returned to pre-20th century breeding levels in the interior United States (White et al. 2002). Pesticide and other chemical poisoning, including PCBs, mercury, and lead, continue to negatively affect the species in many portions its range (Andreotti et al. 2018, Barnes et al. 2019), but none are known to have exerted population effects on peregrine falcons in North America (Dement et al. 1986, Stone and Okoniewski 1988, Peakall et al. 1990).

Current population-level threats to peregrine falcon have not been observed. Because peregrine falcon is a habitat and prey generalist around the world, habitat modification has not impacted the species. Individual mortality risks to peregrine falcons include secondary poisoning from pesticides, mercury, or lead, and trauma or electrocutions because of collisions with automobiles, windows, and powerlines (O'Neil 1988). In addition, peregrine falcons in remote areas may abandon nest sites in the presence of human activity (White et al. 2002).

Species Status in the Plan Area

Peregrine falcon do not depend on prairie dog colonies for prey or habitat.

Distribution, Abundance and Population Trend in the Plan Area

Peregrine falcon is an extremely uncommon inhabitant of TBNG, but has been observed occasionally nesting in the vicinity of management area 3.63/3.67. Tall structures and high topography are generally unavailable on TBNG to provide preferred nesting habitat. The rare peregrine falcons that occupy TBNG could be subject to mortality as a result of secondary poisoning from anticoagulant rodenticides or recreational shooting that occurs in prairie dog colonies.

Environmental Consequences

Direct and Indirect Effects – All Alternatives

All alternatives are considered to have similar impacts to this species. Recreational shooting and secondary poisoning from contaminated prey would be the primary activities to cause potential mortality to the species. The Grassland-wide Alternative (Alternative 3) proposes the use of anticoagulants, which could indirectly impact the species since they may scavenge on contaminated prairie dogs; however, this foraging behavior is very uncommon.

Peregrine falcon may scavenge dead or dying prairie dogs and be susceptible to secondary poisoning by lead ammunition used for recreational shooting; however, this foraging behavior is very uncommon.

Cumulative Effects to All Alternatives

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of prey (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will directly and indirectly reduce potential impacts to peregrine falcon (see Table E-29). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-29. Plan components that support peregrine falcon habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management. *Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of grain-bait rodenticides in prairie dog colonies from January 1 to September 30 to protect migratory birds from consumption of poisoned baits.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide. *Ch. 1, Standards and Guidelines, H.2 (GW)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	colonies from risks related to shooting.		has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	

Determination of Effects

Peregrine falcon meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for peregrine falcon habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations for all alternatives is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species' range. There are few detections of peregrine falcon on the TBNG; however, the species is considered well distributed within its range. Primary impacts of the alternatives include those activities that would cause potential mortality. Additional rationale to support the effects determinations includes:

- Peregrine falcon likely nests in woody draws, cliffs, rocky outcrops, and other areas not associated with prairie dog colonies.
- Peregrine falcon is an aerial hunter and very infrequent scavenger. No substantive effects from zinc phosphide (secondary poisoning) are expected in any of the alternatives. Mortality to peregrine falcon from limited use of anticoagulants in the Grassland-wide Alternative (Alternative 3) could occur very infrequently due to secondary poisoning to the rare individual that scavenges a dead or dying prairie dog. However, those effects would only occur in small areas and to a few individuals. Anticoagulant use would be uncommon, occur only after 3 years of zinc phosphide use in an area, and is not likely to occur across the TBNG at any given time. Therefore, it is expected that mortality could occur to a few individuals in the Grassland-wide Alternative (Alternative 3) during any given application, but would but would not apply to the larger population across the TBNG.
- There is potential for shooting of other animals in the vicinity of prairie dog colonies during recreational shooting activities, and individuals could occasionally be shot. Effects would be localized and very infrequent. No pertinent difference among alternatives.
- Use of lead ammunition for recreational shooting in prairie dog colonies could cause lead poisoning to individuals, but effects would be localized and extremely infrequent because peregrine falcon do not often scavenge. No pertinent difference among alternatives.

Ring-billed Gull (*Larus delawarensis*)

Introduction

Ring-billed gull is a medium-sized seabird. It is a migratory, year-round generalist of freshwater and marine habitats across North America. Nesting habitat includes any ground near to water. Ring-billed gulls are extreme diet generalists and will eat all types of small vertebrates and arthropods, carrion, and garbage. Few ring-billed gulls occur on TBNG because breeding habitat is extremely limited. Ring-billed gulls occasionally use TBNG as migratory habitat or for foraging when breeding on reservoirs in the vicinity. Ring-billed gulls have no direct habitat relationships with prairie dog colonies, but may feed on dead or dying prairie dogs in colonies that have been subject to recreational shooting or lethal control. For this reason, the potential for secondary poisoning by lead ammunition or anticoagulant rodenticides exists.

Range-wide Information, Distribution and Abundance

The breeding range of ring-billed gull extends across southern and central Canada, the northern United States and Great Lakes region, and throughout much of Idaho, Wyoming, and eastern Oregon and Washington. Ring-billed gull winters in coastal and southern United States and much of Mexico and the Caribbean, and migrates through the remainder of the United States. Ring-billed gull are abundant throughout its range (Pollet et al. 2012).

Life History and Habitat

Ring-billed gull depends on inland water bodies, wetlands, or marine habitats year-round. Breeding sites are located on the ground near water, ranging from inland lakes, reservoirs, and rivers, to coastal beaches. Wintering habitat includes a variety of marine habitats, including beaches, rocky coasts, estuaries, river deltas, and coastal waters, and inland freshwater sites or urban areas. Migratory habitat is typically inland freshwater sites. Ring-billed gull often occur in parking lots, landfills, and agricultural areas to forage (Pollet et al. 2012).

Ring-billed gull is an opportunistic feeder and extreme diet generalist, and depending on where a breeding colony is located, its diet during the breeding season may include small mammals, fish, birds, carrion, garbage, and a variety of invertebrates (Winkler 1996).

Population Trends and Threats

Ring-billed gull is widely distributed and is considered a species of least concern by the International Union for Conservation of Nature (Lepage, Birdlife International 2019). Ring-billed gulls faced direct mortality from shooting and other eradication efforts by humans in the late 19th and early 20th centuries because they consumed agricultural crops, but the species has since recovered. Continued threats to ring-billed gull include human disturbance of breeding colonies and the ingestion of pesticides, plastics, and other contaminants during foraging, especially at landfills. The ingestion of or entanglement in plastic while foraging at landfills is a significant source of mortality to individuals (Pollet et al. 2012).

Species Status in the Plan Area

Ring-billed gull do not depend on prairie dog colonies and often prefer habitat near water.

Distribution, Abundance and Population Trend in the Plan Area

Ring-billed gull occurs very infrequently on TBNG, and primarily uses the area as migratory habitat. Observations from the citizen science birding database eBird shows that reservoirs near TBNG may host breeding populations of ring-billed gull (https://ebird.org/; Sullivan et al. 2009). No research has examined ring-billed gull habitat and occurrence on TBNG specifically.

Environmental Consequences

Direct and Indirect Effects – All Alternatives

All alternatives are considered to have similar impacts to this species. Recreational shooting would be the primary activity to cause potential mortality to the species. The Grassland-wide Alternative (Alternative 3) proposes the use of anticoagulants, which could indirectly impact ring-billed gulls since they may scavenge on contaminated prairie dogs.

Gulls may scavenge dead or dying prairie dogs and be susceptible to secondary poisoning by lead ammunition or anticoagulant rodenticides used for recreational shooting or lethal control in prairie dog colonies on TBNG.

Cumulative Effects to All Alternatives

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of prey (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will directly and indirectly reduce potential impacts to ring-billed gull (see Table E-30). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-30. Plan components that support ring-billed gull habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management. *Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of grain-bait rodenticides in prairie dog colonies from January 1 to September 30 to protect migratory birds from consumption of poisoned baits.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide. *Ch. 1, Standards and Guidelines, H.2 (GW)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.		February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	

Determination of Effects

Ring-billed gull meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for ring-billed gull habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations for all alternatives is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species' range. There are few detections of ring-billed gull on the TBNG; however, the species is considered well distributed. Primary impacts of the alternatives include those activities that would cause potential mortality.

Additional rationale to support the effects determinations include:

- Ring-billed gull is a very infrequent inhabitant of TBNG and not associated with prairie dog habitat. The species likely breeds on reservoirs in the vicinity and may forage during breeding season or migrate through TBNG.
- Ring-billed gull could occasionally scavenge on prairie dog colonies and is a very opportunistic forager. No substantive effects from zinc phosphide (secondary poisoning) are expected in any alternatives.
- Mortality from anticoagulants (secondary poisoning) could occur in the Grassland-wide Alternative (Alternative 3); however, those effects would only occur in small areas and to a few individuals. Anticoagulant use would be uncommon, occur only after 3 years of zinc phosphide use in an area, and is not likely to occur across the TBNG at any given time. Therefore, it is expected that mortality could occur to a few individuals in the Grassland-wide Alternative (Alternative 3) during any given application, but would but would not apply to the larger population across the TBNG.
- There is potential for shooting other animals in the vicinity of prairie dog colonies during recreational shooting activities, and individuals could occasionally be shot. Effects would be localized and very infrequent. No pertinent difference among alternatives.
- Use of lead ammunition for recreational shooting in prairie dog colonies could cause lead poisoning to individuals, but effects would be localized. No pertinent difference among alternatives.

Sage Thrasher (*Oreoscoptes montanus*)

Introduction

Sage thrasher is a medium-sized passerine bird. Sage thrasher breeds across the shrub-steppe region of the western United States and migrates to the southwest United States and northern Mexico during the winter. The species has experienced steady declines in population across much of its range since at least the mid-20th century. Sage thrasher relies on continuous sagebrush cover for nesting, breeding, and foraging habitat. Sagebrush is at risk of loss or degradation across the western United States, most often as a result of the development of infrastructure for oil and gas extraction and increased frequency of fire.

The expansion of prairie dog colonies is an additional disturbance that can result in some removal of sagebrush due to increased herbivory. Sagebrush typically does not occur or occurs at very low densities in prairie dog colonies. Because the plan amendment may change prairie dog management, changes to the extent of available habitat for sage thrasher could result. The total observed extent of prairie dog colonies on TBNG from all years totals less than 8 percent of the area of sagebrush prioritized for protection under the greater sage-grouse management plan, and the extent of prairie dog colonies is typically much less than 6 percent of the priority habitat management area in any year.

Range-wide Information, Distribution and Abundance

Sage thrasher is a North American endemic that breeds in and around the Great Basin area and winters in the Sonoran and Chihuahuan deserts of the southwestern United States, western Mexico (including the Baja California peninsula), and the Mexican Plateau (Reynolds et al. 1999).

Life History and Habitat

Sage thrasher is considered a sagebrush obligate species and occurs in prairie and foothill shrubland habitat where big sagebrush (*Artemisia tridentata* sspp.) dominates (Reynolds et al. 1999, Reinkensmeyer et al. 2007). In some limited cases, the species has been observed using non-sagebrush shrubland, including greasewood (*Sarcobatus vermiculatus*) habitat in Utah and Nevada (Fautin 1976, Medin 1990) and antelope bitterbrush (*Purshia tridentata*) habitat in Washington (Smith et al. 1997). Nest sites are located on the ground or in shrubs that are entirely or mostly alive and approximately 1 to 3 feet above ground (Reynolds 1981). Nesting pair territories range from 2 up to nearly 15 acres (Mutter et al. 2015). This species ground forages and feeds primarily on insects (Reynolds et al. 1999). It is not susceptible to nest parasitism by cowbirds (*Molothrus ater*) like many other avian sagebrush species. This species readily “ejects” cowbird eggs once detected in the nest (Rich and Rothstein 1985).

Population Trends and Threats

Sage thrasher populations have declined over the past several decades. Survey-wide data from the U.S. Geological Survey North American Breeding Bird Survey showed a statistically significant decline in population from 1966 to 2015, averaging 1.2 percent annually. This data covered all of the sage thrasher range except Mexico. Survey-wide North American Breeding Bird Survey data from 2005-2015 showed a non-significant decline of 1.2 percent annually, indicating little alleviation of the rate of population decline in recent years. Much of this decline has occurred across the Great Basin region, where state-level annual rates of population decline have been observed in Idaho, Montana, Oregon, and Utah. North American Breeding Bird Survey data for Wyoming were insufficient to indicate trends (Sauer et al. 2017).

Population declines throughout this species’ range may be due to fragmentation and removal of sagebrush habitat. Disturbance to sagebrush often negatively affects sage thrasher abundance because the species relies heavily on the shrub for nesting and breeding habitat. For example, fire tends to reduce sagebrush cover in burned areas for relatively long periods of time, thus reducing available habitat for sage thrasher

(Noson et al. 2006, Holmes 2007). Mechanical vegetation treatments that remove sagebrush or intentionally alter vegetative species composition can also result in declines in sage thrasher abundance (Carlisle et al. 2018). Landscape fragmentation is often a direct threat to nest success by allowing increased opportunities for predators to move around and see nests and by decreasing the size of available patches for nest territories (Vander Haegen et al. 2002, Vander Haegen 2007). For example, habitat loss and fragmentation as a result of oil and gas well development has caused declines in sage thrasher nest survival and increases in nest predation by rodents (Hethcoat and Chalfoun 2015). Others have observed that oil and gas development may reduce sage thrasher abundance at the landscape scale where road densities can fragment sagebrush cover into patches too small for sage thrasher territories (Mutter et al. 2015). Because sage thrashers tend to have relatively high inter-annual site fidelity, nesting pairs will return to sites for several years to nest even after oil and gas development has compromised the suitability of the site (Gilbert and Chalfoun 2011, Mutter et al. 2015).

Species Status in the Plan Area

Sage thrasher do not depend on prairie dog colonies and prefer sagebrush vegetation for nesting and foraging habitat.

Distribution, Abundance and Population Trend in the Plan Area

Sage thrasher occurs across TBNG during the breeding season. Sagebrush faces several threats on TBNG, including fragmentation and removal as a result of fire and energy development. Other threats include vegetation management projects that involve the planting of non-native species or species that can outcompete sagebrush. Because of these threats, existing management direction implemented as part of a management plan for greater sage-grouse (*Centrocercus urophasianus*) contains strong protections for sagebrush habitat.

Environmental Consequences

Direct and Indirect Effects – All Alternatives

All alternatives are considered to have similar impacts to this species. Recreational shooting would pose little risk to the species, as would rodenticide use. The primary impact to this species would occur from allowing prairie dog expansion, thereby limiting sage thrasher preferred habitat.

Cumulative Effects to All Alternatives

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of foraging and nesting habitat (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will indirectly benefit sage thrasher by reducing or eliminating potential impact (Table E-31). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-31. Plan components that support sage thrasher habitat availability

Threats	Habitat availability – Loss of exclusive breeding season habitat in sagebrush-dominated sites because of expansion of prairie dog colonies
No Action Alternative	*GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.
Proposed Action Alternative	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.
Grassland-wide Alternative	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is allowed when composite colony area is greater than the target. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.

Threats	Habitat availability – Loss of exclusive breeding season habitat in sagebrush-dominated sites because of expansion of prairie dog colonies
Prairie Dog Emphasis Alternative	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is allowed when composite colony area is greater than the targets. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.
Preferred Alternative	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-11 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is allowed when composite colony area is greater than the objective. *GRSG-GRSGH-DC-001; GRSG-GRSGH-DC-002; GRSG-GRSGH-ST-003; GRSG-GRSGH-ST-004; GRSG-GRSGH-ST-005*: GRSG-GRSGH-DC-001 and GRSG-GRSGH-DC-002 outline the desired conditions for greater sage-grouse habitat management areas on National Forest System lands, including nearly the entirety of the Thunder Basin National Grassland. The desired conditions describe vegetation characteristics for a healthy sagebrush ecosystem, including 10-30% sagebrush canopy cover on at least 70% of lands capable of producing sagebrush. GRSG-GRSGH-ST-003 requires that habitat restoration projects move toward the desired conditions in greater sage-grouse habitat management areas. GRSG-GRSGH-ST-004 and GRSG-GRSGH-ST-005 outline habitat monitoring requirements and hard triggers that require cessation of discretionary authorizations for new actions until causes of the decline in greater sage-grouse habitat availability or population have been identified and addressed.

Determination of Effects

Sage thrasher meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, “no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated” under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for sage thrasher habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations for all alternatives is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species’ range. There are few detections on the TBNG; however, the species is understudied. Primary impacts of the alternatives include those activities that would allow prairie dogs to expand, thereby limiting sage thrasher preferred habitat.

Additional rationale to support the effects determinations include:

- Sage thrasher breeds and nests undisturbed sagebrush. Extreme growth of prairie dog colonies could cause a small reduction in total available habitat (all observed historical prairie dog occupancy is approximately 8% of greater sage-grouse primary habitat management area on TBNG; acreage objectives are far lower than this proportion and not all core is suitable habitat).
- Sage thrasher do not forage in prairie dog colonies. There is a very minimal chance that individuals occupying prairie dog colonies could consume rodenticides and experience non-target poisoning.
- Sage thrasher do not occupy prairie dog colonies. Recreational shooting poses little risk.

Short-eared Owl (*Asio flammeus*)

Introduction

Short-eared owl is a medium sized raptor that occupies open habitats across parts of Africa, Asia, Europe, North America, and South America. Short-eared owl nests on the ground at low densities. Short-eared owls have large territories and are sensitive to habitat fragmentation. The species is largely dependent on the availability of small mammals, especially voles (*Microtus* spp.) for a prey base. Key threats to this species include prairie dog control and plague, rodenticides, recreational shooting and hunting, electrocution, collisions with wires and vehicles, energy development and infrastructure, and climate change.

Range-wide Information, Distribution and Abundance

The short-eared owl is distributed globally, found in Africa, Asia, Europe, North America, and South America. In North America, the species breeds in open habitats throughout most arctic and temperate areas and south into the central portions of the United States. Short-eared owls are nomadic within their range and may be absent from some breeding areas for several years. In addition, occasional breeding occurs in typically non-breeding regions in the southern United States.

Life History and Habitat

Short-eared owls are specialist predators of small mammals, and in specific locations, they will often rely on a single species of the genus of voles (*Microtus*) for the majority of their diet (Wiggins et al. 2006). Populations of small mammals can vary substantially both spatially and temporally; when small mammals are abundant, short-eared owls can gather and breed at very high densities (Pitelka et al. 1955), but when they are scarce, short-eared owls do not breed or may leave an area entirely (Clark 1975, Korpimaki and Norrdahl 1991). During winter, short-eared owl survival, abundance, and distribution is influenced by the interactions between snow cover and prey availability (Priestley et al. 2008).

Short-eared owl inhabits wetlands, shrub-steppe, tundra, and some agricultural lands, but it primarily relies on large, intact grasslands for survival. Short-eared owl nests on the ground, usually in relatively dense vegetation. Nesting densities are usually very low, territories are large, and the species tends to occur in low abundance across its range (Dechant et al. 2002, Wiggins et al. 2006, Wickens et al. 2017). Although the habitat in the northern part of its breeding distribution (i.e., Alaska and northern Canada) has remained mostly intact, the areas in which the species occurs year-round (i.e., southern Canada through the northern half of the contiguous United States) have undergone substantial loss, fragmentation, and degradation (Samson and Knopf 1994, COSEWIC 2008b). While the species uses agricultural fields, it is sensitive to fragmentation of habitat by development and linear features such as roads because of increased risk of predation on their ground nests (Wiggins et al. 2006).

Population Trends and Threats

U.S. Geological Survey North American Breeding Bird Survey data suggest declines in the short-eared owl breeding populations across Canada since the mid-1960s, though data for short-eared owl is generally low quality due to small sample sizes (Sauer et al. 2017). Short-eared owl is listed as a species at risk of becoming endangered or threatened under the Species at Risk Act in Canada, meaning it warrants special analysis prior to the execution of Federal government projects (COSEWIC 2008b). North American Breeding Bird Survey data for other parts of the range are inconclusive (Sauer et al. 2017).

Species Status in the Plan Area

Open, non-forested shrubland and prairie occur on over 98 percent of the total area of the TBNG (USDA Forest Service 2012). Populations of voles and other small mammals that may serve as prey for short-eared owls are not tracked on TBNG. Local threats to these prey species are not known. While the expansion of prairie dog colonies can reduce vegetative cover, the degree of expansion does not likely affect the availability of short-eared owl nesting or foraging habitat. Recorded prairie dog colonies have not affected more than 10 percent of available shrubland or grassland habitat on TBNG in any given year, and occupancy is typically far lower than 10 percent. However, drought conditions during high prairie dog occupancy may cause additional large portions of TBNG to become unsuitable for short-eared owls because of low vegetative cover. Agricultural development for cultivation is negligible on TBNG; however, development for energy extraction is common and may cause fragmentation of potential short-eared owl territories.

Distribution, Abundance and Population Trend in the Plan Area

Short-eared owls are likely year-round residents or migratory breeders on TBNG (Wickens et al. 2017). Short-eared owls generally occur in limited numbers on TBNG. However, limited observation records show that short-eared owl has been observed across much of the area. Observation records date from the late 1970s through 2018. Existing observation data are insufficient to show trends in local short-eared owl abundance (Figure E-16).

Habitat Requirements and Characteristics in the Plan Area

No research has explored short-eared owl habitat needs on TBNG specifically. The key habitat requirement of short-eared owl across the range is large, open landscapes. On TBNG, short-eared owls likely use large expanses of shrubland and mixed- and shortgrass prairie, depending on the availability of small mammals for prey (Poulin et al. 2001). Meadow voles (*Microtus pennsylvanicus*) and prairie voles (*M. ochrogaster*) occur on TBNG and tend to use areas with greater vegetative cover to create runs for travel within their territories (Reich 1981, Stalling 1990). Prairie dog colonies provide quality habitat for some species of small rodents that short-eared owls may occasionally use as prey, such as deer mice (*Peromyscus maniculatus*) and grasshopper mice (*Onychomys leucogaster*), but vegetative manipulation by prairie dogs negatively impacts many other rodent species associated with dense vegetation, including voles. Short-eared owl is a ground nesting species, and is not likely impacted by availability of nest sites on TBNG (Wiggins et al. 2006).

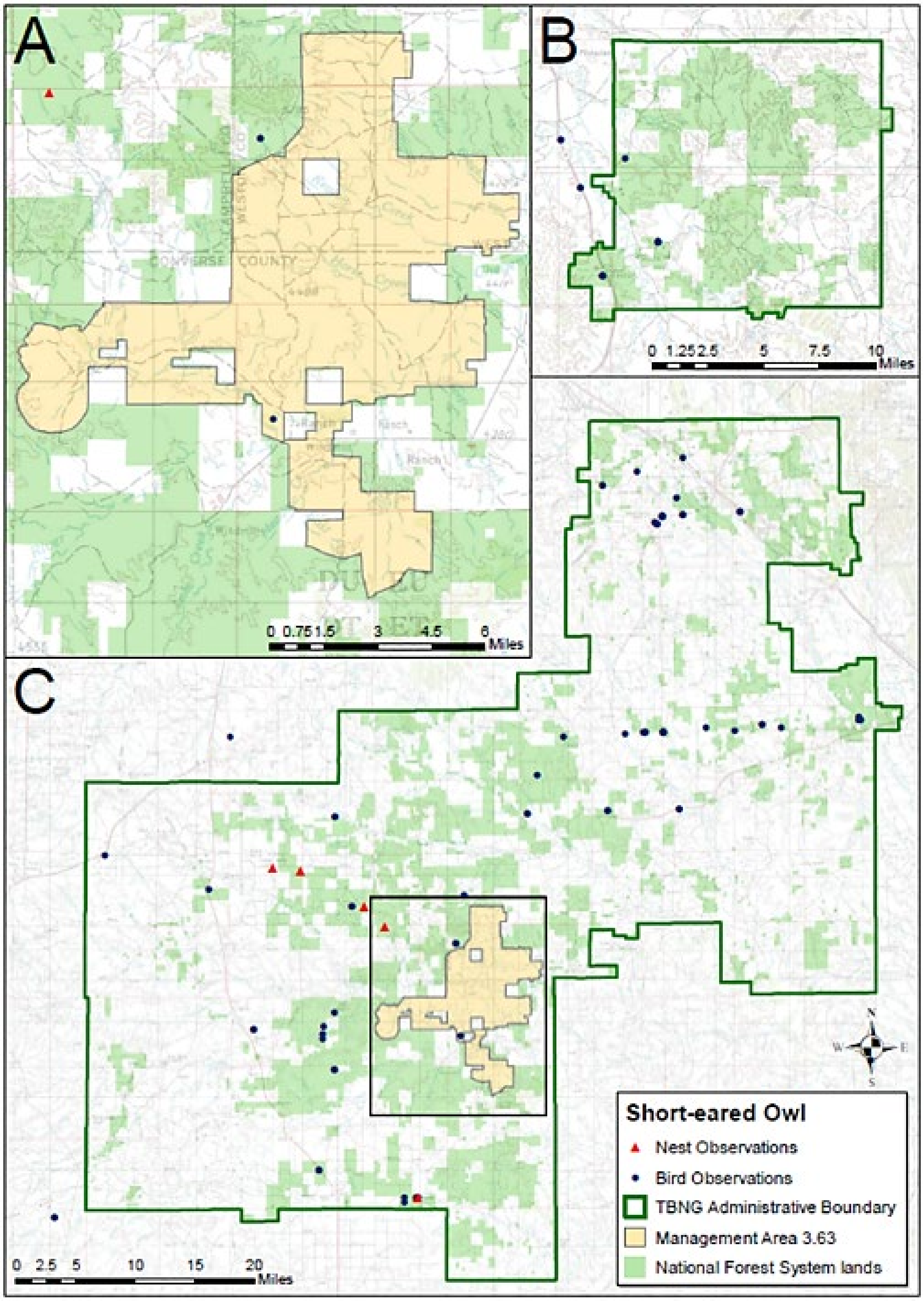

Figure E-16. Short-eared owl bird and nest observations on the Thunder Basin National Grassland and vicinity. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1979, 1982-1984, 1987, 1988, 1990, 1991, 1997, 1999, 2000, 2004-2006, 2011, 2012, and 2015-2017. Observation data are from the local survey dataset maintained by the Douglas Ranger District, the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of the species on the Thunder Basin National Grassland. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Environmental Consequences

Direct Effects – Habitat Availability

Direct effects of boundary changes under any of the alternatives are negligible or may benefit short-eared owls by limiting prairie dogs and their habitat, allowing for preferred prey species to persist.

Indirect Effects – Habitat Suitability

Habitat suitability for short-eared owl would be impacted by rodenticide use and recreational shooting. Some rodenticides may indirectly pose a risk of secondary poisoning to short-eared owls by ingestion of contaminated prey source. Anticoagulant rodenticides are proposed for limited use in the Grassland-wide Alternative (Alternative 3). Anticoagulants remain potent within prairie dog carcasses for up to 2 weeks, causing high risk to predators and scavengers if the carcasses are not removed from the environment (Ruder et al. 2011, Witmer et al. 2016). Contrary to anticoagulants, zinc phosphide poses minimal secondary poisoning risk to scavengers because residues are not retained at consequential levels in carcasses (Bell and Dimmick 1975, Marsh 1987, Matschke et al. 1992).

Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives, but limits to recreational shooting exist in specific locations. Effects of recreational shooting include short-eared owls getting shot and killed or ingesting lead while scavenging, leading to secondary poisoning. The No Action and Prairie Dog Emphasis alternatives have the most limitations on recreational shooting and thus the greatest protections for short-eared owl from this activity, with a year-round shooting prohibition in MA 3.63 and in Category 2 areas. The Proposed Action and Preferred Alternative offer the next highest level of protections, with a seasonal recreational shooting restriction in MA 3.67 from February 1 through August 15. The Grassland-wide Alternative does not include any recreational shooting restrictions.

Cumulative Effects to All Alternatives

In addition to proposed activities in each alternative, other actions contribute to potential impacts to the short-eared owl. A summary of cumulative effects are provided below.

Collisions – Collisions with barbed wire fences or pwerlines may cause mortality or injury. Dead short-eared owls have been found hanging from strands of barbed-wire (Fitzner 1975, Knight and Skriletz 1980) and from pwerlines (Fitzner 1975, O'Neil 1998). Fencing for livestock pastures and powerlines associated with oil, gas, and mineral extraction are common on the TBNG.

Energy development and infrastructure – Drilling operations for oil and gas may negatively impact nesting habitat availability because of fragmentation of territories. In addition, road construction and traffic may result in direct mortality to short-eared owl due to collisions with vehicles (Wiggins et al. 2006). Oil and gas drilling occurs across the TBNG. Current management direction limits surface activity within 0.125 miles of known short-eared owl nests (USDA Forest Service 2012).

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). Increased incidence of hot days during the late spring can lead to declines in nest success (Steenhof et al. 1997, Kochert et al. 2019). In addition, if climate change results in greater frequency of drought on the TBNG, it could reduce the availability of prey because of a loss of forage for small mammalian herbivores (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will indirectly benefit short-eared owl by reducing or eliminating potential impacts (Table E-32). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-32. Plan components that support short-eared owl habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management. *Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of grain-bait rodenticides in prairie dog colonies from January 1 to September 30 to protect migratory birds from consumption of poisoned baits.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide. *Ch. 1, Standards and Guidelines, H.2 (GW)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	associated with prairie dog colonies from risks related to shooting.		when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	

Determination of Effects

Short-eared owl meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for short-eared owl habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations for all alternatives is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species' range. There are numerous detections of short-eared owl on the TBNG and the species is well-distributed. Primary impacts of the alternatives include those activities that would decrease available habitat and cause potential mortality.

Additional rationale to support the effects determinations includes:

- Short-eared owls do not rely on prairie dogs as a prey source. As a result, any reduction in prairie dog numbers is not expected to impact prey base.
- No substantive effects from zinc phosphide (secondary poisoning) are expected in any alternatives.
- Mortality from anticoagulants in the Grassland-wide Alternative (Alternative 3) could occur from secondary poisoning; however, those effects would only occur in small areas and to a few individuals. Anticoagulant use would be uncommon, occur only after 3 years of zinc phosphide use in an area, and is not likely to occur across the TBNG at any given time. Therefore, it is expected that mortality could occur to a few individuals in the Grassland-wide Alternative (Alternative 3) during any given application, but would but would not apply to the larger population across the TBNG.
- There is potential for shooting of other animals in the vicinity of prairie dog colonies during recreational shooting activities, and individual short-eared owls could occasionally be shot. Effects would be localized and very infrequent. No pertinent difference among alternatives.
- Use of lead ammunition for recreational shooting in prairie dog colonies could cause secondary lead poisoning to individuals, but effects would be localized. No pertinent difference among alternatives.

Swainson's Hawk (*Buteo swainsoni*)

Introduction

Swainson's hawk is a large raptor that breeds across western North America and winters in the Argentine pampas. Swainson's hawks use open grassland, shrubland, tundra, and agricultural landscapes across their range. Pairs typically nest in trees adjacent to open foraging habitat, where they prey on small mammals, birds, reptiles, and invertebrates. While Swainson's hawks faced large-scale declines in abundance in the early 20th century because of shooting (intentional and accidental) by farmers and ranchers and in the late 20th century as a result of pesticide use on their wintering grounds in Argentina, the global population has since stabilized. Swainson's hawk is relatively adaptable to human disturbance and will nest and forage in human-disturbed landscapes.

Range-wide Information, Distribution and Abundance

Swainson's hawk is a wide-ranging and common raptor that breeds across much of inland western North America from Alaska and western Canada to northern Mexico. Swainson's hawk migrates through Mexico, Central America, and central South America to the Argentine pampas, where almost the entire population overwinters (Bechard et al. 2010).

Life History and Habitat

Swainson's hawk inhabit a wide variety of open habitats, ranging from prairie and shrub-steppe to desert and intensive agricultural systems. Nesting Swainson's hawks occupy relatively level terrain to gently rolling hills, and typically avoid mountainous terrain or steep canyons (Woodbridge 1998). Although Swainson's hawks will nest in trees located in upland areas, their strong association with riparian forests suggests that protection and restoration of these habitats may provide nesting habitat superior to other sources of trees such as roadsides and field margins (Woodbridge 1998).

Swainson's hawks place nests in close proximity to foraging habitats that are entirely different from the vegetation selected for nest sites (Woodbridge 1998). Nest sites may be located in isolated trees, natural or planted groups of trees, or riparian gallery forest. Although this species typically does not occupy large tracts of forest or woodland, it may nest at margins where woodlands meet grassland or agricultural habitats (Woodbridge 1991, Bechard et al. 2010). The density of breeding territories is strongly affected by land use type and availability of nest trees (Woodbridge 1998). Because of human-caused habitat changes, Swainson's hawks now commonly breed in areas of intensive agriculture, where hayfields and pasturelands can support large numbers of insects and ground mammals (Bechard et al. 2010). Swainson's hawks seem to tolerate human activity and frequently nest in farmsteads, shelterbelts, and the outskirts of urban areas where trees planted by people can offer nesting structures otherwise limited or absent in the surrounding landscape (Faulkner 2010). The species will occasionally nest on telephone poles and on the ground when trees are absent (Dunkle 1977).

Swainson's hawks are aerial foragers that feed on a variety of small mammalian prey (e.g., rodents, leporids) and reptiles during breeding season and while raising their fledglings. When not breeding, they forage almost exclusively on insects, eating grasshoppers in particular. Abundant insects are necessary to support large concentrations of Swainson's hawk (Bechard et al. 2010). However, annual productivity seems driven by the availability of certain small mammals. For example, research in California has shown that low densities of Swainson's hawk were associated with lower densities of pocket gophers (family *Geomyidae*) and voles (family *Cricetidae*), despite an abundance of other seemingly suitable prey like kangaroo rats (*Dipodomys* spp.) and pocket mice (family *Heteromyidae*) (Woodbridge 1998). Swainson's hawks construct open platform nests; materials commonly include sticks and plant parts from sagebrush, Russian thistle, and other weeds (Fitzner 1980).

Population Trends and Threats

Trend data from the U.S. Geological Survey North American Bird Breeding Survey suggest that the overall population of Swainson's hawk has been stable or is growing across much of the breeding range since the 1960s; however, results are not conclusive because of insufficient sample sizes in many areas (Sauer et al. 2017).

Key threats to this species include prairie dog control and plague, rodenticides, recreational shooting and hunting, electrocution, collisions with wires and vehicles, energy development and infrastructure, and climate change. Shooting and trapping (intentional and accidental) in the early 20th century resulted in some large-scale impacts to Swainson's hawk abundance prior to the 1950s. The species later experienced large population declines in the western parts of the United States and Canada during the 1990s as a result of pesticide use on Swainson's hawk wintering grounds in Argentina (Woodbridge et al. 1995, Goldstein et al. 1997). The pesticide in use, monocrotophos, was banned from the U.S. in 1991, distribution to Argentina was stopped, and Swainson's hawk populations subsequently stabilized.

Loss of native prairie can cause declines in prey base and impact Swainson's hawk abundance. For example, a study in northeastern California documented how weedy ruderal fields and cheatgrass-dominated grazing lands supported low prey populations and received little use by foraging Swainson's hawks (Woodbridge 1991). This pattern was also reported by Estep (1989) in the Central Valley of California. Additionally, invasion by species such as Russian thistle (*Salsola kali*), cheatgrass (*Bromus tectorum*), and tumble-mustard (*Sisymbrium altissimum*) resulted in increased fire potential, further reducing cover of less fire-resistant native perennial grasses and shrubs and habitat for important prey species. In addition, anthropogenic changes to prairie ecosystems that result in an increase in nesting structures (e.g., planting of shelterbelts around homesteads and crop fields, construction of transmission lines) has increased populations of competitors for both nest sites and prey, such as red-tailed hawk (*Buteo jamaicensis*) and common raven (*Corvus corax*) (Kirk and Hyslop 1998, Coates et al. 2014).

Other threats can result in direct mortality such as collisions with poorly placed wind turbines, causing population level effects (Beston et al. 2016, Watson et al. 2018a, Watson et al. 2018c).

Species Status in the Plan Area

Open, non-forested shrubland and prairie occur on over 98 percent of the total area of the TBNG (USDA Forest Service 2012). Trees and artificial nest sites occur across TBNG, and availability of nest sites will likely not change substantially going forward. Swainson's hawk is likely a generalist in foraging behavior on the TBNG, though local diet composition has not been studied. Swainson's hawk has not been observed as sensitive to other common anthropogenic disturbances on TBNG, including oil and gas well development, transportation infrastructure, or structures associated with livestock grazing. The status of Swainson's hawk habitat availability will likely remain stable.

Distribution, Abundance and Population Trend in the Plan Area

A review of eBird observation data (Sullivan et al. 2009) suggests that Swainson's hawk is well distributed across TBNG (Figure E-17). Swainson's hawk generally uses the TBNG for nesting and foraging, but inconsistently and in relatively low numbers. Observation records are insufficient to show local population trends or an accurate distribution of nests across the plan area from year to year.

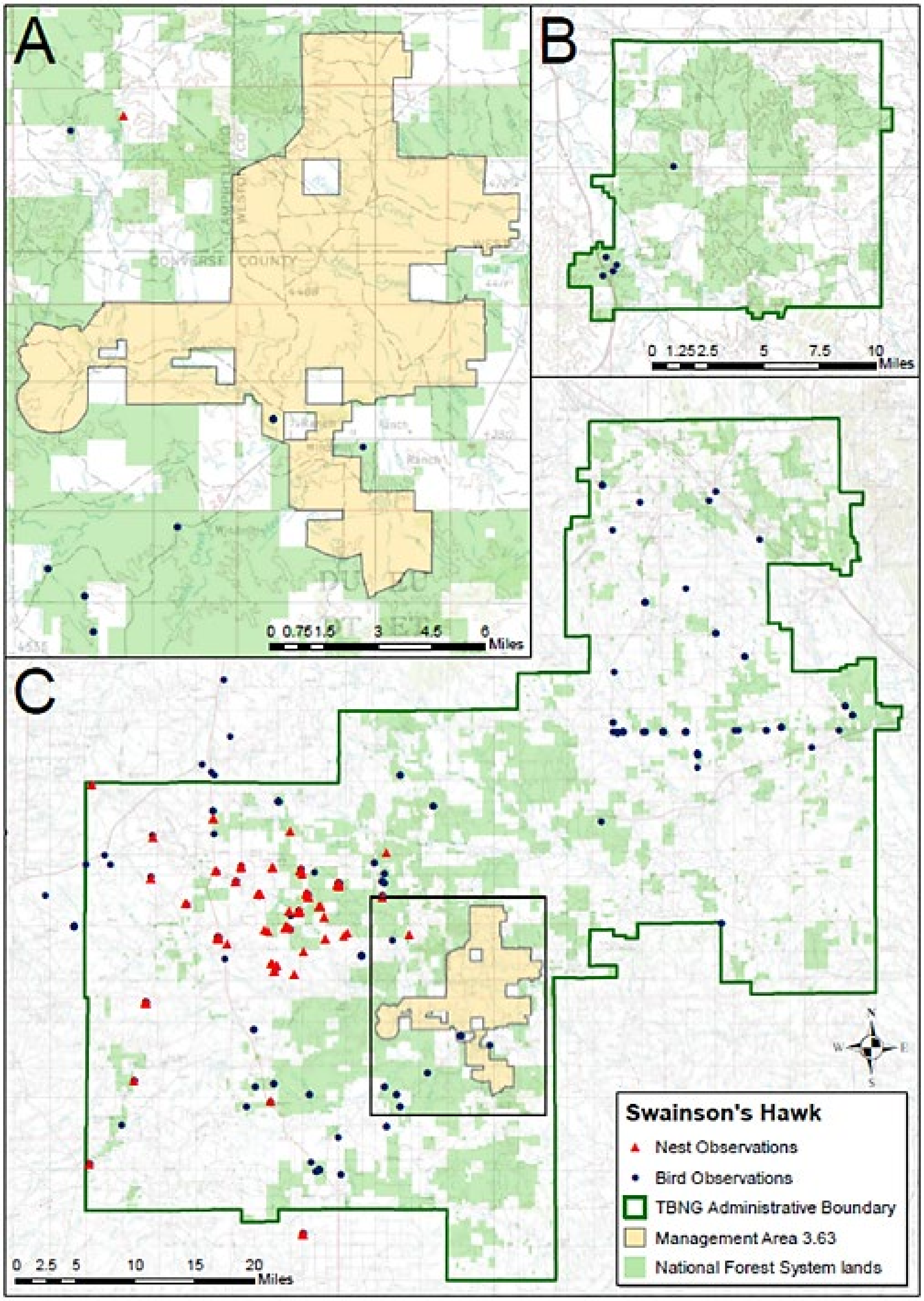

Figure E-17. Swainson's hawk bird and nest observations on the Thunder Basin National Grassland and vicinity. Map A is an inset map of Management Area 3.63 and its vicinity; the inset area is shown as a black perimeter on Map C. Map B depicts the Spring Creek Geographic Area. Map C depicts the Thunder Basin National Grassland, excluding the Spring Creek Geographic Area. Observation data shown on the map were collected in 1974, 1980-1982, 1984, 1988-1996, 1998, 1999, 2001, and 2004-2018. Observation data are from the local survey dataset maintained by the Douglas Ranger District, the Forest Service Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the eBird Basic Dataset (https://ebird.org/data/download). Note that some areas of the map may not have been surveyed, and the map may not show the full distribution of the species on the Thunder Basin National Grassland. Note that Management Area 3.63 as shown on the map includes Management Area 2.1 Cheyenne River Zoological Special Interest Area, which is not depicted.

Environmental Consequences

Direct Effects – Habitat Availability

Direct effects of boundary changes under any alternative are negligible or may benefit Swainson's hawk by limiting prairie dogs and their habitat, allowing for preferred prey species to persist.

Indirect Effects – Habitat Suitability

Habitat suitability would be impacted by rodenticide use and individuals may be impacted by recreational shooting. Some rodenticides may indirectly pose a risk of secondary poisoning to Swainson's hawk by ingestion of contaminated prey source. Anticoagulant rodenticides are proposed for limited use in the Grassland-wide Alternative (Alternative 3). Anticoagulants remain potent within prairie dog carcasses for up to 2 weeks, causing high risk to predators and scavengers if the carcasses are not removed from the environment (Ruder et al. 2011, Witmer et al. 2016). Contrary to anticoagulants, zinc phosphide poses minimal secondary poisoning risk to scavengers because residues are not retained at consequential levels in carcasses (Bell and Dimmick 1975, Marsh 1987, Matschke et al. 1992).

Recreational shooting of prairie dogs is allowed across most of the TBNG under all alternatives, but limits to recreational shooting exist in specific locations. Effects of recreational shooting include Swainson's hawks getting shot and killed or ingesting lead while scavenging, leading to secondary poisoning. The No Action and Prairie Dog Emphasis alternatives have the most limitations on recreational shooting and thus the greatest protections for Swainson's hawks from this activity, with a year-round shooting prohibition in MA 3.63 and in Category 2 areas. The Proposed Action and Preferred Alternatives offer the next highest level of protections, with a seasonal recreational shooting restriction in MA 3.67 from February 1 through August 15. The Grassland-wide Alternative does not include any recreational shooting restrictions.

Cumulative Effects to All Alternatives

In addition to proposed activities in each alternative, other actions contribute to potential impacts to the Swainson's hawk. A summary of cumulative effects are provided below.

Collisions – Collisions with barbed wire fences or powerlines may cause mortality or injury. Dead Swainson's hawks have been found hanging from strands of barbed-wire (Fitzner 1975, Knight and Skriletz 1980) and from pwerlines (Fitzner 1975). Fencing for livestock pastures and powerlines associated with oil, gas, and mineral extraction are common on the TBNG.

Energy development and infrastructure – Drilling operations for oil and gas may negatively impact nesting habitat availability because of fragmentation of territories. In addition, road construction and traffic may result in direct mortality to Swainson's hawk due to collisions with vehicles (Wiggins et al. 2006). Oil and gas drilling occurs across TBNG. Current management direction limits surface activity within 0.125 miles of known Swainson's hawk nests (USDA Forest Service 2012).

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). Increased incidence of hot days during the late spring can lead to declines in nest success (Steenhof et al. 1997, Kochert et al. 2019). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of prey because of a loss of forage for small mammalian herbivores (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for Swainson's hawk and other species will directly and indirectly reduce potential impacts (Table E-33). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-33. Plan components that support Swainson's hawk habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management. *Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of grain-bait rodenticides in prairie dog colonies from January 1 to September 30 to protect migratory birds from consumption of poisoned baits.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide. *Ch. 1, Standards and Guidelines, H.2 (GW)*: Standard H.2 prohibits use of rodenticides in prairie dog colonies from February 1 to September 30.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Determination of Effects

Swainson's hawk meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for Swainson's hawk habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations for all alternatives is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species' range. There are numerous detections of Swainson's hawk on the TBNG and the species is well-distributed. Primary impacts of the alternatives include those activities that would decrease available habitat and cause potential mortality.

Additional rationale to support the effects determinations includes:

- Swainson's hawk do not rely on prairie dogs as a prey source. As a result, any reductions in prairie dog numbers is not expected to impact prey base.
- No substantive effects from zinc phosphide (secondary poisoning) are expected under any alternatives.
- Mortality from anticoagulants in the Grassland-wide Alternative (Alternative 3) occur from secondary poisoning; however, those effects would only occur in small areas and to a few individuals. Anticoagulant use would be uncommon, occur only after 3 years of zinc phosphide use in an area, and is not likely to occur across the TBNG at any given time. Therefore, it is expected that mortality could occur to a few individuals in the Grassland-wide Alternative (Alternative 3) during any given application, but would but would not apply to the larger population across the TBNG.
- There is potential for shooting of other animals in the vicinity of prairie dog colonies during recreational shooting activities, and individual Swainson's hawks could occasionally be shot. Effects would be localized and very infrequent. No pertinent difference among alternatives.
- Use of lead ammunition for recreational shooting in prairie dog colonies could cause secondary lead poisoning to individuals, but effects would be localized. No pertinent difference among alternatives.

Upland Sandpiper (*Bartramia longicauda*)

Introduction

Upland sandpiper is a mixed- and tallgrass prairie species that depends on a mosaic of vegetation conditions during the breeding season. The bird nests in taller, denser vegetation to provide cover, but forages in shorter, sparser vegetation. While upland sandpiper populations declined significantly in the 19th and early 20th centuries as a result of hunting and experienced more moderate declines in the mid-20th century as a result of native grassland conversion for agricultural uses, recent range-wide surveys have shown that numbers have remained stable or grown.

Range-wide Information, Distribution and Abundance

Upland sandpiper breeds in the northern Great Plains, the Great Lakes region, and northwestern Canada and Alaska. Seventy percent of the upland sandpiper breeding range occurs in the central and northern Great Plains, where it spends as little as 4 months prior to migrating to its wintering grounds in South America (Houston et al. 2011). The core of the breeding range runs from southern Saskatchewan and Alberta through the mixed-grass prairie of North Dakota, South Dakota, Nebraska, and Kansas (Dechant et al. 2002). Upland sandpiper has a limited distribution west of the Rockies (Vickery et al. 2010). The core of the winter range lies in the Argentine and Uruguayan pampas. During migration, upland sandpipers can wander as far as Europe and Pacific islands (Houston et al. 2011).

Life History and Habitat

Upland sandpiper is a terrestrial, obligate grassland species characterized by cryptic coloration and ground nesting habits (Houston et al. 2011). Upland sandpiper generally uses dry grasslands with moderate grass cover, little woody vegetation, and little bare ground (Dechant et al. 2002, Vickery et al. 2010). Within these grasslands, upland sandpiper prefers the presence of a mosaic of habitat types to meet the needs of different parts of its lifecycle (Sandercock et al. 2015). The species needs three distinct habitat conditions to complete its life cycle:

1. perches and low vegetation are needed for courtship to provide clear lines of sight
2. taller vegetation is needed during the nesting stage to provide cover
3. lower vegetation is needed for brood rearing (Houston et al. 2011).

In general, areas of dense, tall grass cover are used for nesting while more open areas containing short-stature vegetation are used for foraging (Houston et al. 2011, Sandercock et al. 2015). In areas of taller vegetation, overgrazed pastures and burned areas have been known to provide the vegetation characteristics suitable for foraging habitat (Dorio 1977, Ahlering and Merkord 2016, Hovick et al. 2017). Migratory stopover habitat can include cultivated fields, mowed hayfields, and pastures (Vickery et al. 2010). In Wyoming, upland sandpiper can be found primarily in mixed-grass prairie in the eastern portion of the state (Faulkner 2010). In one study in southcentral Canada and the northcentral United States, graminoids, especially Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), needle and thread (*Hesperostipa comata*), and quackgrass (*Agropyron repens*), were dominant at 83 percent of 588 nest sites with forbs and shrubs as the major vegetation component of the remainder (Kantrud and Higgins 1992).

Upland sandpipers prefer to forage in short-stature vegetation where they visually search for invertebrates and, to a lesser degree, seeds (McAtee and Beal 1912, Dechant et al. 2002). Grasshoppers are a key prey item and may drive habitat selection (Mong 2005). Upland sandpipers are ground nesters and use both native and cultivated vegetation throughout their breeding range (Dechant et al. 2002). Nesting is usually initiated in May, with eggs hatching as late as July. Nests consist of a shallow scrape on the ground that is lined with vegetation. One brood is produced each season (Houston et al. 2011). Young are precocial and active, pursuing their own food within a week of hatching with broods moving to more open habitat after hatching (Buss 1951). In Wisconsin, Ailes (1980) found that 69 percent of family unit observations occurred in heavily grazed pastures with short-statured vegetation less than 10 centimeters tall. Upland sandpiper is sensitive to reductions in grassland patch size (Ribic et al. 2009). Individual nesting territories are relatively large, measured at approximately 20 acres in some parts of the range, but are not discrete (Vickery et al. 1994, Houston et al. 2011). Because the foraging habitat differs from the nesting habitat, the breeding territory can be much larger, and upland sandpiper have been found to be rare in patches less than approximately 125 acres in Maine and less than approximately 50 acres in Illinois (Vickery et al. 1994).

Population Trends and Threats

Previously, U.S. Geological Survey North American Breeding Bird Surveys found that upland sandpiper populations were declining across portions of the United States and Canada (Sauer et al. 2008, Andres 2009). As a result, the species has been listed with priority conservation status in at least 22 states and provinces (Houston et al. 2011). However, more recent data show that populations have increased (Andres 2009). North American Breeding Bird Survey data from 2005 to 2015 show a statistically significant survey-wide estimated population increase of 1.5 percent per year (Sauer et al. 2017). Comparing 1966 to 2015 and taking into account recent upward trends, North American Breeding Bird Survey data show that population numbers in 2015 were very similar to those 50 years ago (non-significant trend). As a result of these recent increases in abundance, both the International Union for Conservation of Nature and the U.S. Shorebird Conservation Plan Partnership have ranked upland sandpiper as a species of least concern (Lepage, BirdLife International 2019, U.S. Shorebird Conservation Plan Partnership 2016). In Wyoming, North American Breeding Bird Survey data show a steady population increase of approximately 5 percent annually from 1968 to 2015, though the species is detected infrequently in the state and the estimates are based on relatively few observations. Wyoming populations are also small enough that these increases have had little effect on continental indices.

The original reason for the species' large population decline was sport hunting in the late 1800s and early 1900s (Ailes 1980, Houston 1999). Conversion of its breeding habitat to agricultural cropland (e.g., row-cropping) was also a primary factor influencing the species' previous decline (Houston et al. 2011). Conversion to agriculture can result in a reduction in the heterogeneity of grassland, especially with interruptions to historical grazing and fire regimes. In addition, some reduction in patch size could result with the introduction of any woody vegetation, such as wind breaks.

Species Status in the Plan Area

The TBNG lies at the edge of the upland sandpiper breeding range. In this portion of the range, upland sandpipers have been found to use both undisturbed and disturbed areas, including burned areas and prairie dog colonies. Disturbed grassland provides foraging habitat, while undisturbed grassland provides nesting habitat. The importance of disturbed areas to nest success, however, has not been studied in the western portion of the species' range. Historical disturbance regimes, including fire and grazing, contribute to the habitat mosaic used by upland sandpiper, and the growth of prairie dog colonies would likely benefit the species. At the same time, upland sandpiper do not seem to depend on prairie dog colonies on TBNG for survival. No substantial threats to the species have been identified in the plan area. Mortality among individuals could occur where prairie dog colonies are open to recreational shooting.

Distribution, Abundance and Population Trend in the Plan Area

Upland sandpiper uses TBNG as breeding habitat from late April or early May through early August. The species is well-established on TBNG, and several hundred observations are recorded in the local Forest Service survey dataset, the Forest Service's Enterprise Data Warehouse, the Wyoming Natural Diversity Database, and the citizen science birding database, eBird (https://ebird.org/; Sullivan et al. 2009). Observations have occurred across the TBNG.

Environmental Consequences

Direct and Indirect Effects

All alternatives are considered to have similar impacts to this species. Recreational shooting would pose little risk to the species, as would rodenticide use. However, seasonal restrictions for shooting and limitations on rodenticide use would reduce potential impacts.

Cumulative Effects to All Alternatives

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of foraging and nesting habitat (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will directly and indirectly reduce potential impacts to upland sandpiper (see Table E-34). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-34. Plan components that support upland sandpiper habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Risk of being shot in prairie dog colonies open to shooting	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting.
Habitat suitability – Possible impacts because of decline in insect prey base after use of deltamethrin in prairie dog colonies	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to upland sandpipers.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to upland sandpipers.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to upland sandpipers.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to upland sandpipers.	*Ch. 1, Standards and Guidelines, J.10*: Guideline J.10 restricts pesticide use where it would have adverse effects on species at risk. This restriction would apply to the use of deltamethrin in prairie dog colonies where it may pose a risk to upland sandpipers.

Determination of Effects

Upland sandpiper meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for upland sandpiper habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations for all alternatives is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species' range. There are detections of upland sandpiper on the TBNG; however, the species is relatively well-distributed. Primary impacts of the alternatives include those activities that would involve recreational shooting and secondary poisoning (although very uncommon).

Additional rationale to support the effects determinations for all alternatives includes:

- Upland sandpiper is a common breeder on TBNG. Upland sandpipers may often forage in or near prairie dog colonies, but no local dependency on prairie dogs has been observed. Populations of upland sandpiper have not been observed to track fluctuations in prairie dog total colony extent on TBNG (i.e., during epizootics).
- Upland sandpipers are insectivorous and very unlikely to consume grain-bait rodenticides. Seasonal restrictions on rodenticide use should allow for only limited opportunity to consume grain-baits.
- Deltamethrin used for plague control could result in some impacts to prey base, but effects would be very localized and short-term because adjacent insect populations could repopulate dusted colonies.
- Recreational shooting poses some risk to individuals occupying prairie dog colonies.

Thirteen-lined Ground Squirrel (*Ictidomys tridecemlineatus*)

Introduction

Thirteen-lined ground squirrel is a small, burrowing rodent that is widely distributed across grassland habitats of central North America. Thirteen-lined ground squirrel is adaptable and can take advantage of land-use conversion for agriculture. Few significant threats have been observed for the species, but humans may often use rodenticides to reduce thirteen-lined ground squirrel because it forages on crop seeds after planting. Thirteen-lined ground squirrels often occupy prairie dog colonies, but are not dependent on colonies for habitat. Thirteen-lined ground squirrels that occupy prairie dog colonies subject to lethal control may experience non-target mortality from rodenticides. Thirteen-lined ground squirrels may also be shot when recreational shooting occurs in prairie dog colonies.

Range-wide Information, Distribution and Abundance

Thirteen-lined ground squirrel is a North American endemic. Originally limited to the Great Plains, thirteen-lined ground squirrel quickly exploited pastures and open areas that were cleared during European settlement, expanding its range to extend from central Alberta, Manitoba, and Saskatchewan southward to Texas and New Mexico, and from central Ohio westward to Colorado (Hygnstrom et al. 1994).

Life History and Habitat

Thirteen-lined ground squirrels prefer open areas with short grass and well-drained loamy or sandy soils for burrows. They can be found where these conditions exist in grasslands, fields, meadows, shrublands, and cultivated areas (Evans 1951).

Thirteen-lined ground squirrel is a fossorial species that breeds from April to June, having one litter per year. It lives in loosely associated family units, but is not a colonial species. Thirteen-lined ground squirrel home ranges vary from 1 to 12 acres in size (Gunderson 1976). Thirteen-lined ground squirrels forage on seeds, fruits, insects, grasses, and forbs and when not foraging spend much of their time resting, caring for young and hibernating underground (Wistrand 1974).

Population Trends and Threats

The population trend for thirteen-lined ground squirrel is stable, and the International Union for Conservation of Nature considers it a species of least concern (Cassola 2016). NatureServe ranks the species as secure throughout its range and in the state of Wyoming (NatureServe 2018).

Thirteen-lined ground squirrel has faced some eradication efforts by humans because it may damage crop yield where it forages on sown crop seeds (Johnson et al. 1985). Rodenticides are commonly used to control thirteen-lined ground squirrel populations (Vantassel et al. 2009).

Species Status in the Plan Area

Distribution, Abundance and Population Trend in the Plan Area

Unit specific information on population trends, demographics, and threats is unavailable. Studies regarding incidence of sylvatic plague in thirteen-lined ground squirrel would be helpful to inform future management of this species on TBNG.

Environmental Consequences

Direct and Indirect Effects

All alternatives are considered to have similar impacts to this species. Recreational shooting would be the primary activity to cause potential mortality to the species. The Grassland-wide Alternative (Alternative 3) proposes the use of anticoagulants and fumigants, which could indirectly impact this species since they will forage in or near prairie dog colonies and use burrows as denning habitat.

The primary threats to thirteen-lined ground squirrel on TBNG are likely non-target mortality during lethal control of prairie dogs and recreational shooting. Thirteen-lined ground squirrels could consume poisoned baits placed in burrows in prairie dog colonies, or die as a result of the use of burrow fumigants in colonies. Recreational shooting of prairie dogs is also common on TBNG (Pauli and Buskirk 2007), and thirteen-lined ground squirrels could experience potential mortality as a result of this activity.

The epizootic disease sylvatic plague, caused by the bacterium *Yersinia pestis*, is prevalent among prairie dogs on TBNG (Pauli et al. 2006, Cully et al. 2010). Ground squirrels are especially susceptible to plague epizootics, but mortality rates among thirteen-lined ground squirrels have not been studied and are likely far lower than the near complete mortality experienced by black-tailed prairie dogs on TBNG (Stapp et al. 2009).

Other threats to thirteen-lined ground squirrel on TBNG are generally unknown, but could include increased drought stress to forage availability with future climate change (Conant et al. 2018, Stephens et al. 2018) and targeted rodenticide or shooting use by humans (Vantassel et al. 2009).

Cumulative Effects to All Alternatives

Energy development and infrastructure – Drilling operations for oil and gas may negatively impact habitat availability. In addition, road construction and traffic may result in direct mortality to this species, since foraging near roads may occur.

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of forage for small mammalian herbivores (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will directly and indirectly reduce potential impacts to thirteen-lined ground squirrel (see Table E-35). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-35. Plan components that support thirteen-lined ground squirrel habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Non-target mortality as a result of the use of rodenticides or other lethal prairie dog management tools in prairie dog colonies	*Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 1, Standards and Guidelines, H.1 (NA); Ch. 3, MA 3.63, Standards and Guidelines, General, 1 (NA)*: Standard F.65b in Chapter 1 adopts the Black-tailed Prairie Dog Conservation Assessment and Management Strategy (Strategy), which contains the existing area targets for prairie dog colonies. Control of prairie dogs is generally not allowed under the Strategy if composite colony area is below targets. General standard 1 for MA 3.63 supports the composite colony area targets contained in the Strategy by prohibiting activities that would inhibit increases in the prairie dog population in MA 3.63 until the colonies could support a sustainable black-footed ferret population. Guideline H.1 in Chapter 1 additionally supports the colony area targets by limiting the use of rodenticides to situations in which public health, damage to facilities, and persistent encroachment are concerns.	*GPA-MA3.67-FWRP-ST-08 (PA)*: GPA-MA3.67-FWRP-ST-08 contains the area target for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-MA3.67-FWRP-ST-12 (PA)*: GPA-MA3.67-FWRP-ST-12 prohibits prairie dog density control in more than 50% of the area of an individual colony when composite colony area is smaller than the target. *GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits the use of anticoagulant rodenticides and fumigants on the Grassland. *Ch. 1, Standards and Guidelines, F.64*:	*GPA-FW-FWRP-ST-02 (GW)*: GPA-FW-FWRP-ST-02 contains the area target for prairie dog colonies. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the target. *GPA-FW-FWRP-ST-06 (GW)*: GPA-FW-FWRP-ST-06 prohibits prairie dog density control in more than 50% of the area of an individual colony when composite colony area is smaller than the target. *GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides and fumigants except in boundary	*GPA-FW-FWRP-ST-01 (PDE)*: GPA-FW-FWRP-ST-01 contains the area targets for prairie dog colonies in Categories 1 and 2 areas. Lethal control of prairie dog colonies is prohibited when composite colony area does not sum to the targets. *GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits the use of anticoagulant rodenticides and fumigants on the Grassland. *Ch. 1, Standards and Guidelines, F.64*: Standard F.64 prohibits activities that would alter water flow regimes and flood prairie dog burrows.	*GPA-MA3.67-FWRP-O-07 (Preferred); GPA-MA3.67-FWRP-GL-09 (Preferred); GPA-MA3.67-FWRP-ST-10 (Preferred); GPA-MA3.67-FWRP-GL-12 (Preferred)*: These plan components describe the area objective of 10,000 acres for prairie dog colonies in MA 3.67. Control of prairie dog colonies is generally restricted when composite colony area does not sum to the objective. 7,500 acres of colonies is the minimum threshold for use of rodenticides in MA 3.67 outside of boundary management zones in all circumstances except density control. *GPA-MA3.67-FWRP-ST-15 (Preferred); GPA-MA3.67-FWRP-GL-16 (Preferred)*: GPA-MA3.67-FWRP-ST-15 stipulates that prairie dog density control is not allowed in MA 3.67 when composite colony area is less than 7,500, unless the best available scientific information indicates that density control will achieve site-specific objectives and maintain habitat requirements for associated species. GPA-MA3.67-FWRP-

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	Ch. 1, Standards and Guidelines, H.4 (NA): Standard H.4 prohibits the use of fumigants in prairie dog colonies on the Grassland. *Ch. 1, Standards and Guidelines, F.64*: Standard F.64 prohibits activities that would alter water flow regimes and flood prairie dog burrows.	Standard F.64 prohibits activities that would alter water flow regimes and flood prairie dog burrows.	management zones after three consecutive applications of zinc phosphide. *Ch. 1, Standards and Guidelines, F.64*: Standard F.64 prohibits activities that would alter water flow regimes and flood prairie dog burrows.		GL-16 indicates that density control in MA 3.67 should not occur in more than 50 percent of the area of any individual colony and should not occur more than every other year. *GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides. *GPA-FW-ADM-ST-05 (Preferred)*: GPA-FW-ADM-ST-05 prohibits use of fumigants except in boundary management zones, 1-mile buffers around residences, and within ¼ mile of non-Federal land after two consecutive applications of zinc phosphide. *Ch. 1, Standards and Guidelines, F.64*: Standard F.64 prohibits activities that would alter water flow regimes and flood prairie dog burrows.
Habitat suitability – Non-target mortality as a result of shooting in prairie dog colonies	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting. GPA-FW-FWRP-ST-03 prohibits shooting	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
	Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.		composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	

Determination of Effects

Thirteen-lined ground squirrel meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for thirteen-lined ground squirrel habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations to all alternatives is based on the availability of foraging and denning habitat on the TBNG, along with sufficient distribution of habitat within the species' range. There are detections of thirteen-lined ground squirrel on the TBNG; however, actual numbers are unknown due to the species being understudied. Primary impacts of the alternatives include those activities that would cause potential mortality.

Additional rationale to support the effects determinations includes:

- Thirteen-lined ground squirrels are prairie and grassland generalists, but will occupy prairie dog habitat. As a result, the species could be affected by some forms of lethal prairie dog control, including rodenticide use and burrow collapsing as well as recreational shooting. However, populations are large and widespread and effects to populations would be localized.
- Thirteen-lined ground squirrels could incur risk of secondary poisoning from anticoagulants and fumigants or eat poisoned grain-bait rodenticides.
- Recreational shooting could cause some occasional morality to individuals. Although likely very infrequent, individuals could get lead poisoning by consuming shot prairie dogs. However, populations are large and widespread and effects to population would be localized.

Plains Hog-nosed Snake *(Heterodon nasicus)*

Introduction

Plains hog-nosed snake is a small to medium-sized Great Plains snake, inhabiting grassland habitats across central North America. Plains hog-nosed snake uses burrows for daily shelter and as winter hibernacula. The plains hog-nosed snake diet is somewhat diverse, but typically incorporates a large amphibian component, especially toads. Although it remains widespread, land-use change from native prairie to row-crop agriculture may have caused some reductions in abundance in portions of the range. Plains hog-nosed snakes are not reliant on prairie dogs colonies for prey or shelter.

Range-wide Information, Distribution and Abundance

The range of plains hog-nosed snake extends from Alberta, Manitoba, and Saskatchewan southward through the Great Plains region of central North America to New Mexico and northern Texas. The species also occupies parts of the Mississippi River Valley in southeastern Minnesota, Illinois, and eastern Missouri (Smith et al. 2003). In the eastern parts of the range, suitable soils for burrowing are discontinuous, while in the arid shortgrass prairies of the western part of the range, plains hog-nosed snake abundance is more continuous (Wright and Didiuk 1998). Plains hog-nosed snake is relatively sparsely distributed across its range, but is also difficult to detect, and few comprehensive surveys exist (Wright and Didiuk 1998).

Life History and Habitat

Plains hog-nosed snakes prefer grasslands with sandy or gravelly areas for burrowing; however, they can also inhabit open brushland and woodland, farmlands, canyon bottoms, scrub brush, and floodplains, (Baxter and Stone 1985, Ernst and Ernst 2003). The species may show a preference for areas close to water, especially because it commonly preys on toads and other amphibians (Baxter and Stone 1985). In the mixed-grass prairie, plains hog-nosed snakes often inhabit floodplains of rivers (Maxell and Burkholder 2017).

Plains hog-nosed snake is a burrowing, diurnal species and although not dangerous can appear quite aggressive when threatened (Baxter and Stone 1985). They are likely to be most active in Wyoming from April to October spending the night in temporary burrows constructed in loose soil. They create burrows for hibernation but will also exploit abandoned mammal burrows (Ernst and Ernst 2003). The diet composition of plains hog-nosed snake is relatively diverse, varying across its range (Durso and Mullin 2017).

Population Trends and Threats

Plains hog-nosed snake is considered a species of least concern by the International Union for Conservation of Nature, with a globally stable population trend. However, regional declines have been observed anecdotally in Montana and Illinois (Durso 2011, Montana Department of Fish, Wildlife, and Parks 2019). As is the case with many prairie grassland species, conversion of grasslands and savannas to agriculture lands has likely caused localized declines (Wright and Didiuk 1998). The species is sometimes killed opportunistically by humans because it is mistaken for rattlesnakes (Baxter and Sone 1985). Plains hog-nosed snakes are also often captured for use as pets (Stallins and Kelley 2013).

Species Status in the Plan Area

Plains hog-nosed snakes do not depend on prairie dog colonies and often prefer habitat near water.

Distribution, Abundance and Population Trend in the Plan Area

No research has examined plains hog-nosed snake habitat and occurrence on TBNG specifically. The Forest Service does not monitor plains hog-nosed snake populations on the TBNG. There are three known detections in the vicinity of TBNG (collected in 1987 and in 2012) in the Wyoming Natural Diversity Database.

Environmental Consequences

Direct and Indirect Effects

All alternatives are considered to have similar impacts to this species. Recreational shooting would be the primary activity to cause potential mortality to the species. The Grassland-wide Alternative (Alternative 3) proposes the use of anticoagulants and fumigants, which could indirectly impact plains hog-nosed snake since they will forage on prairie dogs where prairie dogs occupy riparian areas, such as in the Cheyenne River Special Interest Area.

Intentional killing by humans because of the perceived threat of toxic bites is likely the only substantial risk factor to the species on TBNG (WGFD 2017). A possible rare threat to individuals could be the ingestion of lead ammunition used in the recreational shooting of prairie dogs if a plains hog-nosed snake were to eat a shot prairie dog carcass (Grillitsch and Schiesari 2010). In addition, the use of anticoagulant rodenticides could cause rare instances of non-target poisoning to individuals if they were to ingest a poisoned prairie dog. Anticoagulant rodenticides have not been shown to have effects on reptiles, but mortality possibly as a result of a loss of the ability to thermoregulate has been observed after direct ingestion of poisoned baits (Merton 1987, Hoare and Hare 2006).

Cumulative Effects to All Alternatives

Energy development and infrastructure – Drilling operations for oil and gas may negatively impact habitat availability. In addition, road construction and traffic may result in direct mortality to individuals of this species, since sunning on highways and roads to thremoregulate is common.

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of prey because of a loss of forage for small mammalian herbivores (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will directly and indirectly reduce potential impacts to plains hog-nosed snake (see Table E-36). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-36. Plan components that support plains hog-nosed snake habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.
Habitat suitability – Risk of direct poisoning by fumigants used in prairie dog colonies	*Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of burrow fumigants in prairie dog colonies.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of fumigants.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08prohibits use of fumigants except in boundary management zones after three consecutive applications of zinc phosphide.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of fumigants.	*GPA-FW-ADM-ST-05 (Preferred)*: GPA-FW-ADM-ST-05 prohibits use of fumigants except in boundary management zones, 1-mile buffers around residences, and within ¼ mile of non-Federal land after two consecutive applications of zinc phosphide.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Determination of Effects

Plains hog-nosed snake meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, “no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated” under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for plains-hog-nosed snake habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations to all alternatives is based on the availability of habitat on the TBNG, along with sufficient distribution of habitat within the species’ range. There are few detections of plains hog-nosed snake on the TBNG and the species is understudied. Primary impacts of the alternatives include those activities that would cause potential mortality.

Additional rationale to support the effects determinations includes:

- Plains hog-nosed snake prefers grassland habitat with loose soils for burrowing, often with access to water where preferred amphibian prey are located. It is not associated with prairie dog colonies for habitat.
- Plains hog-nosed snakes could eat poisoned prairie dogs, incurring risk of secondary poisoning from anticoagulants. Effects of anticoagulants on reptiles are not well-known, but could include interference with thermoregulation. Rodenticides pose minimal secondary poisoning risk. However, populations are large and widespread and effects to population would be localized.
- Recreational shooting could cause some occasional morality to individuals. Though likely very infrequent, individuals could get lead poisoning by consuming shot prairie dogs. However, populations are large and widespread and effects to population would be localized.

Prairie Rattlesnake *(Crotalus viridis)*

Introduction

Prairie rattlesnake is a common Great Plains snake, inhabiting grasslands, deserts, and shrubland habitats in much of central North America. Prairie rattlesnake is a diet and open habitat generalist, and is abundant across most of its range. Prairie rattlesnakes require subterranean burrows for shelter and overwinter hibernation. Prairie rattlesnake experience local declines as humans may kill rattlesnakes because of the threat their toxic bite carries. Black-tailed prairie dog burrow can provide denning habitat for a variety of herptofauna, including the prairie rattlesnake (Kretzer and Cully 2001).

Range-wide Information, Distribution and Abundance

The range of prairie rattlesnake extends from Alberta and Saskatchewan southward through the Great Plains region of central North America to northern Mexico. Prairie rattlesnake is abundant throughout its range.

Life History and Habitat

Prairie rattlesnakes occupy plains, foothills, scarp woodlands, and granite or limestone outcrops. They are also found near rocky outcrops, talus slopes, and rocky stream courses. Prairie rattlesnakes burrow for shelter, and they tend to occur in habitat where dens can be established in loose soils or existing mammal burrows, often in prairie dog colonies (Baxter and Stone 1985, Shipley et al. 2006, Shipley et al. 2008). In addition, some research shows that prairie rattlesnakes will return to the same colony in the autumn in which they had hibernated the previous winter (Shipley et al 2013).

Prairie rattlesnakes are likely to be most active in Wyoming from April to October, and they hibernate during the winter months. This species dens communally, but can range up to 7 miles from dens during the summer (Gannon and Secoy 1985). Females give live birth to 4 to 21 young in late summer and generally reproduce biennially, but some may reproduce annually or triennially (Ernst and Ernst 2003). Prairie rattlesnakes overwinter in large aggregations in deep underground crevices, prairie dog burrows, or other abandoned mammal burrows. Aggregations can be quite large, with one hibernaculum in southwestern Saskatchewan having contained an estimated 150 adults, plus juvenile and young-of-year in same den (Gannon and Secoy 1984).

Population Trends and Threats

The prairie rattlesnake is widely distributed and is considered a species of least concern by the International Union for Conservation of Nature, with a globally stable population trend.

As is the case with many prairie grassland species, conversion of grasslands and savannas to agricultural lands has likely caused localized declines. In Wyoming, habitat conversion may be a limiting factor, but specific threats are unknown. Additionally, human disturbances (deliberate killing and hibernacula destruction) could cause declines in the populations. The direct eradication of prairie dog colonies can also reduce favorable habitat where burrows and prey are abundant (WGFD 2017).

Species Status in the Plan Area

Prairie rattlesnakes are habitat generalists on TBNG and do not depend on prairie dog colonies. Prairie rattlesnakes may use prairie dog colonies as secondary habitat for their abundance of burrows and small mammalian and avian prey. Prairie rattlesnakes are most often found on rocky outcrops on TBNG.

Distribution, Abundance and Population Trend in the Plan Area

Prairie rattlesnakes are likely habitat generalists across TBNG, using the array of open shrubland and grassland that occurs on the landscape. In surveys of the Powder River Basin, prairie rattlesnakes occurred at both upland and riparian sites, but were most common on rock outcrops and near roads (Estes-Zumpf et al. 2011). Prairie rattlesnakes are also likely common on prairie dog colonies because they provide an abundance of prey and burrows for shelter (WGFD 2017).

Environmental Consequences

Direct and Indirect Effects

All alternatives are considered to have similar impacts to this species. Recreational shooting would be the primary activity to cause potential mortality of individuals. The Grassland-wide Alternative (Alternative 3) proposes the use of anticoagulants and fumigants, which could indirectly impact prairie rattlesnake since they will forage on prairie dogs and use burrows as denning habitat.

Intentional killing by humans because of the perceived threat of toxic rattlesnake bites is likely the only substantial risk factor to prairie rattlesnake on TBNG (WGFD 2017). Eradication of black-tailed prairie dog colonies on the TBNG would reduce the total availability of habitat for prairie rattlesnake, but would not likely result in negative effects to the prairie rattlesnake population because the species is a habitat generalist in the region. The use of burrow fumigants for lethal control of prairie dogs could kill prairie rattlesnakes inhabiting burrows in prairie dog colonies. A possible rare threat to individual prairie rattlesnakes could be the ingestion of lead ammunition used in the recreational shooting of prairie dogs if a prairie rattlesnake were to eat a shot prairie dog carcass (Grillitsch and Schiesari 2010). In addition, the use of anticoagulant rodenticides could cause rare instances of non-target poisoning to individual prairie rattlesnakes if they were to ingest a poisoned prairie dog. Anticoagulant rodenticides have not been shown to have effects on reptiles, but mortality possibly as a result of a loss of the ability to thermoregulate has been observed after direct ingestion of poisoned baits (Merton 1987, Hoare and Hare 2006).

Cumulative Effects to All Alternatives

Energy development and infrastructure – Drilling operations for oil and gas may negatively impact habitat availability. In addition, road construction and traffic may result in direct mortality to individuals of this species, since sunning on highways and roads to thremoregulate is common.

Weather, climate, and climate change – Weather, moisture patterns, and vegetation growth in the TBNG ecotone is highly variable. Climate change models for the mixed-grass prairie ecotones at the western edge of the Northern Great Plains in Wyoming and Montana project higher temperatures and increased extreme weather events (Conant et al. 2018). In addition, if climate change results in greater frequency of drought on TBNG, it could reduce the availability of prey because of a loss of forage for small mammalian herbivores (Schmidt et al. 2018, Stephens et al. 2018, Wiens et al. 2018).

Plan Components

Plan components developed for other species will directly and indirectly reduce potential impacts to prairie rattlesnake (see Table E-37). In addition, the plan components listed below reduce the overall threats to the species by maintaining preferred habitat.

Table E-37. Plan components that support prairie rattlesnake habitat suitability

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs poisoned using anticoagulant rodenticides	Anticoagulant rodenticides are not prohibited under the No Action Alternative; however, anticoagulant rodenticides have not been approved for use on National Forest Service lands, and the Forest Service does not use anticoagulant rodenticides in current management.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08 prohibits use of anticoagulant rodenticides except in boundary management zones after three consecutive applications of zinc phosphide.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of anticoagulant rodenticides.	*GPA-FW-ADM-ST-04 (Preferred)*: GPA-FW-ADM-ST-04 prohibits use of anticoagulant rodenticides.
Habitat suitability – Risk of direct poisoning by fumigants used in prairie dog colonies	*Ch. 1, Standards and Guidelines, H.4 (NA)*: Standard H.4 prohibits use of burrow fumigants in prairie dog colonies.	*GPA-FW-ADM-ST-05 (PA)*: GPA-FW-ADM-ST-05 prohibits use of fumigants.	*GPA-FW-ADM-ST-08 (GW)*: GPA-FW-ADM-ST-08prohibits use of fumigants except in boundary management zones after three consecutive applications of zinc phosphide.	*GPA-FW-ADM-ST-05 (PDE)*: GPA-FW-ADM-ST-05 prohibits use of fumigants.	*GPA-FW-ADM-ST-05 (Preferred)*: GPA-FW-ADM-ST-05 prohibits use of fumigants except in boundary management zones, 1-mile buffers around residences, and within ¼ mile of non-Federal land after two consecutive applications of zinc phosphide.

Threat	No Action Alternative	Proposed Action Alternative	Grassland-wide Alternative	Prairie Dog Emphasis Alternative	Preferred Alternative
Habitat suitability – Secondary poisoning of individuals via consumption of prairie dogs shot with lead ammunition	*Ch. 1, Standards and Guidelines, F.63 (NA); Ch. 1, Standards and Guidelines, F.65b (NA); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (NA)*: Standard F.63 in Chapter 1 prohibits shooting in prairie dog colonies where shooting poses risks to wildlife associated with prairie dog colonies. The Strategy adopted in Standard F.65b prohibits shooting of prairie dogs in MA 3.63 and Category 1 areas at all times, and Category 2 areas when composite colony area targets have not been met. Standard 1 for the MA 2.1b Cheyenne River Zoological SIA in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times.	*GPA-FW-FWRP-ST-03 (PA); GPA-MA3.67-FWRP-ST-13 (PA)*: GPA-MA3.67-FWRP-ST-13 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning. GPA-FW-FWRP-ST-03 prohibits shooting between February 1 and August 15 in colonies outside of MA 3.63 identified as satellite colonies to protect species associated with prairie dog colonies from risks related to shooting.	Shooting of prairie dogs is not restricted in the Grassland-wide Alternative.	*Ch. 1, Standards and Guidelines, F.63 (PDE); Ch. 3, MA 2.1, 2.1b - Cheyenne River Zoological SIA, 1 (PDE); GPA-MA3.67-FWRP-ST-09 (PDE)*: Standard F.63 in Chapter 1 prohibits shooting of prairie dogs in Category 1 and in Category 2 when composite colony area within Category 2 has not met the target. Standard F.63 prohibits shooting of prairie dogs in Category 2 between February 1 and August 15 when composite colony area has met the target. Standard 1 for MA 2.1b in Chapter 3 prohibits shooting of prairie dogs in the SIA at all times. GPA-MA3.67-FWRP-ST-09 prohibits shooting in MA 3.67 at all times.	*GPA-MA3.67-FWRP-ST-17 (Preferred)*: GPA-MA3.67-FWRP-ST-17 prohibits shooting of prairie dogs in MA 3.67 between February 1 and August 15 to protect species associated with prairie dog colonies from risks related to shooting, including lead poisoning.

Determination of Effects

Prairie rattlesnake meets the minimum criteria for consideration as a potential SCC and this analysis concludes that, with all current activities combined, along with resource protection measures and plan components, "no substantial adverse impacts and no substantially lessened protections as a result of the plan amendment are anticipated" under any of the alternatives, since the effects are considered localized where proposed activities will occur. Despite the impacts of proposed activities, it is expected that sufficient distribution of the species will be maintained on the TBNG and throughout its range. Recognizing that habitat and population distribution are dynamic over time, distribution also implies that ecological conditions are provided to support numbers such that losing one or some without replacement will still support a viable population. In addition, components were developed with the intent of maintaining ecological conditions on the TBNG. These components are expected to provide for prairie rattlesnake habitat on the TBNG.

Overall, potential direct and indirect effects under any of the alternatives, when combined with the cumulative effects generated by other activities listed above would not result in a loss in viability for this species.

The rationale for effects determinations to all alternatives is based on the availability of foraging and nesting habitat on the TBNG, along with sufficient distribution of habitat within the species' range. There are detections of prairie rattlesnake on the TBNG, however, actual numbers are unknown due to the species being understudied. Primary impacts of the alternatives include those activities that would cause potential mortality.

Additional rationale to support the effects determinations for all alternatives include:

- Prairie rattlesnake are prairie and grassland generalists, but will occupy prairie dog habitat. As a result, the species could be affected by some forms of lethal prairie dog control including rodenticides and collapsing burrows, as well as recreational shooting. However, populations are large and widespread and effects to population would be localized.
- Prairie rattlesnakes could eat poisoned prairie dogs, incurring risk of secondary poisoning from anticoagulants. Effects of anticoagulants on reptiles are not well-known, but could include interference with thermoregulation. Rodenticides pose minimal secondary poisoning risk, and populations are large and widespread and effects to population would be localized.
- Recreational shooting could cause some occasional morality to individuals. Though likely very infrequent, individuals could get lead poisoning by consuming shot prairie dogs. However, populations are large and widespread and effects to population would be localized.

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