

Billing Code 4333–15

**DEPARTMENT OF THE INTERIOR**

**Fish and Wildlife Service**

**50 CFR Part 17**

**[Docket No. FWS-R2-ES-2021-0015; FF09E21000 FXES1111090FEDR 234]**

**RIN 1018–BB27**

**Endangered and Threatened Wildlife and Plants; Lesser Prairie-Chicken;  
Threatened Status with Section 4(d) Rule for the Northern Distinct Population  
Segment and Endangered Status for the Southern Distinct Population Segment**

**AGENCY:** Fish and Wildlife Service, Interior.

**ACTION:** Final rule.

**SUMMARY:** We, the U.S. Fish and Wildlife Service (Service), are listing two Distinct Population Segments (DPSs) under the Endangered Species Act of 1973 (Act), as amended, for the lesser prairie-chicken (*Tympanuchus pallidicinctus*), a grassland bird known from southeastern Colorado, western Kansas, eastern New Mexico, western Oklahoma, and the Texas Panhandle. We determine threatened status for the Northern DPS and endangered status for the Southern DPS. This rule adds the DPSs to the List of Endangered and Threatened Wildlife. We also finalize a rule under the authority of section 4(d) of the Act that provides measures that are necessary and advisable to provide for the conservation of the Northern DPS.

**DATES:** This rule is effective [INSERT DATE 60 DAYS AFTER THE DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** This final rule is available on the internet at <https://www.regulations.gov>.

Comments and materials we received, as well as supporting documentation we used in preparing this rule, are available for public inspection at <https://www.regulations.gov> at Docket No. FWS-R2-ES-2021-0015.

**FOR FURTHER INFORMATION CONTACT:** Beth Forbus, Regional ES Program Manager, Southwest Regional Office, 500 Gold Ave SW, Albuquerque, NM 87102; telephone 505–318–8972. Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point-of-contact in the United States.

**SUPPLEMENTARY INFORMATION:**

**Executive Summary**

*Why we need to publish a rule.* Under the Act, a species warrants listing if it meets the definition of an endangered species (in danger of extinction throughout all or a significant portion of its range) or a threatened species (likely to become endangered in the foreseeable future throughout all or a significant portion of its range). If we determine that a species warrants listing, we must list the species promptly and designate the species' critical habitat to the maximum extent prudent and determinable. We have determined that the Northern DPS of the lesser prairie-chicken meets the definition of a threatened species and that the Southern DPS of the lesser prairie-chicken meets the definition of an endangered species; therefore, we are listing them as such and finalizing a rule under section 4(d) of the Act for the Northern DPS. Listing a species as an

endangered or threatened species can be completed only by issuing a rule through the Administrative Procedure Act's rulemaking process.

*What this document does.* This rule revises the regulations in title 50 of the Code of Federal Regulations to list the Northern DPS of the lesser prairie-chicken as a threatened species with a rule under section 4(d) of the Act and the Southern DPS of the lesser prairie-chicken as an endangered species under the Act.

*The basis for our action.* Under the Act, we may determine that a species is an endangered or threatened species because of any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that both the northern and southern parts of the lesser prairie-chicken's range are discrete and significant under our DPS Policy and are, therefore, listable entities under the Act. The Southern DPS includes the Shinnery Oak Ecoregion in New Mexico and Texas, and the Northern DPS includes the Sand Sagebrush Ecoregion, the Mixed-Grass Ecoregion, and the Short-Grass/Conservation Reserve Program (CRP) Ecoregion in Texas, Oklahoma, Colorado, and Kansas. These two DPSs together encompass the entirety of the lesser prairie-chicken's range. The primary threat impacting both DPSs is the ongoing loss of large, connected blocks of grassland and shrubland habitat. The Southern DPS has low resiliency, redundancy, and representation and is particularly vulnerable to severe droughts due to being located in the dryer and hotter southwestern portion of the range.

Because the Southern DPS is currently at risk of extinction, we are listing it as endangered.

In the Northern DPS, as a result of habitat loss and fragmentation, resiliency has been much reduced across two of the ecoregions in the Northern DPS when compared to historical conditions. However, this DPS still has redundancy across the three ecoregions and genetic and environmental representation. We expect habitat loss and fragmentation across the Northern DPS to continue into the foreseeable future, resulting in even further reduced resiliency. Because the Northern DPS is at risk of extinction in the foreseeable future, we are listing it as threatened. The section 4(d) rule for the Northern DPS of the lesser prairie-chicken generally prohibits the same activities as prohibited for an endangered species. It includes exceptions from take associated with continuation of routine agricultural practices on existing cultivated lands, implementation of prescribed fire for the purposes of grassland management, and implementation of prescribed grazing following a grazing management plan developed by a Service-approved party.

### **List of Acronyms**

We use many acronyms in this rule. For the convenience of the reader, we define some of them here:

ACEC = Area of Critical Environmental Concern

BLM = Bureau of Land Management

CI = confidence interval

CCAA = candidate conservation agreement with assurances

CCA/CCAA= candidate conservation agreement and candidate conservation agreement with assurances

CDL = Cropland Data Layer

CHAT = Crucial Habitat Assessment Tool

CPW = Colorado Parks and Wildlife

CRP = Conservation Reserve Program

DOE= Department of Energy

DPS = Distinct Population Segment

EOR = Estimated occupied range

EOR+10 = Estimated occupied range plus a 10-mile buffer

FSA = U.S. Department of Agriculture's Farm Services Agency

KDWP = Kansas Department of Wildlife and Parks (formerly KDWPT: Kansas Department of Wildlife, Parks, and Tourism)

LPCI = Lesser Prairie-Chicken Initiative

NRCS = Natural Resources Conservation Service

ODWC = Oklahoma Department of Wildlife Conservation

PECE = Policy for the Evaluation of Conservation Efforts when Making Listing Decisions

PFW = the Service's Partners for Fish and Wildlife Program

RMPA = Resource Management Plan Amendment

RWP = Lesser Prairie-Chicken Range-wide Conservation Plan

SSA = Species Status Assessment

TPWD = Texas Parks and Wildlife Department

USDA = U.S. Department of Agriculture

USFS = U.S. Forest Service

WAFWA = Western Association of Fish and Wildlife Agencies

LWEG = Land-Based Wind Energy Guidelines

### **Previous Federal Actions**

Please refer to the proposed listing rule for the Northern DPS and the Southern DPS of the lesser prairie-chicken for a detailed description of previous Federal actions concerning this species (86 FR 29432, June 1, 2021).

### **Summary of Changes from the Proposed Rule**

Based upon our review of the public comments, State agency comments, peer review comments, and relevant information that became available since the proposed rule published, we updated information in our species status assessment report, including:

- adding references on the effects of overhead power lines,
- adding a discussion regarding the effects from competition with ring-necked pheasants,
- updating monitoring information related to the translocation efforts in the Sand Sagebrush Ecoregion,
- updating information related to conservation banks,
- updating information related to previous conservation efforts,
- adding discussion regarding the Southern Plains Grassland Program,
- updating information related to the recent purchase by the New Mexico Department of Game and Fish of additional lands to be managed for the lesser prairie-chicken, and
- updating current population abundance information using the 2021 aerial survey results.

We also made changes as appropriate in this final rule. In addition to minor clarifying edits and incorporation of additional information on the species' biology, populations, and threats, this determination differs from the proposal in the following ways:

(1) We included updated population trend data, including survey data made available since the publication of the proposed rule. Some of these population survey results became available after we finalized the SSA report. Thus, though the SSA report does not include those results, we have added them to this final rule and fully considered them in our determinations on the status of the two DPSs.

(2) We included new and updated conservation actions as submitted by commenters during the open comment period.

(3) Based on public comments, we expanded our Significant Portion of the Range analysis to explain why the Sand Sagebrush Ecoregion is not significant.

(4) Based on comments received from State agencies, local governments, industry groups, and private citizens, we have updated the section 4(d) rule to include one new exception from the section 9 take prohibitions:

The new exception is for take incidental to grazing management when land managers are following a site-specific grazing plan developed by a party that has been approved by the Service. When livestock grazing is managed in ways that are compatible with promoting the maintenance of the vegetative characteristics needed by the lesser prairie-chicken, this activity can be an invaluable tool necessary for managing healthy grasslands benefiting the lesser prairie-chicken. Therefore, we consider this new

exception from prohibitions to be necessary and advisable to the conservation of the species.

### **Supporting Documents**

A species status assessment (SSA) team prepared an SSA report for the lesser prairie-chicken. The SSA team was composed of Service biologists in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial data available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species. In accordance with our joint policy on peer review published in the *Federal Register* on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we sought the expert opinions of six appropriate specialists regarding the SSA. We received four responses. We also sent the SSA report to the five State fish and wildlife agencies within the range of the lesser prairie-chicken (Colorado, Kansas, New Mexico, Oklahoma, and Texas) and the four primary Federal agencies with whom we work to deliver conservation actions that could benefit the lesser prairie-chicken: the Bureau of Land Management (BLM) the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA), and U.S. Forest Service (USFS). These partners include scientists with expertise in management of either the lesser prairie-chicken or the habitat upon which the lesser prairie-chicken depends. We received responses from USFS, BLM, and all five of the State wildlife agencies. Comments and feedback from partners and peer reviewers were incorporated into the SSA report as appropriate and have informed this final rule.

## **I. Final Listing Determination**

### **Background**

Below is a summary of the taxonomy, life history, and ecology of the lesser prairie-chicken; for a thorough review, please see the SSA report (version 2.3; Service 2022, pp. 5–14).

The lesser prairie-chicken is in the order Galliformes, family Phasianidae, subfamily Tetraoninae; it is generally recognized as a species separate from the greater prairie-chicken (*Tympanuchus cupido pinnatus*) (Jones 1964, pp. 65–73; American Ornithologist's Union 1998, p. 122).

Most lesser prairie-chicken adults live for 2 to 3 years and reproduce in the spring and summer (Service 2022, pp. 10–12). Males congregate on leks during the spring to attract and mate with females (Copelin 1963, p. 26; Hoffman 1963, p. 730; Crawford and Bolen 1975, p. 810; Davis et al. 1979, p. 84; Merchant 1982, p. 41; Haukos 1988, p. 49). Male prairie-chickens tend to exhibit strong breeding site fidelity, often returning to a specific lek many times, even in cases of declining female attendance and habitat condition (Copelin 1963, pp. 29–30; Hoffman 1963, p. 731; Campbell 1972, pp. 698–699, Hagen et al. 2005, entire, Harju et al. 2010, entire). Females tend to establish nests relatively close to the lek, commonly within 0.6 to 2.4 mile (mi) (1 to 4 kilometers (km)) (Copelin 1963, p. 44; Giesen 1994, p. 97), where they incubate 8 to 14 eggs for 24 to 27 days and then raise broods of young throughout the summer (Boal and Haukos 2016, p. 4). Some females will attempt a second nesting if the first nest fails (Johnsgard 1973, pp. 63–64; Merchant 1982, p. 43; Pitman et al. 2006, p. 25). Eggs and young lesser prairie-chickens are susceptible to natural mortality from environmental stress and predation.

The appropriate vegetative community and structure is vital to provide cover for nests and young and to provide food resources as broods mature into adults (Suminski 1977, p. 32; Riley 1978, p. 36; Riley et al. 1992, p. 386; Giesen 1998, p. 9). For more detail on habitat needs of the lesser prairie-chicken, please see the SSA report (Service 2022, pp. 9–14).

The lesser prairie-chicken once ranged across the Southern Great Plains of Southeastern Colorado, Southwestern Kansas, Western Oklahoma, the Panhandle and South Plains of Texas, and Eastern New Mexico; currently, it occupies a substantially reduced portion of its presumed historical range (Rodgers 2016, p. 15). Estimates of the potential maximum historical range of the lesser prairie-chicken (e.g., Taylor and Guthery 1980a, p. 1, based on Aldrich 1963, p. 537; Johnsgard 2002, p. 32; Playa Lakes Joint Venture 2007, p. 1) range from about 64–115 million acres (ac) (26–47 million hectares (ha)). The more recent estimate of the historical range of the lesser prairie-chicken encompasses an area of approximately 115 million ac (47 million ha).

Presumably, not all of the area within this historical range was evenly occupied by lesser prairie-chicken, and some of the area may not have been suitable to regularly support lesser prairie-chicken populations (Boal and Haukos 2016, p. 6). However, the current range of the lesser prairie-chicken has been significantly reduced from the historical range at the time of European settlement. Estimates as to the extent of the loss vary from greater than 90 percent reduction (Hagen and Giesen 2005, unpaginated) to approximately 83 percent reduction (Van Pelt et al. 2013, p. 3).

Lesser prairie-chicken monitoring has been occurring for multiple decades and has included multiple different methodologies. Estimates of population abundance prior

to the 1960s are indeterminable and rely almost entirely on anecdotal information (Boal and Haukos 2016, p. 6). While little is known about precise historical population sizes, the lesser prairie-chicken was reported to be quite common throughout its range in the early 20<sup>th</sup> century (Bent 1932, pp. 280–281, 283; Baker 1953, p. 8; Bailey and Niedrach 1965, p. 51; Sands 1968, p. 454; Fleharty 1995, pp. 38–44; Robb and Schroeder 2005, p. 13). For example, prior to 1900, as many as two million birds may have existed in Texas alone (Litton 1978, p. 1). Information regarding population size is available starting in the 1960s when the State fish and wildlife agencies began routine lesser prairie-chicken monitoring efforts. However, survey methodology and effort have differed over the decades, making it difficult to precisely estimate trends.

The SSA report and this final rule rely on two main population estimates. The two methodologies largely cover different time periods, so we report the results of both throughout this final rule in order to give the best possible understanding of lesser prairie-chicken trends both recently and throughout the past decades.

The first of the two studies used historical lek surveys and population reconstruction methods to calculate historical trends and estimate male abundance from 1965 through 2016 (Hagen et al. (2017, pp. 6–9). We have concerns with some of the methodologies and assumptions made in this analysis including survey effort prior to the 1970s, variation in survey efforts between States, and completeness and accuracy of source data used. Others have also noted the challenges of using these data for long-term trends (for example, Zavaleta and Haukos 2013, p. 545; Cummings et al. 2017, pp. 29–30). While these concerns remain, including the very low sample sizes particularly in the 1960s, this work represents the only attempt to compile the historical ground lek count

data collected by State agencies to estimate the number of males at both the range-wide and ecoregional scales, and represents the best available data for understanding historical population trends.

Following development of aerial survey methods (McRoberts et al. 2011, entire), the second summary of lesser prairie-chicken population data uses more statistically rigorous estimates of lesser prairie-chicken abundance (both males and females). This study was designed to address the shortcomings and limitations associated with ground-based survey efforts as discussed above. This second study uses data from aerial line-transect surveys throughout the range of the lesser prairie-chicken; these results are then extrapolated from the surveyed area to the rest of the range (Nasman et al. 2022, entire). The results of these survey efforts should not be taken as precise estimates of the annual lesser prairie-chicken abundance, as indicated by the large confidence intervals associated with these estimates. The confidence intervals are a calculation related to the degree of certainty or uncertainty that the sampling method results in estimates that represent the true population abundance.

Due to the lack of confidence in the precision of these population estimates as reflected by the large confidence intervals, conclusions regarding current population sizes or population changes should not be drawn based upon annual fluctuations. In addition to the large confidence intervals, the lesser prairie-chicken is considered a “boom–bust” species with a high degree of annual variation in rates of successful reproduction and recruitment. These annual and short-term patterns are largely driven by the influence of seasonal precipitation patterns. Periods of below-average precipitation and higher spring/summer temperatures cause less suitable grassland vegetation cover and less food

available, resulting in decreased reproductive output (bust periods). Periods with above-normal precipitation and cooler spring/summer temperatures will support favorable habitat conditions and result in higher reproductive success (boom periods). Thus, annual population changes are not a measure of population health but instead largely represent the influence of short-term precipitation cycles whereas long-term population trends are tied to habitat availability. Instead of reporting the annual estimates, the best use of this data is for long-term trend analysis. Thus, in the SSA report and this final rule, we report the population estimate for the current condition as the average of the past 5 years of surveys.

The results of the study using ground-based lek data (abundance of males) indicate that lesser prairie-chicken range-wide abundance (based on a minimum estimated number of male lesser prairie-chickens at leks) peaked during 1965–1970 at a mean estimate of about 175,000 males (figure 1). The estimated mean population maintained levels of greater than 100,000 males until 1989, after which the population steadily declined to a low of 25,000 males in 1997 (Garton et al. 2016, p. 68). The mean population estimates following 1997 peaked again at about 92,000 males in 2006, albeit at a significantly lower value than the prior peak of 175,000. The mean population estimate subsequently declined to 34,440 males in 2012 (figure 1).

The aerial survey results from 2012 through 2022 (figure 2) estimated the lesser prairie-chicken population abundance, averaged over the most recent 5 years of surveys (2017–2022, no surveys in 2019), at 32,210 (including males and females; 90 percent confidence interval: 11,489, 64,303) (Nasman et al. 2022, p. 16; table 10).

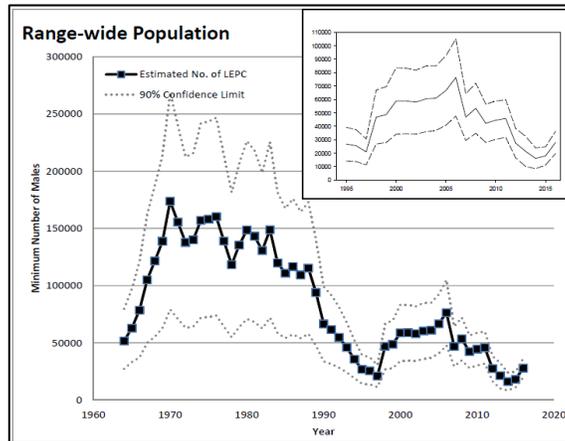


Figure 1. Estimated range-wide minimum number of lesser prairie-chicken males attending leks 1964–2016 (90% confidence interval). (Based on population reconstruction using 2016 aerial survey as the initial population size (reproduced from Hagen et al. 2017).)

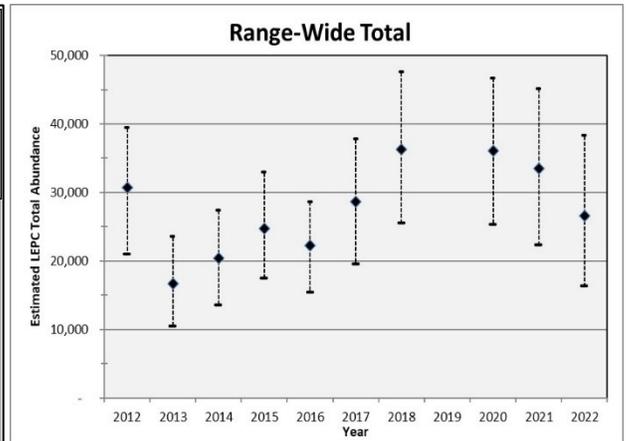


Figure 2. Annual estimates of total range-wide population size of lesser prairie-chicken from 2012–2022. Bars represent the bootstrapped 90% confidence intervals. Graph generated from Nasman et al. (2022, p. 16). There were no surveys in 2019.)

The preferred habitat of the lesser prairie-chicken is mixed-grass prairies and shrublands, with the exception of some areas in the northern extent of the range where shrubs play a lesser role. Lesser prairie-chickens appear to select areas having a shrub component dominated by sand sagebrush or sand shinnery oak when those areas are available (Donaldson 1969, pp. 56, 62; Taylor and Guthery 1980a, p. 6; Giesen 1998, pp. 3–4). In the southern and central portions of the lesser prairie-chicken range, small shrubs, such as sand shinnery oak, are important for summer shade (Copelin 1963, p. 37; Donaldson 1969, pp. 44–45, 62), winter protection, and as supplemental foods (Johnsgard 1979, p. 112). In some areas in the northern extent of the species’ range, stands of grass that provide adequate vegetative structure likely serve the same roles. The absence of anthropogenic features as well as other vertical structures is important, as lesser prairie-chickens tend to avoid using areas with trees, vertical structures, and other disturbances in areas with otherwise adequate habitat conditions (Braun et al. 2002, pp. 11–13; Pruett

et al. 2009, pp. 1256, 1258; Hovick et al. 2014a, p. 1685; Boggie et al. 2017, entire; Lautenbach 2017, pp. 104–142; Plumb et al. 2019, entire).

At the population scale, the most important requirement for the lesser prairie-chicken is having large, intact, ecologically diverse grasslands to complete their life history and maintain healthy populations (Fuhlendorf et al. 2017b, entire). As detailed in chapter 2 of the SSA report, the lesser prairie-chicken requires large ecologically diverse grasslands to meet specific resource needs, in terms of microhabitat conditions, which vary to some degree by life stage and activity (Service 2022, pp. 10–11). Historically, these ecologically diverse grasslands and shrublands were maintained by the occurrence of wildfires (keeping woody vegetation restricted to drainages and rocky outcroppings) and by grazing by bison and other large ungulates. The lesser prairie-chicken is a species that requires large, intact grasslands for functional self-sustaining populations (Giesen 1998, pp. 3–4; Bidwell et al. 2002, pp. 1–3; Hagen et al. 2004, pp. 71, 76–77; Haukos and Zavaleta 2016, p. 107).

The lesser prairie-chicken now occurs within four ecoregions (figure 3); these ecoregions were originally delineated in 2012 as part of the aerial survey designed to monitor long-term trends in lesser prairie-chicken populations. Each ecoregion is associated with unique environmental conditions based on habitat and climatic variables and some genetic differentiation (Boal and Haukos 2016, p. 5; Oyler-McCance et al. 2016, p. 653). These four ecoregions are the Short-Grass Prairie/CRP Ecoregion in Kansas; the Sand Sagebrush Prairie Ecoregion in Colorado, Kansas, and Oklahoma; the Mixed-Grass Prairie Ecoregion in Kansas, Texas, and Oklahoma; and the Shinnery Oak Prairie Ecoregion of New Mexico and Texas.

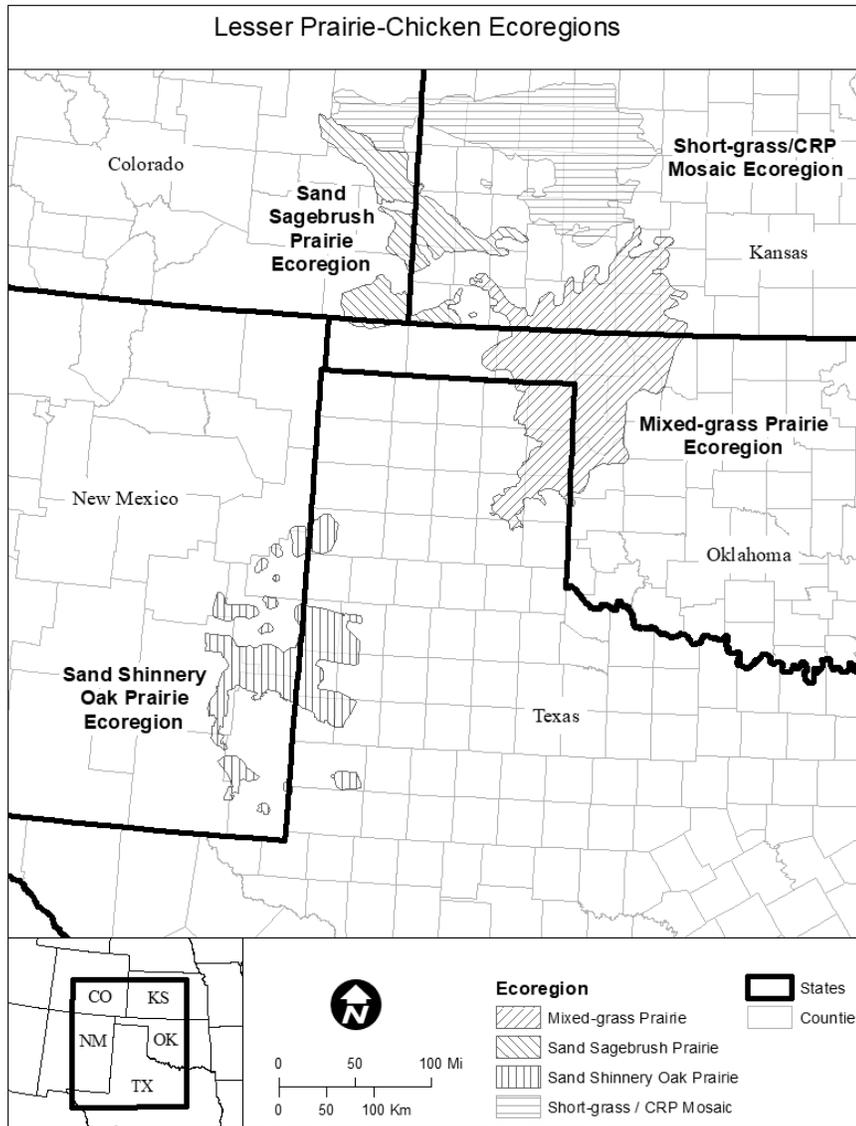


Figure 3—The four ecoregions that make up the range of the lesser prairie-chicken: the Sand Shinnery Oak Prairie (Shinnery Oak) Ecoregion, the Sand Sagebrush Prairie (Sand Sagebrush) Ecoregion, the Mixed-Grass Prairie (Mixed-Grass) Ecoregion, and the Short-grass/CRP Mosaic (Short-Grass/CRP) Ecoregion.

The Shinnery Oak Ecoregion occupies portions of eastern New Mexico and the South Plains of Texas (McDonald et al. 2012, p. 2). It has a variable vegetation community that contains a mix of shrubs such as sand shinnery oak (*Quercus havardii*) and sand sagebrush (*Artemisia filifolia*) as well as mixed and tall grasses and forbs (Grisham et al. 2016a, p. 317). The mean population estimate ranged between about

5,000 to 12,000 males through 1980, increased to 20,000 males in the mid-1980s and declined to ~1,000 males in 1997 (Hagen et al. 2017, pp. 6–9). The mean population estimate peaked again to ~15,000 males in 2006 and then declined again to fewer than 3,000 males in the mid-2010s. While population estimates for the Shinnery Oak Ecoregion have varied over recent years, the most recent surveys estimate a 5-year average population size of 2,806 birds (including males and females; 90 percent confidence intervals (CI): 179, 9,007). Approximately 9 percent of all lesser prairie-chicken occur in this ecoregion. Lesser prairie-chickens from the Shinnery Oak Ecoregion are genetically distinct and geographically isolated from the other three ecoregions by 95 mi (153 km) (figure 3; Oyler-McCance et al. 2016, p. 653). Historically, the Shinnery Oak Ecoregion was likely connected to the rest of the lesser prairie-chicken range but as a result of habitat loss and fragmentation from European settlement the lesser prairie-chicken in the Shinnery Oak Ecoregion have likely been isolated for over a century (Oyler-McCance et al. 2016, p. 655).

In New Mexico, the majority of the Shinnery Oak Ecoregion is privately owned (Grisham et al. 2016a, p. 315), with some portions owned by the State Game Commission and federally owned BLM lands. Nearly all of the area in the Texas portion of the ecoregion is privately owned and managed for agricultural use and petroleum production (Haukos 2011, p. 110). The remaining patches of shinnery oak prairie have become isolated, relict communities because the surrounding grasslands have been converted to row crop agriculture or fragmented by oil and gas exploration and urban development (Peterson and Boyd 1998, p. 22). Additionally, honey mesquite (*Prosopis glandulosa*) encroachment within this ecoregion has played a significant role in decreasing available

space for the lesser prairie-chicken. Technological advances in irrigated row crop agriculture have led to more recent conversion of shinnery oak prairie habitat to row crops in Eastern New Mexico and West Texas (Grisham et al. 2016a, p. 316).

The Sand Sagebrush Ecoregion occurs in Southeast Colorado, Southwest Kansas, and a small portion of Western Oklahoma (McDonald et al. 2012, p. 2). The vegetation community in this area primarily consists of sand sagebrush and the associated mixed and tall grass species that are usually found in the sandier soils adjacent to rivers, streams, and other drainages in the area. Lesser prairie-chicken from the Sand Sagebrush Ecoregion show some genetic differentiation from other ecoregions but have likely contributed some individuals to the Short-Grass/CRP Ecoregion through dispersal (Oyler-McCance et al. 2016, p. 653).

Historically, the Sand Sagebrush Ecoregion supported the highest density of lesser prairie-chicken and was considered the core of the lesser prairie-chicken range (Haukos et al. 2016, p. 282). A single flock detected in Seward County, Kansas, was estimated to contain more than 15,000 birds (Bent 1932, p. 281). The population size is estimated to have peaked at more than 85,000 males in the 1970s (Garton et al. 2016, p. 62). More recent survey efforts estimate a 5-year average population size of 1,297 birds (including males and females; 90 percent CI: 56, 4,881; Nasman et al. 2022, p. 16). Less than 5 percent of all lesser prairie-chicken occur in this ecoregion (Service 2022, pp. 64–78). Most of the decline has been attributed to habitat deterioration and conversion of sand sagebrush to intensive row crop agriculture due to an increase in center pivot irrigation (Jensen et al. 2000, p. 172). Environmental conditions in this ecoregion can be

extreme, with stochastic events such as blizzards negatively impacting lesser prairie-chicken populations.

The Short-Grass/CRP Ecoregion falls within the mixed- and short-grass prairies of Central and Western Kansas (McDonald et al. 2012, p. 2). As the name implies, much of this ecoregion historically consisted of short-grass prairie interspersed with mixed-grass prairie as well as sand sagebrush prairie along some drainages (Dahlgren et al. 2016, p. 260). By the 1980s, large expanses of prairies had been converted from native grass for crop production in this ecoregion. After the introduction of the CRP in 1985, landowners began to have enhanced incentives to convert croplands to perennial grasslands to provide cover for the prevention of soil erosion. The State of Kansas required those enrolling in the CRP to plant native mixed- and tall-grass species, which is notable because the grasses in this area historically consisted largely of short-grass species, which generally do not provide adequate habitat for the lesser prairie-chicken. For more information on the CRP, see the SSA report (Service 2022, pp. 52–54).

Prior to the late 1990s, lesser prairie-chickens in this ecoregion were thought to be largely absent (or occurred sporadically in low densities) (Hagen and Giesen 2005, unpaginated; Rodgers 1999, p. 19). We do not know what proportion of the eastern Short-Grass/CRP Ecoregion in Kansas was historically occupied by lesser prairie-chicken (Hagen 2003, pp. 3–4), and surveys in this ecoregion only began in earnest in 1999 (Dahlgren et al. 2016, p. 262). The CRP is an idle lands program, which requires establishment of grass cover and precludes tillage or agricultural commodity production for the duration of the contract, and has contractual limits to the type, frequency, and timing of management activities, such as burning, haying, or grazing of the established

grasses. As a result of these factors, CRP often provides the vegetative structure preferentially used by lesser prairie-chickens for nesting. In the State of Kansas, the availability of CRP lands, especially CRP lands with interseeded or original seed mixture of forbs, resulted in increased habitat availability for the lesser prairie-chicken and, thus, an expansion of the known lesser prairie-chicken range and an increase in the abundance of the lesser prairie-chicken (Rodgers 1999, pp. 18–19; Fields 2004, pp. 11, 105; Fields et al. 2006, pp. 931, 937; Sullins et al. 2018, p. 1617).

The Short-Grass/CRP Ecoregion is now estimated to contain the majority of lesser prairie-chickens compared to the other ecoregions, with recent survey efforts estimating a 5-year average population size of 23,083 birds (including males and females; 90 percent CI: 9,653, 39,934), representing approximately 72 percent of the rangewide population. Recent genetic studies indicate that lesser prairie-chickens have moved northward largely from the Mixed-Grass Ecoregion and, to a lesser extent, the Sand Sagebrush Ecoregion into the Short-Grass/CRP Ecoregion (Oyler-McCance et al. 2016, p. 653).

The northern section of this ecoregion is the only portion of the lesser prairie-chicken's range where co-occurrence with greater prairie-chicken occurs. Hybridization rates of up to 5 percent have been reported (Pitman 2013, p. 5), and that rate seemed to be stable across multiple years, though sampling is limited where the species co-occur (Pitman 2013, p. 12). Limited additional work has been completed to further assess the rate of hybridization. There are concerns about the implications of genetic introgression (dilution) of lesser prairie-chicken genes, particularly given that potential effects are poorly understood (Dahlgren et al. 2016, p. 276). Unresolved issues include whether

hybridization reduces fitness and alters behavior or morphological traits in either a positive or negative way and the historical occurrence and rate of hybridization.

The Mixed-Grass Ecoregion for the lesser prairie-chicken lies in the northeastern panhandle of Texas, the panhandle of northwestern Oklahoma, and south-central Kansas (McDonald et al. 2012, p. 2). The Mixed-Grass Ecoregion is separated from the Short-Grass/CRP Ecoregion in Kansas by the Arkansas River. The vegetation community in this ecoregion consists largely of a mix of perennial grasses and shrubs such as sand sagebrush, sand plum (*Prunus angustifolia*), yucca (*Yucca* spp.), and sand shinnery oak (Wolfe et al. 2016, p. 300). Based upon population reconstruction data, the mean population estimate was around 30,000 males in the 1970s and 1980s followed by a decline in the 1990s (Hagen et al. 2016, pp. 6–7). The mean population estimate peaked again in the early 2000s at around 25,000 males, before declining to and remaining at its lowest levels, less than 10,000 males since 2012 (Hagen et al. 2016, pp. 6–7). Although historical population estimates in the ecoregion reported some of the highest densities of lesser prairie-chicken in the range (Wolfe et al. 2016, p. 299), recent aerial survey efforts estimate a 5-year average population size of 5,024 birds (including males and females; 90 percent CI: 1,601, 10,481). The recent survey work indicates that about 15 percent of lesser prairie-chicken occur in this ecoregion. Lesser prairie-chicken from the Mixed-Grass Ecoregion are similar in genetic variation with the Short-Grass/CRP Ecoregion, with individuals likely dispersing from the Mixed-Grass Ecoregion to the Short-Grass/CRP Ecoregion (Oyler-McCance et al. 2016, p. 653).

## **Distinct Population Segment Evaluation**

Under the Act, the term “species” includes “any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.” 16 U.S.C. 1532(16). To guide the implementation of the distinct population segment (DPS) provisions of the Act, we and the National Marine Fisheries Service (National Oceanic and Atmospheric Administration—Fisheries), published the Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act (DPS Policy) in the *Federal Register* on February 7, 1996 (61 FR 4722). Under our DPS Policy, we use two elements to assess whether a population segment under consideration for listing may be recognized as a DPS: (1) The population segment’s discreteness from the remainder of the species to which it belongs, and (2) the significance of the population segment to the species to which it belongs. If we determine that a population segment being considered for listing is a DPS, then the population segment’s conservation status is evaluated based on the five listing factors established by the Act to determine if listing it as either endangered or threatened is warranted.

As described in **Previous Federal Actions**, we were petitioned to list the lesser prairie-chicken either rangewide or in three distinct population segments. The petition suggested three DPS configurations: (1) Shinnery Oak Ecoregion, (2) the Sand Sagebrush Ecoregion, and (3) a segment including the Mixed-Grass Ecoregion and the Short-Grass/CRP Ecoregion. The petition combined the Mixed-Grass Ecoregion and the Short-Grass/CRP Ecoregion due to evidence they are linked genetically and geographically (Molver 2016, p. 18). Genetic studies indicate that lesser prairie-chicken from the Mixed-

Grass Ecoregion are similar in genetic variation with the Short-Grass/CRP Ecoregion, with individuals likely dispersing from the Mixed-Grass Ecoregion to the Short-Grass/CRP Ecoregion (Oyler-McCance et al. 2016, p. 653). Other genetic data indicate that lesser prairie-chicken from the Sand Sagebrush Ecoregion and lesser prairie-chicken from the Mixed-Grass and Short-Grass/CRP Ecoregion also share genetic traits. Genetic studies of neutral markers indicate that, although lesser prairie-chicken from the Sand Sagebrush Ecoregion form a distinct genetic cluster from other ecoregions, they have also likely contributed some individuals to the Short-Grass/CRP Ecoregion through dispersal (Oyler-McCance et al. 2016, p. 653). Additionally, these three ecoregions are not geographically isolated from one another (figure 3). As a result of the shared genetic characteristics and the geographic connections, we have concluded a “Northern” population segment of the species that includes the Sand Sagebrush Ecoregion, the Mixed-Grass Ecoregion, and the Short-Grass/CRP Ecoregion is appropriately considered a potential DPS configuration.

Under the Act, we have the authority to consider for listing any species, subspecies, or, for vertebrates, any distinct population segment (DPS) of these taxa if there is sufficient information to indicate that such action may be warranted. We considered whether two segments meet the DPS criteria under the Act: a “Southern” population segment, including the southernmost ecoregion (Shinnery Oak), and a “Northern” population segment, including the three northernmost ecoregions (Mixed-Grass, Short-Grass/CRP, and Sand Sagebrush).

*Discreteness*

Under our DPS Policy, a population segment of a vertebrate taxon may be considered discrete if it satisfies either of the following conditions: (1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors (Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.); or (2) it is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

We conclude the two segments satisfy the “markedly separate” condition. The two segments are not separated from each other by international governmental boundaries. The southern population segment (which includes the Shinnery Oak ecoregion) is separated from the northern population segment (which includes the three northern ecoregions) by approximately 95 mi (153 km). Most of this separation between the two segments is developed or otherwise unsuitable habitat. There has been no recorded movement of lesser prairie-chickens between the Shinnery Oak Ecoregion and the three northern ecoregions over the past several decades. Because there is no connection between the two population segments, there is subsequently no gene flow between them (Oyler-McCance et al. 2016, entire).

Therefore, we have determined that both a southern segment and a northern segment of the lesser prairie-chicken range both individually meet the condition for discreteness under our DPS Policy.

*Significance*

Under our DPS Policy, once we have determined that a population segment is discrete, we consider its biological and ecological significance to the larger taxon to which it belongs. This consideration may include, but is not limited to: (1) Evidence of the persistence of the discrete population segment in an ecological setting that is unusual or unique for the taxon, (2) evidence that loss of the population segment would result in a significant gap in the range of the taxon, (3) evidence that the population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historical range, or (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

For the lesser prairie-chicken, we first considered evidence that the Shinnery Oak Ecoregion population segment differs markedly from the other populations of the species, i.e., the ecoregions that constitute the Northern population segment (Mixed-Grass Ecoregion, Short-Grass/CRP Ecoregion, and Sand Sagebrush Ecoregion) in its genetic characteristics. The most recent rangewide genetic study examined neutral markers in the four ecoregions where the lesser prairie-chicken occurs. It concluded that there is significant genetic variation across the lesser prairie-chicken range. The study also concluded that although there is genetic exchange between the three northern ecoregions (particularly movement of birds northward from the Mixed-Grass Ecoregion to the Short-Grass/CRP Ecoregion, and, to a lesser extent, from the Sand Sagebrush Ecoregion into the Short-Grass/CRP Ecoregion), lesser prairie-chicken from the Shinnery Oak Ecoregion (that make up the southern population segment) are a group that is genetically distinct from the remainder of the range, i.e., the northern population segment (Oyler-McCance et

al. 2016, p. 653). The Shinnery Oak Ecoregion is more distinct from all three ecoregions in the Northern population segment than those ecoregions are from each other (Oyler-McCance et al. 2016, table 4). The Shinnery Oak Ecoregion was likely historically connected to the remainder of the range, but the two parts have been separated since approximately the time of European settlement. Therefore, the two segments of the range are genetically distinct from each other and therefore significant to the taxon as a whole.

We next considered evidence that loss of the population segment would result in a significant gap in the range of the taxon. As discussed above, the southern population segment and the northern population segment are separated by approximately 95 mi (153 km). The loss of the Shinnery Oak Ecoregion would result in the loss of the entire southern part of the species' range and decrease species redundancy and ecological and genetic representation, thus decreasing its ability to withstand demographic and environmental stochasticity. The loss of the other three ecoregions would result in the loss of 75 percent of the species' range, as well as loss of the part of the range (the Short-Grass/CRP Ecoregion) that has recently experienced an expansion of occupied habitat. This would create a large gap in the northern portion of the species' range, also reducing the species' ability to withstand demographic and environmental stochasticity. Therefore, the loss of either part of the range would result in a significant gap in the range of the lesser prairie-chicken. These genetic differences and the evidence that a significant gap in the range of the taxon would result from the loss of either discrete population segment both individually satisfy the significance criterion of the DPS Policy. Therefore, under the Service's DPS Policy, we find that both the southern and northern segments of the lesser prairie-chicken are significant to the taxon as a whole.

## Distinct Population Segment Conclusion

Our DPS Policy directs us to evaluate the significance of a discrete population in the context of its biological and ecological significance to the remainder of the species to which it belongs. Based on an analysis of the best available scientific and commercial data, we conclude that the northern and southern parts of the lesser prairie-chicken range are discrete due to geographic (physical) isolation from the remainder of the taxon. Furthermore, we conclude that both parts of the lesser prairie-chicken range are significant, because loss of either part would result in a significant gap in the range of the taxon, and because the two parts of the range differ markedly from each other based on neutral genetic markers. Therefore, we conclude that both the northern and southern parts of the lesser prairie-chicken range are both discrete and significant under our DPS Policy and are, therefore, uniquely listable entities under the Act.

Based on our DPS Policy (61 FR 4722; February 7, 1996), if a population segment of a vertebrate species is both discrete and significant relative to the taxon as a whole (i.e., it is a distinct population segment), its evaluation for endangered or threatened status will be based on the Act's definition of those terms and a review of the factors enumerated in section 4(a) of the Act. Having found that both parts of the lesser prairie-chicken range meet the definition of a distinct population segment, we evaluate the status of both the Southern DPS and the Northern DPS of the lesser prairie-chicken to determine whether either meets the definition of an endangered or threatened species under the Act. The line demarcating the break between the Northern and Southern DPS lies approximately halfway between the two DPSs in the unoccupied area between them (figure 4).

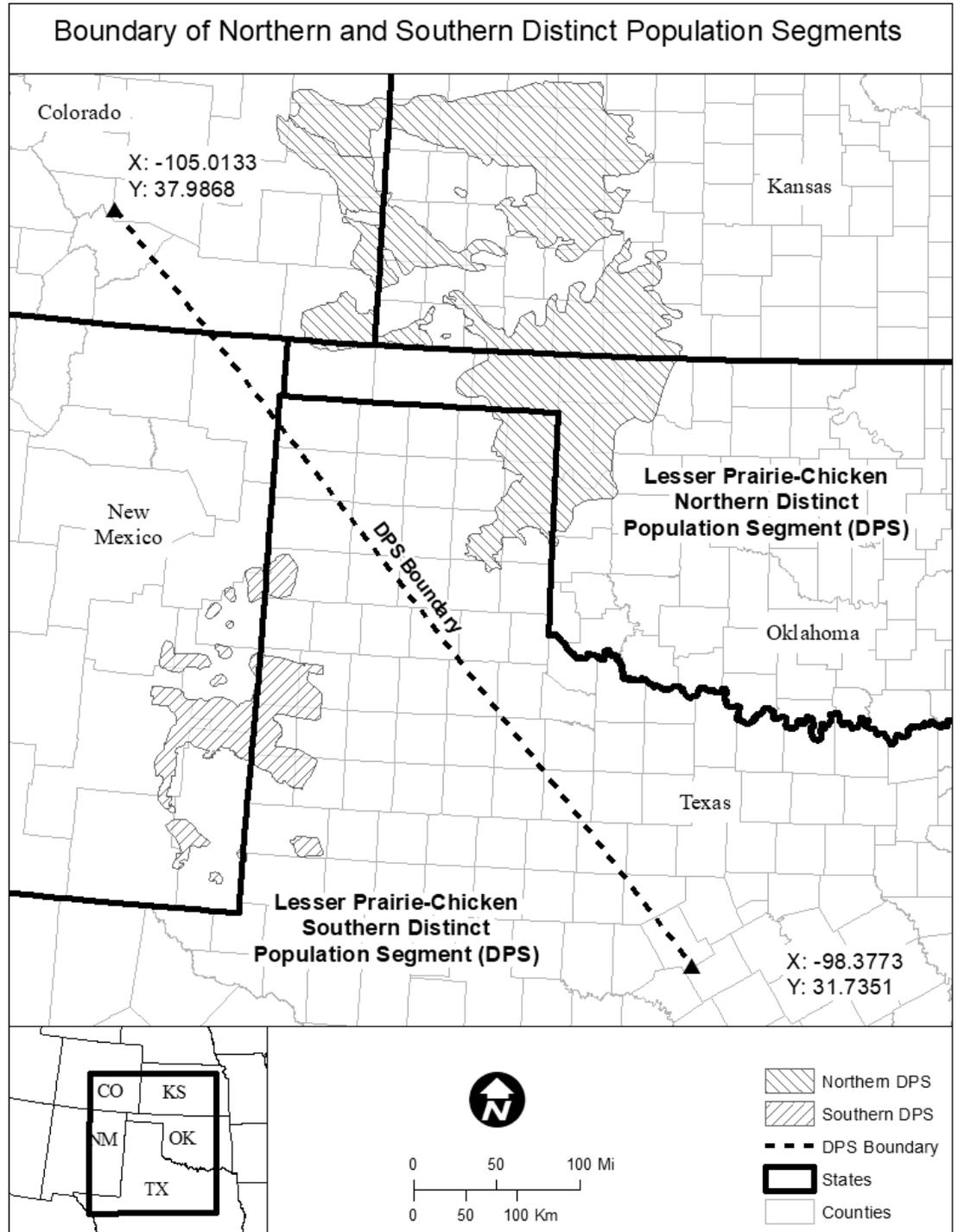


Figure 4—The Northern and Southern DPSs of the lesser prairie-chicken. Areas northeast of the dividing line constitute the Northern DPS, while areas southwest of the line constitute the Southern DPS.

## **Regulatory and Analytical Framework**

### *Regulatory Framework*

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species is an endangered species or a threatened species, issuing protective regulations for threatened species, and designating critical habitat for threatened and endangered species. In 2019, jointly with the National Marine Fisheries Service, the Service issued final rules that revised the regulations in 50 CFR parts 17 and 424 regarding how we add, remove, and reclassify threatened and endangered species and the criteria for designating listed species' critical habitat (84 FR 45020 and 84 FR 44752; August 27, 2019). At the same time the Service also issued final regulations that, for species listed as threatened species after September 26, 2019, eliminated the Service's general protective regulations automatically applying to threatened species the prohibitions that section 9 of the Act applies to endangered species (collectively, the 2019 regulations).

As with the proposed rule, we are applying the 2019 regulations for this final rule because the 2019 regulations are currently in effect, just as they were when we completed the proposed rule. Although there was a period in the interim—between July 5, 2022, and September 21, 2022—when the 2019 regulations became vacated and the pre-2019 regulations therefore governed, the 2019 regulations are now in effect and govern listing and critical habitat decisions (*see Center for Biological Diversity v. Haaland*, No. 4:19-cv-05206-JST, Doc. 168 (N.D. Cal. July 5, 2022) (*CBD v. Haaland*) (vacating the 2019 regulations and thereby reinstating the pre-2019 regulations)) and *In re: Cattlemen's*

*Ass'n*, No. 22-70194 (9<sup>th</sup> Cir. Sept. 21, 2022) (staying the vacatur of the 2019 regulations and thereby reinstating the 2019 regulations until a pending motion for reconsideration before the district court is resolved)).

The Act defines an "endangered species" as a species that is in danger of extinction throughout all or a significant portion of its range, and a "threatened species" as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

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

We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term

“threat” includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term “threat” may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an “endangered species” or a “threatened species.” In determining whether a species meets either definition, we must evaluate all identified threats by considering the species' expected response and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an “endangered species” or a “threatened species” only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

The Act does not define the term “foreseeable future,” which appears in the statutory definition of “threatened species.” Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term “foreseeable future” extends only so far into the future as we can reasonably determine that both the future threats and the species' responses to those threats are likely. In other words, the foreseeable future is the period of time in which we

can make reliable predictions. “Reliable” does not mean “certain”; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

It is not always possible or necessary to define foreseeable future as a particular number of years. Analysis of the foreseeable future uses the best scientific and commercial data available and should consider the timeframes applicable to the relevant threats and to the species’ likely responses to those threats in view of its life-history characteristics. Data that are typically relevant to assessing the species’ biological response include species-specific factors such as lifespan, reproductive rates or productivity, certain behaviors, and other demographic factors.

#### *Analytical Framework*

The SSA report documents the results of our comprehensive biological review of the best scientific and commercial data regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent our decision on whether the species should be listed as an endangered or threatened species under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies. The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket FWS-R2-ES-2021-0015 on <https://www.regulations.gov>.

To assess lesser prairie-chicken viability, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency supports the ability of the species to withstand environmental

and demographic stochasticity (for example, wet or dry, warm or cold years), redundancy supports the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation supports the ability of the species to adapt over time to long-term changes in the environment (for example, climate changes). In general, the more resilient and redundant a species is and the more representation it has, the more likely it is to sustain populations over time, even under changing environmental conditions. Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

The SSA process can be categorized into three sequential stages. During the first stage, we evaluated the individual species' life-history needs. The next stage involved an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species' responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time. We use this information to inform our regulatory decision.

### **Summary of Biological Status and Threats**

In this discussion, we review the biological condition of the species and its resources, and the threats that influence the species' current and future condition, in order to assess the species' overall viability and the risks to that viability.

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have not only analyzed individual effects on the species, but we have also analyzed their potential cumulative effects. We incorporate the cumulative effects into our SSA analysis when we characterize the current and future condition of the species. To assess the current and future condition of the species, we undertake an iterative analysis that encompasses and incorporates the threats individually and then accumulates and evaluates the effects of all the factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.

### *Representation*

To evaluate representation as a component of lesser prairie-chicken viability, we considered the need for multiple healthy lesser prairie-chicken populations within each of the four ecoregions to conserve the genetic and ecological diversity of the lesser prairie-chicken. Each of the four ecoregions varies in terms of vegetative communities and environmental conditions, resulting in differences in abundance and distribution and management strategies (Boal and Haukos 2016, p. 5). Despite reduced range and population size, most lesser prairie-chicken populations appear to have maintained comparatively high levels of neutral genetic variation (DeYoung and Williford 2016, p. 86). As discussed in *Significance* above, recent genetic studies also show significant genetic variation across the lesser prairie-chicken range based on neutral markers (Service 2022, figure 2.4), which supports management separation of these four

ecoregions and highlights important genetic differences between them (Oyler-McCance et al. 2016, p. 653). While it is unknown how this genetic variation relates to differences in adaptive capacity between the ecoregions, maintaining healthy lesser prairie-chicken populations across this range of diversity increases the likelihood of conserving inherent ecological and genetic variation within the species to enhance its ability for adaptation to future changes in environmental conditions.

### *Resiliency*

In the case of the lesser prairie-chicken, we considered the primary indicators of resiliency to be habitat availability, population abundance, growth rates, and quasi-extinction risk. Lesser prairie-chicken populations within ecoregions must have sufficient habitat and population growth potential to recover from natural disturbance events such as extensive wildfires, extreme hot or cold events, extreme precipitation events, or extended local periods of below-average rainfall. These events can be particularly devastating to populations when they occur during the late spring or summer when nesting and brood-rearing are occurring and individuals are more susceptible to mortality.

The lesser prairie-chicken is considered a “boom–bust” species based on its high reproductive potential with a high degree of annual variation in rates of successful reproduction and recruitment. These variations are largely driven by the influence of seasonal precipitation patterns (Grisham et al. 2013, pp. 6–7), which impact the population through effects on the quality of habitat. Periods of below-average precipitation and higher spring/summer temperatures result in less appropriate grassland vegetation cover and less food available, resulting in decreased reproductive output (bust periods). Periods with above-normal precipitation and cooler spring/summer

temperatures will support favorable lesser prairie-chicken habitat conditions and result in high reproductive success (boom periods). In years with particularly poor weather conditions, individual female lesser prairie-chicken may forgo nesting for the year. This population characteristic highlights the need for habitat conditions to support large population growth events during favorable climatic conditions so they can withstand the declines during poor climatic conditions without a high risk of extirpation.

Historically, the lesser prairie-chicken had large expanses of grassland habitat to maintain populations. Early European settlement and development of the Southern Great Plains for agriculture initially, and for energy extraction later, substantially reduced the amount and connectivity of the grasslands of this region. Additionally, if historically some parts of the range were drastically impacted or eliminated due to a stochastic event, that area could be reestablished from other populations. Today, those characteristics of the grasslands have been degraded, resulting in the loss and fragmentation of grasslands in the Southern Great Plains. Under present conditions, the potential lesser prairie-chicken habitat is limited to small, fragmented grassland patches (relative to historical conditions) (Service 2022, pp. 64–78). The larger and more intact the remaining grassland patches are, with appropriate vegetation structure, the larger, healthier, and more resilient the lesser prairie-chicken populations will be. Exactly how large habitat patches should be to support healthy populations depends on the quality and intactness of the patches. Recommended total space needed for a single lesser prairie-chicken lek ranges from a minimum of about 12,000 ac (4,900 ha) (Davis 2005, p. 3) up to more than 50,000 ac (20,000 ha), depending on the quality and intactness of the area (Applegate and Riley 1998, p. 14; Haufler et al. 2012, pp. 7–8; Haukos and Zavaleta 2016, p. 107).

A single lesser prairie-chicken lek is not considered a population that can persist on its own. Instead, complexes of multiple leks that interact with each other are required for a lesser prairie-chicken population to persist over time. These metapopulation dynamics, in which individuals interact on the landscape to form larger populations, are dependent upon the specific biotic and abiotic landscape characteristics of the site and how those characteristics influence space use, movement, patch size, and fragmentation (DeYoung and Williford 2016, pp. 89–91). Maintaining multiple, highly resilient populations (complexes of leks) within the four ecoregions that have the ability to interact with each other will increase the probability of persistence in the face of environmental fluctuations and stochastic events. Because of this concept of metapopulations and their influence on long-term persistence, when evaluating lesser prairie-chicken populations, site-specific information can be informative. However, many of the factors affecting lesser prairie-chicken populations should be analyzed at larger spatial scales (Fuhlendorf et al. 2002, entire).

### *Redundancy*

Redundancy describes the ability of a species to withstand catastrophic events. Catastrophes are stochastic events that are expected to lead to population collapse regardless of population health and for which adaptation is unlikely. Redundancy spreads the risk and can be measured through the duplication and distribution of resilient populations that are connected across the range of the species. The larger the number of highly resilient populations the lesser prairie-chicken has, distributed over a large area within each ecoregion, the better the species can withstand catastrophic events.

Catastrophic events for lesser prairie-chicken might include extreme drought; widespread, extended droughts; or a disease outbreak.

Measuring redundancy for lesser prairie-chicken is a difficult task due to the physiological and biological characteristics of the species, which make it difficult to survey and limit the usefulness of survey results. To estimate redundancy for the lesser prairie-chicken, we estimated the geographic distribution of predicted available habitat within each of the four ecoregions and the juxtaposition of that habitat to other habitat and non-habitat. As the amount of large grassland patches decreases and grassland patches become more isolated to reduce or preclude lesser prairie-chicken movement between them, the overall redundancy of the species is reduced. As redundancy decreases within any representative ecoregion or DPS, the likelihood of extirpation within that ecoregion or DPS increases. As large grassland patches, the connectivity of those patches, and the number of lesser prairie-chicken increase, so does the redundancy within an ecoregion or a DPS.

#### *Current Condition*

In the SSA report, we assessed the current condition of the lesser prairie-chicken through an analysis of existing habitat; a review of factors that have impacted the species in the past, including a geospatial analysis to estimate areas of land cover impacts on the current landscape condition; a summary of the current potential usable area based upon our geospatial analysis; and a summary of past and current population estimates. We also evaluated and summarized the benefits of the extensive conservation efforts that are ongoing throughout the lesser prairie-chicken range to conserve the species and its habitat.

## Geospatial Analysis Summary

The primary concern for the lesser prairie-chicken is habitat loss and fragmentation. We conducted a geographic information system (GIS) analysis to analyze the extent of usable land cover changes and fragmentation within the range of the lesser prairie-chicken, characterizing landscape conditions spatially to analyze the ability of those landscapes to support the biological needs of the lesser prairie-chicken. Impacts included in this analysis were the direct and indirect effects of areas that were converted to cropland; encroached by woody vegetation such as mesquite and eastern red cedar (*Juniperus virginiana*); and developed for roads, petroleum production, wind energy, and transmission lines. We acknowledge that there are other impacts, such as power lines or incompatible grazing on the landscape that can affect lesser prairie-chicken habitat. For those impacts, either no geospatial data were available, or the available data would have added so much complexity to our geospatial model that the results would have been uninterpretable or not explanatory for our purpose.

There are several important limitations to our geospatial analysis. First, it is a landscape-level analysis, so the results only represent broad trends at the ecoregional and rangewide scales. Secondly, this analysis does not incorporate different levels of habitat quality, as the data do not exist at the spatial scale or resolution needed. Our analysis considers areas only as either potentially usable or not usable by lesser prairie-chicken based upon land cover classifications. We recognize that some habitat, if managed as high-quality grassland, may have the ability to support higher densities of lesser prairie-chicken than other habitat that exists at lower qualities. Additionally, we also recognize that some areas of land cover that we identified as suitable could be of such poor quality

that it is of limited value to the lesser prairie-chicken. We recognize there are many important limitations to this landscape analysis, including variation and inherent error in the underlying data and unavailable data. We interpreted the results of this analysis with those limitations in mind.

In this final rule, we discuss effects that relate to the total potential usable unimpacted acreage for lesser prairie-chicken, as defined by our geospatial analysis (hereafter, analysis area). A complete description of the purpose, methodology, constraints, and additional details for this analysis is provided in the SSA report for the lesser prairie-chicken (Service 2022, appendix B, parts 1, 2, and 3).

#### Threats Influencing Current Condition

Following are summary evaluations of the threats analyzed in the SSA report for the lesser prairie-chicken: effects associated with habitat degradation, loss, and fragmentation, including conversion of grassland to cropland (Factor A), petroleum production (Factor A), wind energy development and transmission (Factor A), woody vegetation encroachment (Factor A), and roads and electrical distribution lines (Factor A); other factors, such as livestock grazing (Factor A), shrub control and eradication (Factor A), collision mortality from fences (Factor E), predation (Factor C), influence of anthropogenic noise (Factor E), fire (Factor A); and extreme weather events (Factor E). We also evaluate existing regulatory mechanisms (Factor D) and ongoing conservation measures.

In the SSA report, we also considered three additional threats: hunting and other recreational, educational, and scientific use (Factor B); parasites and diseases (Factor C); and insecticides (Factor E). We concluded that, as indicated by the best available

scientific and commercial information, these threats are currently having little to no impact on lesser prairie-chickens and their habitat, and thus their overall effect now and into the future is expected to be minimal. Therefore, we will not present summary analyses of those threats in this document but will consider them in our overall conclusions of impacts to the species. For full descriptions of all threats and how they impact the species, please see the SSA report (Service 2022, pp. 24–49).

#### Habitat Degradation, Loss, and Fragmentation

The grasslands of the Great Plains are among the most threatened ecosystems in North America (Samson et al. 2004, p. 6) and have been impacted more than any other major ecosystem on the continent (Samson and Knopf 1994, p. 418). Temperate grasslands are also one of the least conserved ecosystems (Hoekstra et al. 2005, p. 25). Grassland loss in the Great Plains is estimated at approximately 70 percent (Samson et al. 2004, p. 7), with nearly 23 million ac (93,000 km<sup>2</sup>; 9.3 million ha) of grasslands in the United States lost between 1982 and 1997 alone (Samson et al. 2004, p. 9). The vast majority of the lesser prairie-chicken range (more than 95 percent) occurs on private lands that have been in some form of agricultural production since at least the early 1900s. As a result, available habitat for grassland species, such as the lesser prairie-chicken, has been much reduced and fragmented compared to historical conditions across its range.

Habitat impacts occur in three general categories that often work synergistically at the landscape scale: degradation, loss, and fragmentation. Habitat degradation results in changes to a species' habitat that reduces its suitability to the species, but without making the habitat entirely unsuitable. Degradation may result in lower carrying capacity, lower

reproductive potential, higher predation rates, or other effects. Habitat loss may result from the same anthropogenic sources that cause degradation, but the habitat has been altered to the point where it has no suitability for the species at all. Habitat fragmentation occurs when habitat loss is patchy and leaves a matrix of grassland habitat behind. While habitat degradation continues to be a concern, we focus our analysis on habitat loss and fragmentation from the cumulative effects of multiple sources of activities as the long-term drivers of the species' viability.

Initially, reduction in the total area of available habitat may be more significant than fragmentation and can exert a much greater effect on populations (Fahrig 1997, pp. 607, 609). However, as habitat loss continues, the effects of fragmentation often compound effects of habitat loss and produce even greater population declines than habitat loss alone (Bender et al. 1998, pp. 517–518, 525). Spatial habitat fragmentation occurs when some form of disturbance, usually habitat degradation or loss, results in the separation or splitting apart of larger, previously contiguous, functional components of habitat into smaller, often less valuable, noncontiguous patches (Wilcove et al. 1986, p. 237; Johnson and Igl 2001, p. 25; Franklin et al. 2002, entire). Habitat loss and fragmentation influence habitat availability and quality in three primary ways: (1) total area of available habitat constrains the maximum population size for an area; (2) the size of habitat patches within a larger habitat area, including edge effects (changes in population or community structures that occur at the boundary of two habitats), influences habitat quality and size of local populations; and (3) patch isolation influences the amount of species movement between patches, which constrains demographic and

genetic exchange and ability to recolonize local areas where the species might be extirpated (Johnson and Igl 2001, p. 25; Stephens et al. 2003, p. 101).

Habitat loss, fragmentation, and degradation correlate with the ecological concept of carrying capacity. Within any given block or patch of lesser prairie-chicken habitat, carrying capacity is the maximum number of birds that can be supported indefinitely by the resources available within that area, that is, sufficient food, shelter, and lekking, nesting, brood-rearing, and wintering areas. As habitat loss increases and the size of an area decreases, the maximum number of birds that can inhabit that particular habitat patch also decreases. Consequently, a reduction in the total area of available habitat can negatively influence biologically important characteristics such as the amount of space available for establishing territories and nest sites (Fahrig 1997, p. 603). Over time, the continued conversion and loss of habitat will reduce the capacity of the landscape to support historical population levels, causing a decline in population sizes.

Habitat loss not only contributes to overall declines in usable area for a species but also causes a reduction in the size of individual habitat patches and influences the proximity and connectivity of these patches to other patches of similar habitat (Stephens et al. 2003, p. 101; Fletcher 2005, p. 342), reducing rates of movement between habitat patches until, eventually, complete isolation results. Habitat quality for many species is, in part, a function of patch size and declines as the size of the patch decreases (Franklin et al. 2002, p. 23). Both the size and shape of the habitat patch have been shown to influence population persistence in many species (Fahrig and Merriam 1994, p. 53). The size of the fragment can influence reproductive success, survival, and movements. As the distances between habitat fragments increase, the rate of dispersal between the habitat

patches may decrease and ultimately cease, reducing the likelihood of population persistence and potentially leading to both localized and regional extinctions (Harrison and Bruna 1999, p. 226; With et al. 2008, p. 3153). In highly fragmented landscapes, once a species becomes extirpated from an area, the probability of recolonization is greatly reduced (Fahrig and Merriam 1994, p. 52).

For the lesser prairie-chicken, habitat loss can occur due to either direct or indirect habitat impacts. Direct habitat loss is the result of the removal or alteration of grasslands, making that space no longer available for use by the lesser prairie-chicken. Indirect habitat loss and degradation is when the vegetation still exists, but the areas adjacent to a disturbance (the disturbance can be natural or manmade) are no longer used by lesser prairie-chicken or are used at reduced rates, or the disturbance negatively alters demographic rates or behavior in the affected area. In many cases, as discussed in detail below for specific disturbances, the indirect habitat loss can greatly exceed the direct habitat loss.

Primarily due to their site fidelity and the need for large, ecologically diverse landscapes, lesser prairie-chickens appear to be relatively intolerant to habitat alteration, particularly for activities that fragment habitat into smaller patches. The birds require habitat patches with large expanses of vegetative structure in different successional stages to complete different phases in their life cycle, and the loss or partial loss of even one of these structural components can significantly reduce the overall value of that habitat to lesser prairie-chickens (Elmore et al. 2013, p. 4). In addition to the impacts on the individual patches, as habitat loss and fragmentation increases on the landscape, the juxtaposition of habitat patches to each other and to non-habitat areas will change. This

changing pattern on the landscape can be complex and difficult to predict, but the results, in many cases, are increased isolation of individual patches (either due to physical separation or barriers preventing or limiting movement between patches) and direct impacts to metapopulation structure, which could be important for population persistence (DeYoung and Williford 2016, pp. 88–91).

The following sections provide a discussion and quantification of the influence of habitat loss and fragmentation on the grasslands of the Great Plains within the lesser prairie-chicken analysis area and more specifically allow us to characterize the current condition of lesser prairie-chicken habitat.

#### *Conversion of Grassland to Cropland*

Historical conversion of grassland to cultivated agricultural lands in the late 19<sup>th</sup> century and throughout the 20<sup>th</sup> century has been regularly cited as an important cause in the rangewide decline in abundance and distribution of lesser prairie-chicken populations (Copelin 1963, p. 8; Jackson and DeArment 1963, p. 733; Crawford and Bolen 1976a, p. 102; Crawford 1980, p. 2; Taylor and Guthery 1980b, p. 2; Braun et al. 1994, pp. 429, 432–433; Mote et al. 1999, p. 3). Because cultivated grain crops may have provided increased or more dependable winter food supplies for lesser prairie-chickens (Braun et al. 1994, p. 429), the initial conversion of smaller patches of grassland to cultivation may have been temporarily beneficial to the short-term needs of the species as primitive and inefficient agricultural practices made grain available as a food source (Rodgers 2016, p. 18). However, as conversion increased, it became clear that landscapes having greater than 20 to 37 percent cultivated grains may not support stable lesser prairie-chicken populations (Crawford and Bolen 1976a, p. 102). More recently, abundances of lesser

prairie-chicken increased with increasing cropland until a threshold of 10 percent was reached; after that, abundance of lesser prairie-chicken declined with increasing cropland cover (Ross et al. 2016b, entire). While lesser prairie-chicken may forage in agricultural croplands, croplands do not provide for the habitat requirements of the species' life cycle (cover for nesting and thermoregulation); thus, lesser prairie-chicken avoid landscapes dominated by cultivated agriculture, particularly where small grains are not the dominant crop (Crawford and Bolen 1976a, p. 102).

As part of the geospatial analysis completed for the SSA, we estimated the amount of cropland that currently exists in the four ecoregions of the lesser prairie-chicken. These percentages do not equate to the actual proportion of habitat loss in the analysis area because not all of the analysis area was necessarily suitable lesser prairie-chicken habitat; they are only the estimated portion of the total analysis area converted from the native vegetation community, i.e., grassland, to cropland. About 37 percent of the total area in the Short-Grass/CRP Ecoregion; 32 percent of the total area in the Sand Sagebrush Ecoregion; 13 percent of the total area in the Mixed-Grass Ecoregion; and 14 percent of the total area in the Shinnery Oak Ecoregion have been converted to cropland in the analysis area of the lesser prairie-chicken. Rangewide, we estimate about 4,963,000 ac (2,009,000 ha) of grassland have been converted to cropland, representing about 23 percent of the total analysis area. We note that these calculations do not account for all conversion that has occurred within the historical range of the lesser prairie-chicken but are limited to the amount of cropland within our analysis area. For further information, including total acreages impacted, see the SSA report for the lesser prairie-chicken (Service 2022, appendix E and figure E.1).

The effects of grassland converted to cropland within the historical range of the lesser prairie-chicken have significantly impacted the amount of habitat available and how fragmented the remaining habitat is for the lesser prairie-chicken, leading to overall decreases in resiliency and redundancy throughout the range of the lesser prairie-chicken. The impact of cropland has shaped the historical and current condition of the grasslands and shrublands upon which the lesser prairie-chicken depends.

#### *Petroleum and Natural Gas Production*

Petroleum and natural gas production has occurred over much of the estimated historical and current range of the lesser prairie-chicken. As demand for energy has continued to increase nationwide, so has oil and gas development in the Great Plains. In Texas, for example, one study noted that from 2002–2012 active oil and gas wells in the lesser prairie-chicken occupied range increased by more than 80 percent (Timmer et al. 2014, p. 143). The impacts from oil and gas development extend beyond the immediate well sites; they involve activities such as surface exploration, exploratory drilling, field development, and facility construction, as well as access roads, well pads, and operation and maintenance. Associated facilities can include compressor stations, pumping stations, and electrical generators.

Petroleum and natural gas production result in both direct and indirect habitat effects to the lesser prairie-chicken (Hunt and Best 2004, p. 92). Well pad construction, seismic surveys, access road development, power line construction, pipeline corridors, and other activities can all result in direct habitat loss by removal of vegetation used by lesser prairie-chickens. As documented in other grouse species, indirect habitat loss also occurs from avoidance of vertical structures, noise, and human presence (Weller et al.

2002, entire), which all can influence lesser prairie-chicken behavior in the general vicinity of oil and gas development areas. These activities also disrupt lesser prairie-chicken reproductive behavior (Hunt and Best 2004, p. 41).

Anthropogenic features, such as oil and gas wells, affect the behavior of lesser prairie-chickens and alter the way in which they use the landscape (Hagen et al. 2011, pp. 69–73; Pitman et al. 2005, entire; Hagen 2010, entire; Hunt and Best 2004, pp. 99–104; Plumb et al. 2019, pp. 224–227; Sullins et al. 2019, pp. 5–8; Peterson et al. 2020, entire). Please see the SSA report for a detailed summary of the best available scientific information regarding avoidance distances and effects of oil and gas development on lesser prairie-chicken habitat use (Service 2022, pp. 27–28).

As part of the geospatial analysis discussed in the SSA report, we calculated the amount of usable land cover for the lesser prairie-chicken that has been impacted (both direct and indirect impacts) by oil and natural gas wells in the current analysis area of the lesser prairie-chicken, though this analysis did not include all associated infrastructure as those data were not available. We used an impact radius of 984 feet (ft) (300 meters (m)) for indirect effects of oil and gas wells. For details regarding the establishment of the impact radius, see appendix B, part 2C, of the SSA report (Service 2022). These calculations were limited to the current analysis area and do not include historical impacts of habitat loss that occurred outside of the current analysis area. Thus, the calculation likely underestimates the rangewide effects of historical oil and gas development on the lesser prairie-chicken. About 4 percent of the total area in the Short-Grass/CRP Ecoregion; 5 percent of the total area in the Sand Sagebrush Ecoregion; about 10 percent of the total area in the Mixed-Grass Ecoregion; and 4 percent of the total area

in the Shinnery Oak Ecoregion of space that was identified as potential usable or potential restorable areas have been impacted due to oil and gas development in the current analysis area of the lesser prairie-chicken. Rangewide, we estimate about 1,433,000 ac (580,000 ha) of grassland have been lost due to oil and gas development representing about 7 percent of the total analysis area. Maps of these areas in each ecoregion are provided in the SSA report (Service 2022, appendix E, figure E.2).

Oil and gas development directly removes habitat that supports lesser prairie-chicken, and the effects of the development extend past the immediate site of the wells and their associated infrastructure, further impacting habitat and altering behavior of lesser prairie-chicken throughout both the Northern and the Southern DPS. These activities have resulted in decreases in population resiliency and species redundancy.

#### *Wind Energy Development and Power Lines*

Wind power is a form of renewable energy increasingly being used to meet current and projected future electricity demands in the United States. Much of the new wind energy development is likely to come from the Great Plains States because they have high wind resource potential, which exerts a strong, positive influence on the amount of wind energy developed within a particular State (Staid and Guikema 2013, p. 384). In 2019, three of the five States within the lesser prairie-chicken range (Colorado, New Mexico, and Kansas) were within the top 10 States nationally for fastest growing States for wind generation in the past year (AWEA 2020, p. 33). There is considerable information (Southwest Power Pool 2020) indicating interest by the wind industry in developing wind energy within the range of the lesser prairie-chicken, especially if additional transmission line capacity is constructed. As of May 2020, approximately

1,792 wind turbines were located within the lesser prairie-chicken analysis area (Hoen et al. 2020). Not all areas within the analysis area are habitat for the lesser prairie-chicken, so not all turbines located within the analysis area affect the lesser prairie-chicken and its habitat.

The average size of installed wind turbines and all other size aspects of wind energy development continues to increase (DOE 2015, p. 63; AWEA 2020, p. 87–88; AWEA 2014, entire; AWEA 2015, entire; AWEA 2016, entire; AWEA 2017, entire; AWEA 2018, entire; AWEA 2019, entire; AWEA 2020, entire). Wind energy developments range from 20 to 400 towers, each supporting a single turbine. The individual permanent footprint of a single turbine unit, about 0.75–1 ac (0.3–0.4 ha), is relatively small in comparison with the overall footprint of the entire array (DOE 2008, pp. 110–111). Roads are necessary to access the turbine sites for installation and maintenance. Depending on the size of the wind energy development, one or more electrical substations, where the generated electricity is collected and transmitted on to the power grid, may also be built. Considering the initial capital investment and that the service life of a single turbine is at least 20 years (DOE 2008, p. 16), we expect most wind energy developments to be in place for at least 30 years. Wind repowering is the combined activity of dismantling or refurbishing existing wind turbines and commissioning new ones at existing wind energy development sites at the end of their service life. Wind repowering is increasingly common, with 2,803 megawatts of operating projects partially repowering in 2019 (AWEA 2020, p. 2).

Please see the SSA report for a detailed review of the best available scientific information regarding the potential effects of wind energy development on habitat use by the lesser prairie-chicken (Service 2022, pp. 29–34).

Noise effects to prairie-chickens have been recently explored as a way to evaluate potential negative effects of wind energy development. For a site in Nebraska, wind turbine noise frequencies were documented at less than or equal to 0.73 kilohertz (kHz) (Raynor et al. 2017, p. 493), and reported to overlap the range of lek-advertisement vocalization frequencies of lesser prairie-chicken, 0.50–1.0 kHz. Female greater prairie-chickens avoided wooded areas and row crops but showed no response in space use based on wind turbine noise (Raynor et al. 2019, entire). Additionally, differences in background noise and signal-to-noise ratio of boom chorus of leks in relation to distance to turbine have been documented, but the underlying cause and response needs to be further investigated, especially since the study of wind energy development noise on grouse is almost unprecedented (Whalen et al. 2019, entire).

The effects of wind energy development on the lesser prairie-chicken must also take into consideration the influence of the transmission lines critical to distribution of the energy generated by wind turbines. Transmission lines can traverse long distances across the landscape and can be both above ground and underground, although the vast majority of transmission lines are erected above ground. Most of the impacts to lesser prairie-chicken associated with transmission lines are with the aboveground systems. Support structures vary in height depending on the size of the line. Most high-voltage power line towers are 98 to 125 ft (30 to 38 m) high but can be higher if the need arises.

Local distribution lines, if erected above ground, are usually much shorter in height but still contribute to fragmentation of the landscape.

The effect of the transmission line infrastructure is typically much larger than the physical footprint of transmission line installation. Information on grouse and power lines is relatively limited with more studies needed. The available data includes a range of reported impacts (see Nonne et al. 2013, entire; Dinkins et al. 2014, entire; Hansen et al. 2016, entire; Jarnevich et al. 2016, entire; Londe et al. 2019, entire; LeBeau et al. 2019, entire; Kohl et al. 2019, entire; and England and Robert 2021, entire). Transmission lines can indirectly lead to alterations in lesser prairie-chicken behavior and space use (avoidance), decreased lek attendance, and increased predation on lesser prairie-chicken. Transmission lines, particularly due to their length, can be a significant barrier to dispersal of prairie grouse, disrupting movements to feeding, breeding, and roosting areas. Both lesser and greater prairie-chickens avoided otherwise usable habitat near transmission lines and crossed these power lines much less often than nearby roads, suggesting that power lines are a particularly strong barrier to movement (Pruett et al. 2009, pp. 1255–1257). Because lesser prairie-chicken avoid tall vertical structures like transmission lines and because transmission lines can increase predation rates, leks located in the vicinity of these structures may see reduced attendance by new males to the lek, as has been reported for sage-grouse (Braun et al. 2002, pp. 11–13).

Decreased probabilities of use by lesser prairie-chicken were shown with the occurrence of more than 0.09 mi (0.15 km) of major roads, or transmission lines within a 1.2-mi (2-km) radius (Sullins et al. 2019, unpagged). Additionally, a recent study corroborated numerous authors' (Pitman et al. 2005; Pruett et al. 2009; Hagen et al. 2011;

Grisham et al. 2014; Hovick et al. 2014a) findings of negative effects of power lines on prairie grouse and reported a minimum avoidance distance of 1,925.8 ft (587 m), which is similar to other studies of lesser prairie-chickens (Plumb et al. 2019, entire). LeBeau et al. (2020, p. 24) largely aggregated their findings of wind turbines and a transmission line on lesser prairie-chicken into effects of “wind energy infrastructure,” but specifically noted evidence that females selected home ranges farther from transmission lines. Using a definition for transmission powerlines that included powerlines transmitting >69 kilovolts, indicated that taller anthropogenic structures (i.e., transmission powerlines and towers) generally had larger estimated avoidance response distances of all the studied features, but also large regional variation (Peterson et al. 2020, p. 9). They found largest estimated avoidance response of 5.6 mi (9 km) in Northwest Kansas, and the smallest in Oklahoma at approximately 1.8 mi (3 km). Effects from anthropogenic features, including power lines, varied by region, and the degree of effect often depended on the presence of other anthropogenic features (Patten et al. 2021, entire).

As part of our geospatial analysis, we calculated the amount of otherwise usable land cover for the lesser prairie-chicken that has been impacted (both direct and indirect impacts) by wind energy development in the current analysis area of the lesser prairie-chicken. We used an impact radius of 5,906 ft (1,800 m) for indirect effects of wind turbines and 2,297 ft (700 m) for indirect effects of transmission lines. For details regarding the establishment of the impact radius, see appendix B, part 2C, of the SSA report (Service 2022). Within our analysis area, the following acreages have been identified as impacted due to wind energy development: about 2 percent of the total area in the Short-Grass/CRP, Mixed-Grass, and Shinnery Oak Ecoregions; and no impacts of

wind energy development documented currently within the Sand Sagebrush Ecoregion. Rangewide, we estimate about 428,000 ac (173,000 ha) of grassland have been impacted by wind energy development, representing about 2 percent of the total analysis area (Service 2022, appendix E, figure E.3). These percentages do not account for overlap that may exist with other features that may have already impacted the landscape.

Additionally, according to our geospatial analysis, the following acreages within the analysis area have been directly or indirectly impacted due to the construction of transmission lines: about 7 percent of the total area in the Short-Grass/CRP Ecoregion; 5 percent of the total area in the Sand Sagebrush Ecoregion; 7 percent of the total area in the Mixed-Grass Ecoregion; and 10 percent of the total area in the Shinnery Oak Ecoregion. Rangewide, we estimate about 1,553,000 ac (629,000 ha) of grassland have been impacted by transmission lines representing about 7 percent of the total analysis area (Service 2022, appendix E, figure E.4).

Wind energy development and transmission lines remove habitat that supports lesser prairie-chicken. The effects of the development extend past the immediate site of the turbines and their associated infrastructure, further impacting habitat and altering behavior of lesser prairie-chicken throughout both the Northern and the Southern DPSs. These activities have resulted in decreases in population resiliency and species redundancy.

#### *Woody Vegetation Encroachment*

As discussed in **Background**, habitat selected by lesser prairie-chicken is characterized by expansive regions of treeless grasslands interspersed with patches of small shrubs (Giesen 1998, pp. 3–4); lesser prairie-chicken avoid areas with trees and

other vertical structures. Prior to extensive Euro-American settlement, frequent fires and grazing by large, native ungulates helped confine trees like eastern red cedar to river and stream drainages and rocky outcroppings. The frequency and intensity of these disturbances directly influenced the ecological processes, biological diversity, and patchiness typical of Great Plains grassland ecosystems (Collins 1992, pp. 2003–2005; Fuhlendorf and Smeins 1999, pp. 732, 737).

Following Euro-American settlement, increasing fire suppression combined with government programs promoting eastern red cedar for windbreaks, erosion control, and wildlife cover facilitated the expansion of eastern red cedar distribution in grassland areas (Owensby et al. 1973, p. 256; DeSantis et al. 2011, p. 1838). Once a grassland area has been colonized by eastern red cedar, the trees are mature within 6 to 7 years and provide a plentiful source of seed so that adjacent areas can readily become infested with eastern red cedar. Despite the relatively short viability of the seeds (typically only one growing season), the large cone crop, potentially large seed dispersal ability, and the physiological adaptations of eastern red cedar to open, relatively dry sites help make the species a successful invader of grassland landscapes (Holthuijzen et al. 1987, p. 1094). Most trees are relatively long-lived and, once they become established in grassland areas, require intensive management to remove to return areas to a grassland state.

Within the southern- and westernmost portions of the estimated historical and occupied ranges of lesser prairie-chicken in Eastern New Mexico, Western Oklahoma, and the South Plains and Panhandle of Texas, honey mesquite is another common woody invader within these grasslands (Riley 1978, p. vii; Boggie et al. 2017, entire). Mesquite is a particularly effective invader in grassland habitat due to its ability to produce

abundant, long-lived seeds that can germinate and establish in a variety of soil types and moisture and light regimes (Lautenbach et al. 2017, p. 84). Though not as widespread as mesquite or eastern red cedar, other tall, woody plants, such as redberry or Pinchot juniper (*Juniperus pinchotii*), black locust (*Robinia pseudoacacia*), Russian olive (*Elaeagnus angustifolia*), and Siberian elm (*Ulmus pumila*) can also be found in grassland habitat historically and currently used by lesser prairie-chicken and may become invasive in these areas.

Invasion of grasslands by opportunistic woody species causes otherwise usable grassland habitat no longer to be used by lesser prairie-chicken and contributes to the loss and fragmentation of grassland habitat (Lautenbach 2017, p. 84; Boggie et al. 2017, p. 74). In Kansas, lesser prairie-chicken are 40 times more likely to use areas that had no trees than areas with 1.6 trees per ac (5 trees per ha), and no nests occur in areas with a tree density greater than 0.8 trees per ac (2 trees per ha), at a scale of 89 ac (36 ha) (Lautenbach 2017, pp. 104–142). Similarly, within the Shinnery Oak Ecoregion, lesser prairie-chicken habitat use in all seasons is altered in the presence of mesquite, even at densities of less than 5 percent canopy cover (Boggie et al. 2017, entire). Woody vegetation encroachment also contributes to indirect habitat loss and increases habitat fragmentation because lesser prairie-chicken are less likely to use areas adjacent to trees (Boggie et al. 2017, pp. 72–74; Lautenbach 2017, pp. 104–142).

Fire is often the best method to control or preclude tree invasion of grassland. However, to some landowners and land managers, burning of grassland can be perceived as a high-risk activity because of the potential liability of escaped fire impacting nontarget lands and property. Additionally, it is undesirable for optimizing cattle

production and is likely to create wind erosion or “blowouts” in sandy soils.

Consequently, wildfire suppression is common, and relatively little prescribed burning occurs on private land. Often, prescribed fire is employed only after significant tree invasion has already occurred and landowners consider forage production for cattle to have diminished. Preclusion of woody vegetation encroachment on grasslands of the southern Great Plains using fire requires implementing fire at a frequency that mimics historical fire frequencies of 2–14 years (Guyette et al. 2012, p. 330), further limiting the number of landowners able to implement fire in a manner that would truly preclude future encroachment. Additionally, in areas where grazing pressure is heavy and fuel loads are reduced, a typical grassland fire may not be intense enough to eradicate eastern red cedar (Briggs et al. 2002a, p. 585; Briggs et al. 2002b, p. 293; Bragg and Hulbert 1976, p. 19) and will not eradicate mesquite.

As part of our geospatial analysis, we calculated the amount of woody vegetation encroachment in the current analysis area of the lesser prairie-chicken. These calculations of the current analysis area do not include historical impacts of habitat loss that occurred outside of the current analysis area; thus, it likely underestimates the effects of historical woody vegetation encroachment rangewide on the lesser prairie-chicken. An additional limitation associated with this calculation is that available remote sensing data lack the ability to detect areas with low densities of encroachment, as well as areas with shorter trees; thus, this calculation likely underestimates lesser prairie-chicken habitat loss due to woody vegetation encroachment. The identified areas of habitat impacted by woody vegetation are: about 5 percent of the total area in the Short-Grass/CRP Ecoregion; about 2 percent of the total area in the Sand Sagebrush Ecoregion; about 24 percent of the total

area in the Mixed-Grass Ecoregion; and about 17 percent of the total area in the Shinnery Oak Ecoregion. Rangeland, we estimate about 3,071,000 ac (1,243,000 ha) of grassland have been directly or indirectly impacted by the encroachment of woody vegetation, or about 18 percent of the total area. These percentages do not account for overlap that may exist with other features that may have already impacted the landscape. Further information, including total acres impacted, is available in the SSA report (Service 2022, appendix B; appendix E, figure E.5).

Woody vegetation encroachment is contributing to ongoing habitat loss as well as contributing to fragmentation and degradation of remaining habitat patches. The effects of woody vegetation encroachment are particularly widespread in the Shinnery Oak Ecoregion that makes up the Southern DPS as well as the Mixed-Grass Ecoregion of the Northern DPS. While there are ongoing efforts to control woody vegetation encroachment, the current level of woody vegetation on the landscape is evidence that removal efforts are being outpaced by rates of encroachment; thus, we expect that this threat will continue to contribute to habitat loss and fragmentation, which has reduced population resiliency across the range of the lesser prairie-chicken.

#### *Roads and Electrical Distribution Lines*

Roads and distribution power lines are linear features on the landscape that contribute to loss and fragmentation of lesser prairie-chicken habitat and fragment populations as a result of behavioral avoidance. Lesser prairie-chickens are less likely to use areas close to roads (Plumb et al. 2019, entire; Sullins et al. 2019, entire). Additionally, roads contribute to lek abandonment when they disrupt important habitat features (such as affecting auditory or visual communication) associated with lek sites

(Crawford and Bolen 1976b, p. 239). Some mammal species that prey on lesser prairie-chicken, such as red fox (*Vulpes vulpes*), raccoons (*Procyon lotor*), and striped skunks (*Mephitis mephitis*), have greatly increased their distribution by dispersing along roads (Forman and Alexander 1998, p. 212; Forman 2000, p. 33; Frey and Conover 2006, pp. 1114–1115).

Traffic noise from roads may indirectly impact lesser prairie-chicken. Because lesser prairie-chicken depend on acoustical signals to attract females to leks, noise from roads, oil and gas development, wind turbines, and similar human activity may interfere with mating displays, influencing female attendance at lek sites and causing young males not to be drawn to the leks. Within a relatively short period, leks can become inactive due to a lack of recruitment of new males to the display grounds. For further discussion on noise, please see *Influence of Anthropogenic Noise*.

Depending on the traffic volume and associated disturbances, roads also may limit lesser prairie-chicken dispersal abilities. Lesser prairie-chickens avoid areas of usable habitat near roads (Pruett et al. 2009, pp. 1256, 1258; Plumb et al. 2019, entire) and in areas where road densities are high (Sullins et al. 2019, p. 8). Lesser prairie-chickens are thought to avoid major roads due to disturbance caused by traffic volume and perhaps to avoid exposure to predators that may use roads as travel corridors. However, the extent to which roads constitute a significant obstacle to lesser prairie-chicken movement and space use is largely dependent upon the local landscape composition and characteristics of the road itself.

Local electrical distribution lines are usually much shorter in height than transmission lines but can still contribute to habitat fragmentation through similar

mechanisms as other vertical features when erected above ground. In addition to habitat loss and fragmentation, electrical power lines can directly affect prairie grouse by posing a collision hazard (Leopold 1933, p. 353; Connelly et al. 2000, p. 974). There were no datasets available to quantify the total impact of distribution lines on the landscape for the lesser prairie-chicken. Although distribution lines are a significant landscape feature throughout the Great Plains with potential to affect lesser prairie-chicken habitat, after reviewing all available information, we were unable to develop a method to quantitatively incorporate the occurrence of distribution lines into our geospatial analysis.

As part of our geospatial analysis, we estimated the area impacted by direct and indirect habitat loss due to roads (Service 2022, appendix B, part 2). These calculations of the current analysis area do not include historical impacts of loss; thus, the calculations likely underestimate the historical effect of roads on rangewide habitat loss for the lesser prairie-chicken. The results indicate that the total areas of grassland that have been directly and indirectly impacted by roads within the analysis area for the lesser prairie-chicken are: about 17 percent of the total area in the Short-Grass/CRP Ecoregion; about 14 percent of the total area in the Sand Sagebrush Ecoregion; about 20 percent of the total area in the Mixed-Grass Ecoregion; and about 19 percent of the total area in the Shinnery Oak Ecoregion. Rangewide, we estimate about 3,996,000 ac (1,617,000 ha) of grassland have been impacted by roads, representing about 18 percent of the total analysis area (Service 2022, appendix E, figure E.6). We did not have adequate spatial data to evaluate habitat loss caused solely by electrical distribution lines, but much of the existing impacts of power lines occur within the impacts caused by roads. Electrical distribution lines that

fall outside the existing impacts of roads would represent additional impacts for the lesser prairie-chicken that are not quantified in our geospatial analysis.

Development of roads and electrical distribution lines directly removes habitat that supports lesser prairie-chicken, and the effects of the development extend past the immediate footprint of the development, further impacting habitat and altering behavior of lesser prairie-chicken throughout both the Northern and the Southern DPSs. These activities have resulted in decreases in population resiliency and species redundancy.

#### Other Factors

##### *Livestock Grazing*

Grazing has long been an ecological driving force throughout the ecosystems of the Great Plains (Stebbins 1981, p. 84), and much of the untilled grasslands within the range of the lesser prairie-chicken is currently grazed by livestock and other animals. Historically, the interaction of fire, drought, prairie dogs (*Cynomys ludovicianus*), and large ungulate grazers created and maintained distinctive plant communities in the Western Great Plains, resulting in a mosaic of vegetation structure and composition that sustained lesser prairie-chicken and other grassland bird populations (Derner et al. 2009, p. 112). As such, grazing by domestic livestock is not inherently detrimental to lesser prairie-chicken management and, in many cases, is needed to maintain appropriate vegetative structure.

However, grazing practices that tend to result in overutilization of forage and decreasing vegetation heterogeneity can produce habitat conditions that differ in significant ways from the historical grassland mosaic; these incompatible practices alter the vegetation structure and composition and degrade the quality of habitat for the lesser

prairie-chicken. The more heavily altered conditions are the least valuable for the lesser prairie-chicken (Jackson and DeArment 1963 p. 733; Davis et al. 1979, pp. 56, 116; Taylor and Guthery 1980a, p. 2; Bidwell and Peoples 1991, pp. 1–2). In some cases, these alterations can result in areas that do not contain the biological components necessary to support the lesser prairie-chicken.

Where grazing regimes leave limited residual cover in the spring, protection of lesser prairie-chicken nests may be inadequate, and desirable food resources can be scarce (Bent 1932, p. 280; Cannon and Knopf 1980, pp. 73–74; Crawford 1980, p. 3; Kraft 2016, pp. 19–21). Because lesser prairie-chicken depend on medium- and tall-grass species for nesting, concealment, and thermal cover that are also preferentially grazed by cattle, these plant species needed by lesser prairie-chicken can easily be reduced or eliminated by cattle grazing, particularly in regions of low rainfall (Hamerstrom and Hamerstrom 1961, p. 290). In addition, when grasslands are in a deteriorated condition due to incompatible grazing and overutilization, the soils have less water-holding capacity (Blanco and Lal 2010, p. 9), and the availability of succulent vegetation and insects used by lesser prairie-chicken chicks is reduced. However, grazing can be beneficial to the lesser prairie-chicken when management practices produce or enhance the vegetative characteristics required by the lesser prairie-chicken.

The interaction of fire and grazing and its effect on vegetation components and structure is likely important to prairie-chickens (Starns et al. 2020, entire). On properties managed with patch-burn grazing regimes, female greater prairie-chickens selected areas with low cattle stocking rates and patches that were frequently burned, though they avoided areas that were recently burned (Winder et al. 2017, p. 171). Patch-burn grazing

created preferred habitats for female greater prairie-chickens if the regime included a relatively frequent fire-return interval, a mosaic of burned and unburned patches, and a reduced stocking rate in unburned areas avoided by grazers. When managed compatibly, widespread implementation of patch-burn grazing could result in significant improvements in habitat quality for wildlife in the tall-grass prairie ecosystem (Winder et al. 2017, p. 165). In the eastern portion of the lesser prairie-chicken range, patch-burn grazing resulted in patchy landscapes with variation in vegetation composition and structure (Lautenbach 2017, p. 20). Female lesser prairie-chickens' use of the diversity of patches in the landscape varied throughout their life cycle. They selected patches with the greatest time-since-fire and subsequently the most visual obstruction for nesting, and they selected sites with less time-since-fire and greater bare ground and forbs for summer brooding.

Livestock also inadvertently flush lesser prairie-chicken and trample lesser prairie-chicken nests (Toole 2005, p. 27; Pitman et al. 2006, pp. 27–29). Brief flushing of adults from nests can expose eggs and chicks to predation and extreme temperatures. Trampling nests can cause direct mortality to lesser prairie-chicken eggs or chicks or may cause adults to permanently abandon their nests, ultimately resulting in loss of young. Although these effects have been documented, the significance of direct livestock effects on the lesser prairie-chicken is largely unknown and is presumed not to be significant at a population scale.

In summary, domestic livestock grazing (including management practices commonly used to benefit livestock production) has altered the composition and structure of grassland habitat, both currently and historically, used by the lesser prairie-chicken.

Much of the remaining remnants of mixed-grass grasslands, while still important to the lesser prairie-chicken, exhibit conditions quite different from those prior to Euro-American settlement. These changes have reduced the suitability of remnant grassland areas as habitat for lesser prairie-chicken. Grazing management that has altered the vegetation community to a point where the composition and structure are no longer suitable for lesser prairie-chicken can contribute to fragmentation within the landscape, even though these areas may remain as prairie or grassland. Livestock grazing, however, is not inherently detrimental to lesser prairie-chicken provided that grazing management results in a plant community diversity and structure that is suitable for lesser prairie-chicken.

While domestic livestock grazing is a dominant land use on untilled range land within the lesser prairie-chicken analysis area, geospatial data do not exist at a scale and resolution necessary to calculate the total amount of livestock grazing that is being managed in a way that results in habitat conditions that are not compatible with the needs of the lesser prairie-chicken. Therefore, we did not attempt to spatially quantify the scope of grazing effects across the lesser prairie-chicken range.

#### *Shrub Control and Eradication*

Shrub control and eradication are additional forms of habitat alteration that can influence the availability and suitability of habitat for lesser prairie-chicken (Jackson and DeArment 1963, pp. 736–737). Most shrub control and eradication efforts in lesser prairie-chicken habitat are primarily focused on sand shinnery oak for the purpose of increasing forage for livestock grazing. Sand shinnery oak is toxic if eaten by cattle when it first produces leaves in the spring and competes with more palatable grasses and forbs

for water and nutrients (Peterson and Boyd 1998, p. 8), which is why it is a common target for control and eradication efforts by rangeland managers. Prior to the late 1990s, approximately 100,000 ac (40,000 ha) of sand shinnery oak in New Mexico and approximately 1,000,000 ac (405,000 ha) of sand shinnery oak in Texas were lost due to the application of tebuthiuron and other herbicides for agriculture and range improvement (Peterson and Boyd 1998, p. 2).

Shrub cover is an important component of lesser prairie-chicken habitat in certain portions of the range, and sand shinnery oak is a key shrub in the Shinnery Oak and portions of the Mixed-Grass Ecoregions. The importance of sand shinnery oak as a component of lesser prairie-chicken habitat in the Shinnery Oak Ecoregion has been demonstrated by several studies (Fuhlendorf et al. 2002, pp. 624–626; Bell 2005, pp. 15, 19–25). In West Texas and New Mexico, lesser prairie-chicken avoid nesting where sand shinnery oak has been controlled with tebuthiuron, indicating their preference for habitat with a sand shinnery oak component (Grisham et al. 2014, p. 18; Haukos and Smith 1989, p. 625; Johnson et al. 2004, pp. 338–342; Patten and Kelly 2010, p. 2151). Where sand shinnery oak occurs, lesser prairie-chicken use it both for food and cover. Sand shinnery oak may be particularly important in drier portions of the range that experience more severe and frequent droughts and extreme heat events, as sand shinnery oak is more resistant to drought and heat conditions than are most grass species. And because sand shinnery oak is toxic to cattle and thus not targeted by grazing, it can provide available cover for lesser prairie-chicken nesting and brood rearing during these extreme weather events. Loss of this component of the vegetative community likely contributed to observed population declines in lesser prairie-chicken in these areas.

While relatively wide-scale shrub eradication has occurred in the past, geospatial data do not exist to evaluate the extent to which shrub eradication has contributed to the habitat loss and fragmentation for the lesser prairie-chicken and, therefore, was not included in our quantitative analysis. While current efforts of shrub eradication are not likely occurring at rates equivalent to those witnessed in the past, any additional efforts to eradicate shrubs that are essential to lesser prairie-chicken habitat will result in additional habitat degradation and thus reduce redundancy and resiliency.

#### *Influence of Anthropogenic Noise*

Anthropogenic noise can be associated with almost any form of human activity, and lesser prairie-chicken may exhibit behavioral and physiological responses to the presence of noise. In prairie-chickens, the “boom” call vocalization transmits information about sex, territorial status, mating condition, location, and individual identity of the signaler and thus is important to courtship activity and long-range advertisement of the display ground (Sparling 1981, p. 484). The timing of displays and frequency of vocalizations are critical reproductive behaviors in prairie grouse and appear to have developed in response to unobstructed conditions prevalent in prairie habitat and indicate that effective communication, particularly during the lekking season, operates within a fairly narrow set of acoustic conditions. Prairie grouse usually initiate displays on the lekking grounds around sunrise, and occasionally near sunset, corresponding with times of decreased wind turbulence and thermal variation (Sparling 1983, p. 41). Considering the narrow set of acoustic conditions in which communication appears most effective for breeding lesser prairie-chicken and the importance of communication to successful reproduction, human activities that result in noises that disrupt or alter these conditions

could result in lek abandonment (Crawford and Bolen 1976b, p. 239). Anthropogenic features and related activities that occur on the landscape can create noise that exceeds the natural background or ambient level. When the behavioral response to noise is avoidance, as it often is for lesser prairie-chicken, noise can be a source of habitat loss or degradation leading to increased habitat fragmentation.

Anthropogenic noise may be a possible factor in the population declines of other species of lekking grouse in North America, particularly for populations that are exposed to human developments (Blickley et al. 2012a, p. 470; Lipp and Gregory 2018, pp. 369–370). Male greater prairie-chicken adjust aspects of their vocalizations in response to wind turbine noise, and wind turbine noise may have the potential to mask the greater prairie-chicken chorus at 296 hertz (Hz) under certain scenarios, but the extent and degree of masking is uncertain (Whalen 2015, entire). Noise produced by typical oil and gas infrastructure can mask grouse vocalizations, compromise the ability of female sage-grouse to find active leks when such noise is present, and affect nest site selection (Blickley and Patricelli 2012, p. 32; Lipp 2016, p. 40). Chronic noise associated with human activity leads to reduced male and female attendance at noisy leks. Breeding, reproductive success, and ultimately recruitment in areas with human developments could be impaired by such developments, impacting survival (Blickley et al. 2012b, entire). Because opportunities for effective communication on the display ground occur under fairly narrow conditions, disturbance during this period may have negative consequences for reproductive success. Other communications used by grouse off the lek, such as parent-offspring communication, may continue to be susceptible to masking by noise from human infrastructure (Blickley and Patricelli 2012, p. 33).

No data are available to quantify the areas of lesser prairie-chicken habitat rangewide that have been affected by noise, but noise is a threat that is almost entirely associated with anthropogenic features such as roads or energy development. Therefore, through our accounting for anthropogenic features we may have inherently accounted for all or some of the response of the lesser prairie-chicken to noise produced by those features.

Overall, persistent anthropogenic noise could cause lek attendance to decline, disrupt courtship and breeding activity, and reduce reproductive success. Noise can also cause abandonment of otherwise usable habitat and, as a result, contribute to habitat loss and degradation.

### *Fire*

Fire, or its absence, is understood to be a major ecological driver of grasslands in the Southern Great Plains (Anderson 2006, entire; Koerner and Collins 2014, entire; Wright and Bailey 1982, pp. 80–137). Fire is an ecological process important to maintaining grasslands by itself and in coupled interaction with grazing and climate. The interaction of these ecological processes results in increasing grassland heterogeneity through the creation of temporal and spatial diversity in plant community composition and structure and associated response of wildlife (Fuhlendorf and Engle 2001, entire; Fuhlendorf and Engle 2004, entire; Fuhlendorf et al. 2017a, pp. 169–196).

Following settlement of the Great Plains, fire management generally emphasized prevention and suppression, often coupled with grazing pressures that significantly reduced and removed fine fuels (Sayre 2017, pp. 61–70). This approach, occurring in concert with settlement and ownership patterns that occurred in most of the Southern

Great Plains, meant that the scale of management was relegated to smaller parcels than historically were affected. This increase in smaller parcels with both intensive grazing and fire suppression resulted in the transformation of landscapes from dynamic heterogeneous to largely static and homogenous plant communities. This simplification of vegetative pattern due to decoupling fire and grazing (Starns et al. 2019, pp. 1–3) changed the number and size of wildfires and ultimately led to declines in biodiversity in the affected systems (Fuhlendorf and Engle 2001, entire).

Changes in patterns of wildfire in the Great Plains have been noted in recent years (Donovan et al. 2017, entire). While these landscapes have a long history of wildfire, large wildfires (greater than 1,000 ac (400 ha)) typically did not occur in recent past decades, and include an increase in the Southern Great Plains of megafires (greater than 100,000 ac (404 km<sup>2</sup>; 40,468 ha)) since the mid-1990s (Lindley et al. 2019, p. 164). Changes have occurred throughout all or portions of the Great Plains in number of large wildfires and season of fire occurrence, as well as increased area burned by wildfire or increasing probability of large wildfires (Donovan et al. 2017, p. 5990). Furthermore, Great Plains land cover dominated by woody or woody/grassland combined vegetation is disproportionately more likely to experience large wildfires, with the greatest increase in both number of fires and of area burned (Donovan et al. 2020a, p. 11). Fire behavior has also been affected such that these increasingly large wildfires are burning under weather conditions (Lindley et al. 2019, entire) that result in greater burned extent and intensity. These shifts in fire parameters and their outcomes have potential consequences for lesser prairie-chicken, including: (1) larger areas of complete loss of nesting habitat as compared to formerly patchy mosaicked burns; and (2) large-scale reduction in the spatial

and temporal variation in vegetation structure and composition affecting nesting and brood-rearing habitat, thermoregulatory cover, and predator escape cover.

Effects from fire are expected to be relatively short term (Donovan et al. 2020b, entire, Starns et al. 2020, entire), with plant community recovery time largely predictable and influenced by pre-fire condition, post-fire weather, and types of management. Some effects from fire, however, such as the response to changing plant communities in the range of the lesser prairie-chicken, will vary based on location within the range and available precipitation. In the eastern extent of the distribution of sand shinnery oak that occurs in the Mixed-Grass Ecoregion, fire has potential negative effects on some aspects of the lesser prairie-chicken habitat for 2 years after the area burns, but these effects could be longer in duration dependent upon precipitation patterns (Boyd and Bidwell 2001, pp. 945–946). Effects from fire on lesser prairie-chicken varied based on fire break preparation, season of burn, and type of habitat; positive effects included improved brood habitat through increased forb and grasshopper abundance, but these can be countered by short-term (2-year) negative effects to quality and availability of nesting habitat and a reduction in food sources (Boyd and Bidwell 2001, pp. 945–946). Birds moved into recently burned landscapes of western Oklahoma for lek courtship displays because of the reduction in structure from formerly dense vegetation (Cannon and Knopf 1979, entire).

More recently, research evaluating indirect effects concluded that prescribed fire and managed grazing following the patch-burn or pyric herbivory (grazing practices shaped fire) approach will benefit lesser prairie-chicken through increases in forbs; invertebrates; and the quality, amount, and juxtaposition of brood habitat to available

nesting habitat (Elmore et al. 2017, entire). The importance of temporal and spatial heterogeneity derived from pyric herbivory is apparent in the female lesser prairie-chicken use of all patch types in the patch-burn grazing mosaic, including greater than 2 years post fire for nesting, 2-year post fire during spring lekking, 1- and 2-year post fire during summer brooding, and 1-year post fire during nonbreeding season (Lautenbach 2017, pp. 20–22). While the use of prescribed fire as a tool for managing grasslands throughout the lesser prairie-chicken range is encouraged, current use is at a temporal frequency and spatial extent insufficient to support large amounts of lesser prairie-chicken habitat. These fire management efforts are limited to a small number of fire-minded landowners, resulting in effects to a small percentage of the lesser prairie-chicken range.

While lesser prairie-chicken evolved in a fire-adapted landscape, little research (Thacker and Twidwell 2014, entire) has been conducted on response of lesser prairie-chicken to altered fire regimes. Research to date has focused on site-specific responses and consequences. Human suppression of wildfire and the limited extent of fire use (prescribed fire) for management over the past century has altered the frequency, scale, and intensity of fire occurrence in lesser prairie-chicken habitat. These changes in fire parameters have happened simultaneously with habitat loss and fragmentation, resulting in patchy distribution of lesser prairie-chicken throughout their range. An increase in size, intensity, or severity of wildfires as compared to historical occurrences results in increased vulnerability of isolated, smaller lesser prairie-chicken populations. Both woody plant encroachment and drought are additive factors that increase risk of negative consequences of wildfire ignition, as well as extended post-fire lesser prairie-chicken

habitat effects. The extent of these negative impacts can be significantly altered by precipitation patterns following the occurrence of the fire; dry periods will inhibit or extend plant community response.

Historically, fire served an important role in maintenance and quality of habitat for the lesser prairie-chicken. Currently, due to a significant shift in fire regimes in the lesser prairie-chicken range, fire use for management of grasslands plays a locally important but overall limited role in most lesser prairie-chicken habitat. This current lack of prescribed fire use in the range of the lesser prairie-chicken is contributing to woody plant encroachment and degradation of grassland quality due to its decoupling from the grazing and fire interaction that is the foundation for plant community diversity in structure and composition, which in turn supports the diverse habitat needs of lesser prairie-chicken. These cascading effects contribute to greater wildfire risk, and concerns exist regarding the changing patterns of wildfires (scale, intensity, and frequency) and their consequences for remaining lesser prairie-chicken populations and habitat that are increasingly fragmented. Concurrently, wildfire has increased as a threat rangewide due to compounding influences of increased size and severity of wildfires and the potential consequences to remaining isolated and fragmented lesser prairie-chicken populations.

#### *Extreme Weather Events*

Weather-related events such as drought, snow, and hailstorms can influence habitat quality or result in direct mortality of lesser prairie-chickens. Although hailstorms typically have only a localized effect, the effects of snowstorms and drought can often be more widespread and can affect considerable portions of the lesser prairie-chicken range. Drought is considered a universal ecological driver across the Great Plains (Knopf 1996,

p. 147). Annual precipitation within the Great Plains is highly variable (Wiens 1974, p. 391), with prolonged drought capable of causing local extinctions of annual forbs and grasses within stands of perennial species; recolonization is often slow (Tilman and El Haddi 1992, p. 263). Grassland bird species in particular are impacted by climate extremes such as extended drought, which acts as a bottleneck that allows only a limited number of individuals to survive through the relatively harsh conditions (Wiens 1974, pp. 388, 397; Zimmerman 1992, p. 92). Drought also interacts with many of the other threats impacting the lesser prairie-chicken and its habitat, such as amplifying the effects of incompatible grazing and predation.

Although the lesser prairie-chicken has adapted to drought as a component of its environment, drought and the accompanying harsh, fluctuating conditions (high temperatures and low food and cover availability) have influenced lesser prairie-chicken populations. Widespread periods of drought commonly result in “bust years” of recruitment. Following extreme droughts of the 1930s, 1950s, 1970s, and 1990s, lesser prairie-chicken population levels declined and a decrease in their overall range was observed (Lee 1950, p. 475; Ligon 1953, p. 1; Schwilling 1955, pp. 5–6; Hamerstrom and Hamerstrom 1961, p. 289; Copelin 1963, p. 49; Crawford 1980, pp. 2–5; Massey 2001, pp. 5, 12; Hagen and Giesen 2005, unpaginated). Additionally, lesser prairie-chicken populations reached near record lows during and after the more recent drought of 2011 to 2013 (McDonald et al. 2017, p. 12; Fritts et al. 2018, entire).

Drought impacts prairie grouse, such as lesser prairie-chicken, through several mechanisms. Drought affects seasonal growth of vegetation necessary to provide suitable nesting and roosting cover, food, and opportunity for escape from predators (Copelin

1963, pp. 37, 42; Merchant 1982, pp. 19, 25, 51; Applegate and Riley 1998, p. 15; Peterson and Silvy 1994, p. 228; Morrow et al. 1996, pp. 596–597; Ross et al. 2016a, entire). Lesser prairie-chicken home ranges will temporarily expand during drought years (Copelin 1963, p. 37; Merchant 1982, p. 39) to compensate for scarcity in available resources. During these periods, the adult birds expend more energy searching for food and tend to move into areas with limited cover in order to forage, leaving them more vulnerable to predation and heat stress (Merchant 1982, pp. 34–35; Flanders-Wanner et al. 2004, p. 31). Chick survival and recruitment may also be depressed by drought (Merchant 1982, pp. 43–48; Morrow et al. 1996, p. 597; Giesen 1998, p. 11; Massey 2001, p. 12), which likely affects population trends more than annual changes in adult survival (Hagen 2003, pp. 176–177). Drought-induced mechanisms affecting recruitment include decreased physiological condition of breeding females (Merchant 1982, p. 45); heat stress and water loss of chicks (Merchant 1982, p. 46); and effects to hatch success and juvenile survival due to changes in microclimate, temperature, and humidity (Patten et al. 2005, pp. 1274–1275; Bell 2005, pp. 20–21; Boal et al. 2010, p. 11). Precipitation, or lack thereof, appears to affect lesser prairie-chicken adult population trends with a potential lag effect (Giesen 2000, p. 145; Ross et al. 2016a, pp. 6–8). That is, rain levels in one year promote more vegetative cover for eggs and chicks in the following year, which influences survival and reproduction.

Although lesser prairie-chicken have persisted through droughts in the past, the effects of such droughts are exacerbated by human land use practices such as incompatible grazing and land cultivation (Merchant 1982, p. 51; Hamerstrom and Hamerstrom 1961, pp. 288–289; Davis et al. 1979, p. 122; Taylor and Guthery 1980a, p.

2; Ross et al. 2016b, pp. 183–186) as well as the other threats that have affected the current condition and have altered and fragmented the landscape and decreased population abundances (Fuhlendorf et al. 2002, p. 617; Rodgers 2016, pp. 15–19). In past decades, fragmentation of lesser prairie-chicken habitat was less extensive than it is today, connectivity between occupied areas was more prevalent, and populations were larger, allowing populations to recover more quickly. In other words, lesser prairie-chicken populations were more resilient to the effects of stochastic events such as drought. As lesser prairie-chicken population abundances decline and usable habitat declines and becomes more fragmented, their ability to rebound from prolonged drought is diminished.

Hailstorms can cause mortality of prairie grouse, particularly during the spring nesting season. An excerpt from the May 1879 Stockton News describes a large hailstorm near Kirwin, Kansas, as responsible for killing prairie-chickens (likely greater prairie-chicken) and other birds by the hundreds (Flehart 1995, p. 241). Although such phenomena are likely rare, the effects can be significant, particularly if they occur during the nesting period and result in significant loss of eggs or chicks. Severe winter storms can also result in localized impacts to lesser prairie-chicken populations. For example, a severe winter storm in 2006 was reported to reduce lesser prairie-chicken numbers in Colorado by 75 percent from 2006 to 2007, from 296 birds observed to only 74. Active leks also declined from 34 leks in 2006 to 18 leks in 2007 (Verquer 2007, p. 2). While populations commonly rebound to some degree following severe weather events such as drought and winter storms, a population with decreased resiliency becomes susceptible to extirpation from stochastic events.

We are not able to quantify the impact that severe weather has had on the lesser prairie-chicken populations, but, as discussed above, these events have shaped recent history and influenced the current condition for the lesser prairie-chicken.

#### Regulatory Mechanisms

In appendix D of the SSA report (Service 2022), we review in more detail all of the existing regulatory mechanisms (such as local, State, and Federal land use regulations or laws) that may impact lesser prairie-chicken conservation. Here, we present a summary of some of those regulatory mechanisms. All existing regulatory mechanisms listed in appendix D of the SSA report were fully considered in our conclusion about the status of the two DPSs.

All five States in the estimated occupied range (EOR) (Van Pelt et al. 2013, p. 3) have incorporated the lesser prairie-chicken as a species of conservation concern and management priority in their respective State Wildlife Action Plans. While identification of the lesser prairie-chicken as a species of conservation concern helps heighten public awareness, this designation provides no protection from direct take or habitat destruction or alteration. The lesser prairie-chicken is listed as threatened in Colorado; this listing protects the lesser prairie-chicken from direct purposeful mortality by humans but does not provide protections for destruction or alteration of habitat.

Primary land ownership (approximately 5 percent of total range) at the Federal level is on USFS and BLM lands. The lesser prairie-chicken is present on the Cimarron National Grassland in Kansas and the Comanche National Grassland in Colorado; a total of approximately 3 percent of the total acres estimated in the SSA analysis area is on USFS land. The 2014 Lesser Prairie-Chicken Management Plan for these grasslands

provides a framework to manage lesser prairie-chicken habitat. The plan provides separate population and habitat recovery goals for each grassland, as well as vegetation surveys to inform ongoing and future monitoring efforts of suitable habitat and lek activities. Because National Grasslands are managed for multiple uses, the plan includes guidelines for prescribed fire and grazing.

In New Mexico, roughly 41 percent of the known historical and most of the estimated occupied lesser prairie-chicken range occurs on BLM land, for a total of 3 percent of the total acres estimated in the analysis area of the SSA report. The BLM established the 57,522-ac (23,278-ha) Lesser Prairie-Chicken Habitat Preservation Area of Critical Environmental Concern (ACEC) upon completion of the Resource Management Plan Amendment (RMPA) in 2008. The management goal for the ACEC is to protect the biological qualities of the area, with emphasis on the preservation of the shinnery oak-dune community to enhance the biodiversity of the ecosystem, particularly habitats for the lesser prairie-chicken and the dunes sagebrush lizard. Upon designation, the ACEC was closed to future oil and gas leasing, and existing leases would be developed in accordance with prescriptions applicable to the Core Management Area as described below (BLM 2008, p. 30). Additional management prescriptions for the ACEC include designation as a right-of-way exclusion area, vegetation management to meet the stated management goal of the area, and limiting the area to existing roads and trails for off-highway vehicle use (BLM 2008, p. 31). All acres of the ACEC have been closed to grazing through relinquishment of the permits except for one 3,442-ac (1,393-ha) allotment.

The BLM's approved RMPA (BLM 2008, pp. 5–31) provides some limited protections for the lesser prairie-chicken in New Mexico by reducing the number of drilling locations, decreasing the size of well pads, reducing the number and length of roads, reducing the number of power lines and pipelines, and implementing best management practices for development and reclamation. The effect of these best management practices on the status of the lesser prairie-chicken is unknown, particularly considering about 82,000 ac (33,184 ha) have already been leased in those areas (BLM 2008, p. 8). Although the BLM RMPA is an important tool for identifying conservation actions that would benefit lesser prairie-chicken, this program does not alleviate all threats acting on the species in this area.

No new mineral leases will be issued on approximately 32 percent of Federal mineral acreage within the RMPA planning area (BLM 2008, p. 8), although some exceptions are allowed on a case-by-case basis (BLM 2008, pp. 9–11). Within the Core Management Area and Primary Population Area, as delineated in the RMPA, new leases will be restricted in occupied and suitable habitat; however, if there is an overall increase in reclaimed to disturbed acres over a 5-year period, new leases in these areas will be allowed (BLM 2008, p. 11). In the southernmost habitat management units outlined in the RMPA, where lesser prairie-chickens are now far less common than in previous decades (Hunt and Best 2004), new leases will not be allowed within 1.5 mi (2.4 km) of a lek (BLM 2008, p. 11).

We conclude that existing regulatory mechanisms have minimal influence on the rangewide trends of lesser prairie-chicken habitat loss and fragmentation because 97 percent of the lesser prairie-chicken analysis area occurs on private lands, which are

largely unregulated for the protection of the species and its habitat. The activities affecting lesser prairie-chicken habitat are largely land use practices and land development without regulations ameliorating the primary threats to the lesser prairie-chicken.

#### Conservation Efforts

Below we include a summary of conservation efforts; for a complete description of these conservation efforts please see the SSA report (Service 2022, pp. 49–62). All of the conservation measures discussed in the SSA report were incorporated into the analysis of the species' current and future condition. Some programs are implemented across the species' range, and others are implemented at the State or local level. Because the vast majority of lesser prairie-chicken and their habitat occurs on private lands, most of these programs are targeted toward voluntary, incentive-based actions in cooperation with private landowners.

At the rangewide scale, plans include the Lesser Prairie-Chicken Rangewide Conservation Plan, the Lesser Prairie-Chicken Initiative, and the Conservation Reserve Program. Below is a summary of the primary rangewide conservation efforts. For detailed descriptions of each program, please see the SSA report. All existing ongoing conservation efforts were fully considered in our determination on the status of the two DPSs.

In 2013, the State fish and wildlife agencies within the range of the lesser prairie-chicken and the Western Association of Fish and Wildlife Agencies (WAFWA) finalized the Lesser Prairie-Chicken Range-wide Conservation Plan (RWP) in response to concerns about threats to lesser prairie-chicken habitat and resulting effects to lesser

prairie-chicken populations (Van Pelt et al. 2013, entire). The RWP established biological goals and objectives as well as a conservation targeting strategy that aims to unify conservation efforts towards common goals. Additionally, the RWP established a mitigation framework administered by WAFWA that allows industry participants the opportunity to mitigate unavoidable impacts of a particular activity on the lesser prairie-chicken. After approval of the RWP, WAFWA developed a companion oil and gas candidate conservation agreement with assurances (CCAA), which adopted the mitigation framework contained within the RWP that was approved in 2014.

As of August 1, 2020, WAFWA had used incoming funds from industry participants to place 22 sites totaling 128,230 unimpacted ac (51,893 ha) under conservation contracts to provide offset for industry impacts that have occurred through the RWP and CCAA (Moore 2020, p. 9). Of those sites, 35,635 unimpacted ac (14,421 ha) are permanently protected and 92,595 unimpacted ac (37,472 ha) are being managed under 10-year term agreements. Landowners who enroll agree to implement actions to restore or enhance their lands for the lesser prairie-chicken. These actions may include restoration actions (such as removal of woody vegetation) or enhancement actions (such as implementation of a grazing management plan designed for their property). These areas are enrolled under RWP conservation contracts that will provide mitigation for 1,538 projects, which impacted 48,743 ac (19,726 ha) (WAFWA 2020, table 32, unpaginated). When enrolling a property, industry participants agree to minimize impacts from projects to lesser prairie-chicken habitat and mitigate for all remaining impacts on the enrolled property.

At the end of 2021 in the CCAA, there were 111 active contracts (Certificates of Inclusion) with 6,226,140 ac (2,519,629 ha) enrolled (WAFWA 2022, p. 4), and in the WAFWA Conservation Agreement there were 52 active WAFWA Conservation Agreement contracts (Certificates of Participation) with 599,626 ac (242,660 ha) enrolled (WAFWA 2020, table 5 unpaginated) by industry participants. These acres of industry enrollment are areas where industry participants have agreed to implement minimization measures and to pay mitigation fees to offset the remaining impacts. A recent audit of the mitigation program associated with the RWP and CCAA identified several key issues to be resolved within the program to ensure financial stability and effective conservation outcomes (Moore 2020, appendix E). WAFWA has hired a consultant who is currently working with stakeholders, including the Service, to consider available options to address the identified issues to ensure long-term durability of the strategy.

In 2010, the USDA's Natural Resources Conservation Service (NRCS) began implementation of the Lesser Prairie-Chicken Initiative (LPCI). The LPCI provides conservation assistance, both technical and financial, to landowners throughout the LPCI's administrative boundary (NRCS 2017, p. 1). The LPCI focuses on maintenance and enhancement of lesser prairie-chicken habitat while benefiting agricultural producers by maintaining the farming and ranching operations throughout the region. In 2019, after annual declines in landowner interest in LPCI, the NRCS made changes in how LPCI will be implemented moving forward and initiated conferencing under section 7 of the Act with the Service. Prior to 2019, participating landowners had to address all threats to the lesser prairie-chicken present on their property. In the future, each conservation plan developed under LPCI will only need to include one or more of the core management

practices that include prescribed grazing, prescribed burning, brush management, and upland wildlife habitat management. Additional management practices may be incorporated into each conservation plan, as needed, to facilitate meeting the desired objectives. These practices are applied or maintained annually for the life of the practice, typically 1 to 15 years, to treat or manage habitat for lesser prairie-chicken. From 2010 through 2019, NRCS worked with 883 private agricultural producers to implement conservation practices on 1.6 million ac (647,497 ha) of working lands within the historical range of the lesser prairie-chicken (NRCS 2020, p. 2). During that time, through LPCI, NRCS implemented prescribed grazing plans on 680,800 ac (275,500 ha) across the range (Griffiths 2020, pers. comm.). Through LPCI, NRCS has also removed over 41,000 ac (16,600 ha) of eastern red cedar in the Mixed-Grass Ecoregion and chemically treated approximately 106,000 ac (43,000 ha) of mesquite in the Shinnery Oak Ecoregion. Lastly, NRCS has conducted prescribed burns on approximately 15,000 ac (6,000 ha) during this time.

The Conservation Reserve Program (CRP) is administered by the USDA's Farm Service Agency and provides short-term protection and conservation benefits on millions of acres within the range of the lesser prairie-chicken. The CRP is a voluntary program that allows eligible landowners to receive annual rental payments and cost-share assistance in exchange for removing cropland and certain marginal pastureland from agricultural production. CRP contract terms are for 10 to 15 years. The total amount of land that can be enrolled in the CRP is capped nationally by the Food Security Act of 1985, as amended (the 2018 Farm Bill) at 27 million ac (10.93 million ha). All five States within the range of the lesser prairie-chicken have lands enrolled in the CRP. The 2018

Farm Bill maintains the acreage limitation that not more than 25 percent of the cropland in any county can be enrolled in CRP, with specific conditions under which a waiver to this restriction can be provided for lands enrolled under the Conservation Reserve Enhancement Program (84 FR 66813, December 6, 2019). Over time, CRP enrollment fluctuates both nationally and locally. Within the counties that intersect the Estimated Occupied Range plus a 10-mile buffer (EOR+10), acres enrolled in CRP have declined annually since 2007 (with the exception of one minor increase from 2010 to 2011) from nearly 6 million ac (2.4 million ha) enrolled to current enrollment levels of approximately 4.25 million ac (1.7 million ha) (FSA 2020a, unpublished data). The EOR+10 is a 10-mile buffer of the EOR often referenced in lesser prairie-chicken planning efforts but also contains significant areas that do not support the biotic and abiotic characteristics required by the lesser prairie-chicken. More specific to our analysis area, current acreage of CRP enrollment is approximately 1,822,000 ac (737,000 ha) within our analysis area. Of those currently enrolled acres there are approximately 120,000 ac (49,000 ha) of introduced grasses and legumes dispersed primarily within the Mixed-Grass and Shinnery Oak Ecoregions (FSA 2020b, unpublished data).

At the State level, programs provide direct technical and financial cost-share assistance to private landowners interested in voluntarily implementing conservation management practices to benefit species of greatest conservation need—including the lesser prairie-chicken. Additionally, a variety of State-level conservation efforts acquire and manage lands or incentivize management by private landowners for the benefit of the lesser prairie-chicken. Below is a summary for each State within the range of the lesser

prairie-chicken. For a complete description of each, see the SSA report. All conservation measures discussed in the SSA report were fully considered in this final rule.

Within the State of Kansas, conservation efforts are administered by the Kansas Department of Wildlife and Parks (KDWP), The Nature Conservancy, and the Service's Partners for Fish and Wildlife Program (PFW). KDWP has targeted lesser prairie-chicken habitat improvements on private lands by leveraging landowner cost-share contributions, industry and nongovernmental organizations' cash contributions, and agency funds toward several federally funded grant programs. The KDWP has implemented conservation measures over 22,000 ac (8,900 ha) through the Landowner Incentive Program, over 18,000 ac (7,285 ha) through the State Wildlife Grant Private Landowner Program, 30,000 ac (12,140 ha) through the Wildlife Habitat Incentives Program, and 12,000 ac (4,855 ha) through the Habitat First Program within the range of the lesser prairie-chicken. Additionally, KDWP was provided an opportunity through contributions from the Comanche Pool Prairie Resource Foundation to leverage additional Wildlife and Sport Fish Restoration funds in 2016 to direct implementation of 19,655 ac (7,954 ha). The Nature Conservancy in Kansas manages the 18,060-ac (7,309-ha) Smoky Valley Ranch. The Nature Conservancy also serves as the easement holder for nearly 34,000 ac (13,760 ha) of properties that are enrolled under the RWP. The Nature Conservancy is also working to use funds from an NRCS Regional Conservation Partnership Program that have resulted in nearly 50,000 ac (20,235 ha) on three ranches either with secured or in-process conservation easements. These easements would restrict future development and would ensure management is compatible for the conservation of the lesser prairie-chicken. Our PFW program has executed 95 private lands agreements with improvements

on about 173,000 ac (70,011 ha) of private lands benefitting conservation of the lesser prairie-chicken in Kansas. The primary activities being implemented on these acres include: efforts to control and eradicate invasive, woody plant species such as eastern red cedar; grazing management; and enhanced use of prescribed fire to improve habitat conditions in native grasslands.

In 2009, Colorado Parks and Wildlife (CPW) initiated its Lesser Prairie-Chicken Habitat Improvement Program that provides cost-sharing to private landowners who participate in practices such as deferred grazing around active leks, enhancement of fields enrolled in CRP and cropland-to-grassland habitat conversion. Since program inception, CPW has completed 37,051 ac (14,994 ha) of habitat treatments. The Nature Conservancy holds permanent conservation easements on multiple ranches that make up the Big Sandy complex. Totaling approximately 48,940 ac (19,805 ha), this complex is managed with lesser prairie-chicken as a conservation objective and perpetually protects intact sand sagebrush and short-grass prairie communities. The USFS currently manages the Comanche Lesser Prairie-Chicken Habitat Zoological Area, as part of the Comanche and Cimarron National Grasslands, which encompass an area of 10,177 ac (4,118 ha) in Colorado that is managed to benefit the lesser prairie-chicken (USFS 2014, p. 9). In 2016, CPW and KDWP partnered with Kansas State University and USFS to initiate a 3-year translocation project to restore lesser prairie-chicken to the Comanche National Grasslands (Colorado) and Cimarron National Grasslands (Kansas). Beginning in the fall of 2016 and concluding with the 2019 spring lekking season, the partnership trapped and translocated 411 lesser prairie-chickens from the Short-Grass/CRP Ecoregion in Kansas to the Sand Sagebrush Ecoregion. During April and May 2020 lek counts, Colorado and

Kansas biologists and technicians found 115 male birds on 20 active leks in the landscape around the Comanche and Cimarron National Grasslands (Rossi 2020, pers. comm.). During lek counts in 2021, 65 males on 15 leks were documented in the release area (CPW 2021).

In 2013, the FWS issued the Oklahoma Department of Wildlife Conservation (ODWC) a 25-year enhancement of survival permit pursuant to section 10(a)(1)(A) of the Act that included an umbrella CCAA between the Service and ODWC for the lesser prairie-chicken in 14 Oklahoma counties (78 FR 14111, March 4, 2013). As of 2019, there were 84 participants with a total of 399,225 ac (161,561 ha) enrolled in the ODWC CCAA, with 357,654 ac (144,737) enrolled as conservation acres (ODWC 2020). The difference between total acres enrolled and conservation acres enrolled is because, while a landowner may enroll their entire property, not all of those acres provide habitat for the lesser prairie-chicken. Landowners who agree to enroll in the CCAA agree to implement measures, primarily prescribed grazing, to enhance or restore habitat for the lesser prairie-chicken. The ODWC owns six wildlife management areas totaling approximately 75,000 ac (30,351 ha) in the range of the lesser prairie-chicken, though only a portion of each wildlife management area can be considered as conservation acres for lesser prairie-chicken because not all acres of the wildlife management areas are habitat for the species. Our PFW program has funded a shared position with ODWC for 6 years to conduct CCAA monitoring and, in addition, has provided funding for on-the-ground work in the lesser prairie-chicken range. Since 2017, the Oklahoma PFW program has implemented 51 private lands agreements on about 10,603 ac (4,291 ha) for the benefit of the lesser prairie-chicken in Oklahoma. On these acres conservation measures may include control

of eastern red cedar, native grass planting, and fence marking and removal to minimize collision mortality. The Nature Conservancy of Oklahoma manages the 4,050-ac (1,640-ha) Four Canyon Preserve in Ellis County for ecological health to benefit numerous short-grass prairie species, including the lesser prairie-chicken. In 2017, The Nature Conservancy acquired a conservation easement on 1,784 ac (722 ha) in Woods County which restricts future development and ensures sustainable management is occurring. The Conservancy is seeking to permanently protect additional acreage in the region through the acquisition of additional conservation easements.

Texas Parks and Wildlife Department (TPWD) worked with the Service and landowners to develop the first State-wide umbrella CCAA for the lesser prairie-chicken in Texas, which was finalized in 2006. The Texas CCAA covers 50 counties, largely encompassing the Texas Panhandle and South Plains. Total landowner participation by the close of January 2020 was 91 properties totaling approximately 657,038 ac (265,894 ha) enrolled in 15 counties (TPWD 2020, entire). On these acres conservation measures would generally consist of prescribed grazing; prescribed burning; brush management; cropland and residue management; range seeding and enrollment in various other Federal or State programs to provide financial assistance to implement these measures. Our PFW program and the TPWD have actively collaborated on range management programs designed to provide cost-sharing for implementation of habitat improvements for lesser prairie-chicken. In the past the Service provided funding to TPWD to support a Landscape Conservation Coordinator position for the Panhandle and Southern High Plains region, as well as funding to support Landowner Incentive Program projects targeting lesser prairie-chicken habitat improvements (brush control and grazing

management) in this region. More than \$200,000 of Service funds were committed in 2010, and an additional \$100,000 was committed in 2011.

Since 2008, Texas has used these and other funds to address lesser prairie-chicken conservation on 14,068 ac (5,693 ha) under the Landowner Incentive Program. Typical conservation measures include native plant restoration, control of exotic or invasive vegetation, prescribed burning, selective brush management, and prescribed grazing. The PFW program in Texas has executed 66 private lands agreements on about 131,190 ac (53,091 ha) of privately owned lands for the benefit of the lesser prairie-chicken in Texas. The Nature Conservancy of Texas acquired approximately 10,635 ac (4,303 ha) in Cochran, Terry, and Yoakum Counties. In 2014, The Nature Conservancy donated this land to TPWD. The TPWD acquired an additional 3,402 ac (1,377 ha) contiguous to the Yoakum Dunes Preserve creating the 14,037-ac (5,681-ha) Yoakum Dunes Wildlife Management Area. In 2015, through the RWP process, WAFWA acquired an additional 1,604 ac (649 ha) in Cochran County, nearly 3 mi (5 km) west of the Yoakum Dunes Wildlife Management Area. The land was deeded to TPWD soon after acquisition. In 2016, an additional 320 ac (129 ha) was purchased by TPWD bordering the WAFWA-acquired tract creating an additional 1,924-ac (779-ha) property that is being managed (including prescribed grazing and invasive species control) as part of the Yoakum Dunes Wildlife Management Area, now at 15,961 ac (6,459 ha).

The BLM's Special Status Species RMPA, which was approved in April 2008, addressed the concerns and future management of lesser prairie-chicken and dunes sagebrush lizard habitats on BLM lands and established the Lesser Prairie-Chicken Habitat Preservation Area of Critical Environmental Concern (BLM 2008, entire). Since

the RMPA was approved in 2008, BLM has closed approximately 300,000 ac (121,000 ha) to future oil and gas leasing and closed approximately 850,000 ac (344,000 ha) to wind and solar development (BLM 2008, p. 3). From 2008 to 2020, they have reclaimed 3,500 ac (1,416 ha) of abandoned well pads and associated roads and required burial of power lines within 2 mi (3.2 km) of lesser prairie-chicken leks. Additionally, BLM has implemented control efforts for mesquite on 832,104 ac (336,740 ha) and has plans to do so on an additional 30,000 ac (12,141 ha) annually. In 2010, BLM acquired 7,440 ac (3,010 ha) of land east of Roswell, New Mexico, to complete the 54,000-ac (21,853-ha) ACEC for lesser prairie-chicken, which is managed to protect key habitat.

Following approval of the RMPA, a candidate conservation agreement (CCA) and CCAA was drafted by a team including the Service, BLM, Center of Excellence for Hazardous Material Management (CEHMM), and participating cooperators to address the conservation needs of the lesser prairie-chicken and the dunes sagebrush lizard. Since the CCA and CCAA were finalized in 2008, 43 oil and gas companies have enrolled a total of 1,964,163 ac (794,868 ha) in the historical range of the lesser prairie-chicken. By enrolling these lands, industry participants have agreed to implement conservation measures aimed to minimize impacts of their development activities to the lesser prairie-chicken and pay fees to offset the remaining impacts. In addition, 72 ranchers in New Mexico and the New Mexico Department of Game and Fish have enrolled a total of 2,055,461 ac (831,815 ha). The New Mexico State Land Office has enrolled a total of 406,673 ac (164,575 ha) in the historical range of the lesser prairie-chicken. By enrolling, the Department of Game and Fish, State Land Office, and landowners agree to follow grazing management standards established in the agreement, limiting development

actions where the landowner has discretion, limit herbicide use, and other actions as identified in the agreement. The CCA and CCAA have treated 79,297 ac (32,090 ha) of mesquite and reclaimed 154 abandoned well pads and associated roads. CEHMM has also removed 7,564 ac (3,061 ha) of dead, standing mesquite, and has another 12,000 ac (5,000 ha) scheduled in the upcoming 2 years.

The Nature Conservancy owns and manages the 28,000-ac (11,331-ha) Milnesand Prairie Preserve near Milnesand, New Mexico. Additionally, the New Mexico Department of Game and Fish (NMDGF) has designated 30 Prairie Chicken Areas (PCAs) specifically for management of the lesser prairie-chicken ranging in size from 28 to 7,189 ac (11 to 2,909 ha) and totaling more than 27,262 ac (11,033 ha). More recently, NMDGF purchased an additional 7,417-ac (3,000-ha) property that connects two of the previously owned PCAs that will create a 9,817-ac (4,000-ha) contiguous property. In 2007, the State Game Commission used New Mexico State Land Conservation Appropriation funding to acquire 5,285 ac (2,137 ha) of private ranchland in Roosevelt County. Our PFW program in New Mexico has contributed financial and technical assistance for restoration and enhancement activities benefitting the lesser prairie-chicken in New Mexico. In 2016, the PFW program executed a private land agreement on 630 ac (255 ha) for treating invasive species with a prescribed burn. In 2020 the PFW program executed a private land agreement for a prescribed burn on 155 ac (63 ha).

## Conditions and Trends

### *Rangewide Trends*

The lesser prairie-chicken estimated historical range encompasses an area of approximately 115 million ac (47 million ha). As discussed in **Background**, not all of the

area within this historical range was evenly occupied by lesser prairie-chicken, and some of the area may not have been suitable to regularly support lesser prairie-chicken populations (Boal and Haukos 2016, p. 6). However, the current range of the lesser prairie-chicken has been significantly reduced from the historical range, and estimates of the reduction vary from greater than 90 percent (Hagen and Giesen 2005, unpaginated) to approximately 83 percent (Van Pelt et al. 2013, p. 3).

We estimated the current amount and configuration of potential lesser prairie-chicken usable area within the analysis area using the geospatial analysis described in the SSA report (Service 2022, section 3.2; appendix B, parts 1, 2, and 3) and considering existing impacts as described above. The total area of all potential usable (land cover that may be consistent with lesser prairie-chicken areas that have the potential to support lesser prairie-chicken use) and potential usable, unimpacted land cover (that is, not impacted by landscape features) categories in each ecoregion and rangewide is shown below in table 1.

To assess lesser prairie-chicken habitat at a larger scale and incorporate some measure of connectivity and fragmentation, we then grouped the areas of potential usable, unimpacted land cover based on the proximity of other areas with potential usable, unimpacted lesser prairie-chicken land cover. To do this, we used a “nearest neighbor” geospatial process to determine how much potential usable land cover is within 1 mi (1.6 km) of any area of potential usable land cover. This nearest neighbor analysis gives an estimate of how closely potential usable, unimpacted land cover is clustered together, versus spread apart, from other potential usable, unimpacted land cover. Areas with at least 60 percent potential usable, unimpacted land cover within 1 mi (1.6 km) were

grouped. The 60 percent threshold was chosen because maintaining grassland in large blocks is vital to conservation of the species (Ross et al. 2016a, entire; Hagen and Elmore 2016, entire; Spencer et al. 2017, entire; Sullins et al. 2019, entire), and these studies indicate that landscapes consisting of greater than 60 percent grassland are required to support lesser prairie-chicken populations. This approach eliminates small, isolated, and fragmented patches of otherwise potential usable land cover that are not likely to support persistent populations of the lesser prairie-chicken. A separate analysis found that the areas with 60 percent or greater unimpacted potential usable land cover within 1 mi (1.6 km) captured approximately 90 percent of known leks (Service 2022, appendix B, part 3).

TABLE 1—RESULTS OF LESSER PRAIRIE-CHICKEN GEOSPATIAL ANALYSIS BY ECOREGION AND RANGEWIDE, ESTIMATING TOTAL AREA IN ACRES, POTENTIAL USABLE AREA, AND AREA CALCULATED BY OUR NEAREST NEIGHBOR ANALYSIS  
 [ALL NUMBERS ARE IN ACRES. NUMBERS MAY NOT SUM DUE TO ROUNDING.]

| <b>Ecoregion</b>                         | <b>Ecoregion Total Area</b> | <b>Potential Usable Area</b> | <b>Nearest Neighbor Analysis</b> | <b>% of Total Area</b> |
|--|-----------------------------|------------------------------|----------------------------------|------------------------|
| Short-Grass/CRP                          | 6,298,014                   | 2,961,318                    | 1,023,894                        | 16.3%                  |
| Mixed-Grass                              | 8,527,718                   | 6,335,451                    | 994,483                          | 11.7%                  |
| Sand Sagebrush                           | 3,153,420                   | 1,815,435                    | 1,028,523                        | 32.6%                  |
| <b>Northern DPS total</b>                | <b>17,979,152</b>           | <b>11,112,204</b>            | <b>3,046,900</b>                 | <b>16.9%</b>           |
| <b>Shinnery Oak (Southern DPS total)</b> | <b>3,850,209</b>            | <b>2,626,305</b>             | <b>1,023,572</b>                 | <b>26.6%</b>           |
| <b>Rangewide Totals</b>                  | <b>21,829,361</b>           | <b>13,738,509</b>            | <b>4,070,472</b>                 | <b>18.6%</b>           |

The results of the nearest neighbor analysis indicate that about 19 percent of the entire analysis area and from 12 percent to 33 percent within each of the four ecoregions is available for use by the lesser prairie-chicken. Due to limitations in data availability and accuracy as well as numerous limitations with the methodology and assumptions made for this analysis, this estimate should not be viewed as a precise measure of the lesser prairie-chicken habitat; instead, it provides a generalized baseline to characterize the current condition and by which we can then forecast the effect of future changes.

In the SSA report, we also considered trends in populations. Estimates of population abundance prior to the 1960s are indeterminable and rely almost entirely on anecdotal information (Boal and Haukos 2016, p. 6). While little is known about precise historical population sizes, the lesser prairie-chicken was reported to be quite common throughout its range in the early 20<sup>th</sup> century (Bent 1932, pp. 280–281, 283; Baker 1953, p. 8; Bailey and Niedrach 1965, p. 51; Sands 1968, p. 454; Fleharty 1995, pp. 38–44;

Robb and Schroeder 2005, p. 13). In the 1960s, State fish and wildlife agencies began routine lesser prairie-chicken monitoring efforts that have largely continued to today.

In the SSA report and this final rule, we discuss lesser prairie-chicken population estimates from two studies. The first study calculated historical trends in lesser prairie-chicken abundances from 1965 through 2016 based on population reconstruction methods and historical lek surveys (Hagen et al. 2017, pp. 6–9). The results of these estimates indicate that lesser prairie-chicken rangewide abundance (based on a minimum estimated number of male lesser prairie-chicken) peaked from 1965–1970 at a mean estimate of about 175,000 males. The mean population estimates maintained levels of greater than 100,000 males until 1989, after which they steadily declined to a low of 25,000 males in 1997 (Garton et al. 2016, p. 68). The mean population estimates following 1997 peaked again at about 92,000 males in 2006 but subsequently declined to 34,440 males in 2012. This 2006 peak was far below the 1965–1970 estimated peak, demonstrating that the species did not achieve its prior peak population level. We identified concerns in the past with some of the methodologies and assumptions made in this analysis, and the challenges of these data are noted in other studies (for example, Zavaleta and Haukos 2013, p. 545; Cummings et al. 2017, pp. 29–30). While these concerns remain, including the very low sample sizes particularly in the 1960s, this work represents the only attempt to compile the extensive historical ground lek count data collected by State agencies to estimate rangewide population sizes. Approximate distribution of lek locations as reported by WAFWA for the entire range that were observed occupied by lesser prairie-chicken at least once between 2015 and 2019 are shown in the SSA report (Service 2022, appendix E, figure E.7).

Following development of aerial survey methods (McRoberts et al. 2011, entire), more statistically rigorous estimates of lesser prairie-chicken abundance (both males and females) have been conducted by flying aerial line-transect surveys throughout the range of the lesser prairie-chicken and extrapolating densities from the surveyed area to the rest of the range beginning in 2012 (Nasman et al. 2022, entire). The aerial survey results from 2012 through 2022 estimated the lesser prairie-chicken population abundance, averaged over the most recent 5 years of surveys (2017–2022, no surveys in 2019), at 32,210 (90 percent CI: 11,489, 64,303) (Nasman et al. 2022, p. 16; table 10). The results of these survey efforts should not be taken as precise estimates of the annual lesser prairie-chicken population abundance, as indicated by the large confidence intervals. Thus, the best use of this data is for long-term trend analysis rather than for conclusions based on annual fluctuations. As such, we report the population estimate for the current condition as the average of the past 5 years of surveys.

TABLE 2—RANGEWIDE AND ECOREGIONAL ESTIMATED LESSER PRAIRIE-CHICKEN TOTAL POPULATION SIZES AVERAGED FROM 2017 TO 2022, LOWER AND UPPER 90 PERCENT CONFIDENCE INTERVALS (CI) OVER THE 5 YEARS OF ESTIMATES, AND PERCENT OF RANGEWIDE TOTALS FOR EACH ECOREGION (FROM NASMAN ET AL. 2022, P. 16). NO SURVEYS WERE CONDUCTED IN 2019.

| <b>Ecoregion</b>        | <b>5-year Average Estimate</b> | <b>5-year Minimum Lower CI</b> | <b>5-year Maximum Upper CI</b> | <b>Percent of Total</b> |
|-------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------|
| <b>Short-Grass/CRP</b>  | <b>23,083</b>                  | 9,653                          | 39,934                         | <b>72%</b>              |
| <b>Mixed-Grass</b>      | <b>5,024</b>                   | 1,601                          | 10,481                         | <b>15%</b>              |
| <b>Sand Sagebrush</b>   | <b>1,297</b>                   | 56                             | 4,881                          | <b>4%</b>               |
| <b>Shinnery Oak</b>     | <b>2,806</b>                   | 179                            | 9,007                          | <b>9%</b>               |
| <b>Rangewide Totals</b> | <b>32,210</b>                  | 11,489                         | 64,303                         | <b>100%</b>             |

We now discuss habitat impacts and population trends in each ecoregion and DPS throughout the range of the lesser prairie-chicken.

*Southern DPS*

Using our geospatial analysis, we were able to explicitly account for habitat loss and fragmentation and quantify the current condition of the Shinnery Oak Ecoregion. Of the sources of habitat loss and fragmentation that have occurred, cropland conversion, roads, and encroachment of woody vegetation had the largest impacts on land cover in the Southern DPS (Table 3). Based on our nearest neighbor analysis, we estimated there are approximately 1,023,572 ac (414,225 ha) or 27 percent of the ecoregion and the Southern DPS potentially available for use by lesser prairie-chicken (table 1).

TABLE 3—ESTIMATED AREAS OF CURRENT DIRECT AND INDIRECT IMPACTS, BY IMPACT SOURCE, AND THE PROPORTION OF THE TOTAL AREA OF THE SHINNERY OAK ECOREGION ESTIMATED TO BE IMPACTED (SEE TABLE 1 FOR TOTALS).

[IMPACTS ARE NOT NECESSARILY CUMULATIVE BECAUSE OF OVERLAP OF SOME IMPACTED AREAS BY MORE THAN ONE IMPACT SOURCE.]

| <b>Shinnery Oak Ecoregion (Southern DPS)</b> |                  |                             |
|--|------------------|-----------------------------|
| <b>Impact Sources</b>                        | <b>Acres</b>     | <b>Percent of Ecoregion</b> |
| Cropland Conversion                          | 540,120          | 14%                         |
| Petroleum Production                         | 161,652          | 4%                          |
| Wind Energy Development                      | 90,869           | 2%                          |
| Transmission Lines                           | 372,577          | 10%                         |
| Woody Vegetation Encroachment                | 617,885          | 16%                         |
| Roads  | 742,060          | 19%                         |
| <b>Total Ecoregion/Southern DPS Area</b>     | <b>3,850,209</b> |                             |

Based on population reconstruction methods, the mean population estimate ranged between about 5,000 to 12,000 males through 1980, increased to 20,000 males in the mid-1980s and declined to ~1,000 males in 1997 (Hagen et al. 2017, pp. 6–9). The mean population estimate peaked again to ~15,000 males in 2006 and then declined again to fewer than 3,000 males in the mid-2010s.

Aerial surveys have been conducted to estimate lesser prairie-chicken population abundance since 2012, and results in the Shinnery Oak Ecoregion from 2012 through

2022 indicate that this ecoregion has the third highest population size (Nasman et al. 2022, p. 16) of the four ecoregions. Average estimates from 2017 to 2022 are 2,806 birds (90 percent CI: 179, 9,007), representing about 9 percent of the rangewide total (table 2). Recent estimates have varied between fewer than 1,000 birds in 2015 to more than 5,000 birds in 2020 and decreasing to fewer than 1,000 birds again in 2022 (see also Service 2022, appendix E, figure E.7).

#### *Northern DPS*

Prairies of the Short-Grass/CRP Ecoregion have been significantly altered since European settlement of the Great Plains. Much of these prairies has been converted to other land uses such as cultivated agriculture, roads, power lines, petroleum production, wind energy, and transmission lines. Some areas have also been altered due to woody vegetation encroachment. Within this ecoregion, it has been estimated that about 73 percent of the landscape has been converted to cropland with 7 percent of the area in CRP (Dahlgren et al. 2016, p. 262). According to our GIS analysis, of the sources of habitat loss and fragmentation that have occurred, conversion to cropland has had the single largest impact on land cover in this ecoregion (table 4). Based on our nearest neighbor analysis, we estimated approximately 1,023,894 ac (414,355 ha), or 16 percent of the ecoregion, is potentially available for use by lesser prairie-chicken (table 1).

TABLE 4—ESTIMATED AREAS OF CURRENT DIRECT AND INDIRECT IMPACTS, BY IMPACT SOURCE, AND THE PROPORTION OF THE TOTAL AREA OF THE SHORT-GRASS/CRP ECOREGION ESTIMATED TO BE IMPACTED (SEE TABLE 1 FOR TOTALS).

[IMPACTS ARE NOT NECESSARILY CUMULATIVE BECAUSE OF OVERLAP OF SOME IMPACTED AREAS BY MORE THAN ONE IMPACT SOURCE.]

| <b>Short-Grass/CRP Ecoregion</b> |                  |                             |
|----------------------------------|------------------|-----------------------------|
| <b>Impact Sources</b>            | <b>Acres</b>     | <b>Percent of Ecoregion</b> |
| Cropland Conversion              | 2,333,660        | 37%                         |
| Petroleum Production             | 248,146          | 4%                          |
| Wind Energy Development          | 145,963          | 2%                          |
| Transmission Lines               | 436,650          | 7%                          |
| Woody Vegetation Encroachment    | 284,175          | 5%                          |
| Roads                            | 1,075,931        | 17%                         |
| <b>Total Ecoregion Area</b>      | <b>6,298,014</b> |                             |

Based on population reconstruction methods, the mean population estimate for this ecoregion increased from a minimum of about 14,000 males in 2001 and peaked at about 21,000 males in 2011 (Hagen et al. 2017, pp. 8–10; see also Service 2022, figure 3.3).

Aerial surveys since 2012 indicate that the Short-Grass/CRP Ecoregion (figure 3.4) has the largest population size (Nasman et al. 2022, p. 16) of the four ecoregions. Average estimates from 2017 to 2022 are 23,083 birds (90 percent CI: 9,653, 39,934), making up about 72 percent of the rangewide lesser prairie-chicken total (table 2).

Much of the Mixed-Grass Ecoregion was originally fragmented by homesteading, which subdivided tracts of land into small parcels of 160–320 ac (65–130 ha) in size (Rodgers 2016, p. 17). As a result of these small parcels, road and fence densities are higher compared to other ecoregions and, therefore, increase habitat fragmentation and pose higher risk for collision mortalities than in other ecoregions (Wolfe et al. 2016, p. 302). Fragmentation has also occurred due to oil and gas development, wind energy

development, transmission lines, highways, and expansion of invasive woody plants such as eastern red cedar. A major concern for lesser prairie-chicken populations in this ecoregion is the loss of grassland due to the rapid westward expansion of the eastern red-cedar (NRCS 2016, p. 16). Oklahoma Forestry Services estimated the average rate of expansion of eastern red-cedar in 2002 to be 762 ac (308 ha) per day (Wolfe et al. 2016, p. 302).

TABLE 5—ESTIMATED AREAS OF CURRENT DIRECT AND INDIRECT IMPACTS, BY IMPACT SOURCE, AND THE PROPORTION (PERCENT) OF THE TOTAL AREA OF THE MIXED-GRASS ECOREGION ESTIMATED TO BE IMPACTED (SEE TABLE 1 FOR TOTALS).  
[IMPACTS ARE NOT NECESSARILY CUMULATIVE BECAUSE OF OVERLAP OF SOME IMPACTED AREAS BY MORE THAN ONE IMPACT SOURCE.]

| <b>Mixed-Grass Ecoregion</b>  |                  |                             |
|-------------------------------|------------------|-----------------------------|
| <b>Impact Sources</b>         | <b>Acres</b>     | <b>Percent of Ecoregion</b> |
| Cropland Conversion           | 1,094,688        | 13%                         |
| Petroleum Production          | 859,929          | 10%                         |
| Wind Energy Development       | 191,571          | 2%                          |
| Transmission Lines            | 576,713          | 7%                          |
| Woody Vegetation Encroachment | 2,047,510        | 24%                         |
| Roads                         | 1,732,050        | 20%                         |
| <b>Total Ecoregion Area</b>   | <b>8,527,718</b> |                             |

Using our geospatial analysis, we were able to explicitly account for habitat loss and fragmentation and quantify the current condition of this ecoregion for the lesser prairie-chicken. Of the sources of habitat loss and fragmentation that have occurred, encroachment of woody vegetation had the largest impact, with conversion to cropland, roads, and petroleum production also having significant impacts on land cover in this ecoregion (table 5). Based on our nearest neighbor analysis, we estimated there are approximately 994,483 ac (402,453 ha) or 12 percent of the ecoregion, that is potentially available for use by lesser prairie-chicken (table 1).

The Mixed-Grass Ecoregion historically contained the highest lesser prairie-chicken densities (Wolfe et al. 2016, p. 299). Based on population reconstruction methods, the mean population estimate for this ecoregion in the 1970s and 1980s was around 30,000 males (Hagen et al. 2017, pp. 6–7). Population estimates declined in the 1990s and peaked again in the early 2000s at around 25,000 males, before declining and remaining at its lowest levels, fewer than 10,000 males in 2012, since the late 2000s (Hagen et al. 2017, pp. 6–7).

Aerial surveys from 2012 through 2022 indicate this ecoregion has the second highest population size of the four ecoregions (Nasman et al. 2022, p. 16). Average estimates from 2017 to 2022 are 5,024 birds (90 percent CI: 1,601, 10,481), representing about 15 percent of the rangewide total (table 2). Results show minimal variation in recent years.

Prairies of the Sand Sagebrush Ecoregion have been influenced by a variety of activities since European settlement of the Great Plains. Much of these grasslands have been converted to other land uses such as cultivated agriculture, roads, power lines, petroleum production, wind energy, and transmission lines. Some areas have also been altered due to woody vegetation encroachment. Only 26 percent of historical sand sagebrush prairie is available as potential nesting habitat for lesser prairie-chicken (Haukos et al. 2016, p. 285). Using our geospatial analysis, we were able to explicitly account for habitat loss and fragmentation and quantify the current condition of this ecoregion for the lesser prairie-chicken. Of the sources of habitat loss and fragmentation that have occurred, conversion to cropland has had the single largest impact on land cover in this ecoregion (table 6). Based on our nearest neighbor analysis, we estimated

there are approximately 1,028,523 ac (416,228 ha) or 33 percent of the ecoregion, potentially available for use by lesser prairie-chicken (table 1). In addition, habitat loss due to the degradation of the rangeland within this ecoregion continues to be a limiting factor for lesser prairie-chicken, and most of the existing birds within this ecoregion persist primarily on and near CRP lands. Drought conditions in the period 2011–2014 have expedited population decline (Haukos et al. 2016, p. 285).

TABLE 6—ESTIMATED AREAS OF CURRENT DIRECT AND INDIRECT IMPACTS, BY IMPACT SOURCE, AND THE PROPORTION (PERCENT) OF THE TOTAL AREA OF THE SAND SAGEBRUSH ECOREGION ESTIMATED TO BE IMPACTED (SEE TABLE 1 FOR TOTALS).

[IMPACTS ARE NOT NECESSARILY CUMULATIVE BECAUSE OF OVERLAP OF SOME IMPACTED AREAS BY MORE THAN ONE IMPACT SOURCE.]

| <b>Sand Sagebrush Ecoregion</b> |                  |                             |
|---------------------------------|------------------|-----------------------------|
| <b>Impact Sources</b>           | <b>Acres</b>     | <b>Percent of Ecoregion</b> |
| Cropland Conversion             | 994,733          | 32%                         |
| Petroleum Production            | 163,704          | 5%                          |
| Wind Energy Development         | 0                | 0%                          |
| Transmission Lines              | 167,240          | 5%                          |
| Woody Vegetation Encroachment   | 68,147           | 2%                          |
| Roads                           | 446,316          | 14%                         |
| <b>Total Ecoregion Area</b>     | <b>3,153,420</b> |                             |

Based on population reconstruction methods, the mean population estimate for this ecoregion peaked at greater than 90,000 males from 1970 to 1975 and declined to its lowest level of fewer than 1,000 males in recent years.

Aerial surveys from 2012 through 2022 indicate that this ecoregion has the lowest population size (Nasman et al. 2022, p. 16) of the four ecoregions. Average estimates from 2017 to 2022 are 1,297 birds (90 percent CI: 56, 4,881) representing about 4 percent of the rangewide lesser prairie-chicken total (table 2). Recent results have been highly variable, with 2020 being the lowest estimate reported. Although the aerial survey results show 171 birds in this ecoregion in 2020 (with no confidence intervals because the

number of detections were too low for statistical analysis), ground surveys in this ecoregion in Colorado and Kansas detected 406 birds, so we know the current population is actually larger than indicated by the aerial survey results (Rossi and Fricke, pers. comm. 2020, entire). Aerial surveys for 2021 estimated 440 birds (90 percent CI: 55, 963) for this ecoregion (Nasman et al. 2022, p. 16).

Table 7 combines the estimated area impacted presented above for each of the three ecoregions into one estimate for each impact source for the Northern DPS.

TABLE 7—ESTIMATED AREAS OF CURRENT DIRECT AND INDIRECT IMPACTS, BY IMPACT SOURCE, AND THE PROPORTION (PERCENT) OF THE TOTAL AREA OF THE NORTHERN DPS ESTIMATED TO BE IMPACTED (SEE TABLE 1 FOR TOTALS).

[IMPACTS ARE NOT NECESSARILY CUMULATIVE BECAUSE OF OVERLAP OF SOME IMPACTED AREAS BY MORE THAN ONE IMPACT SOURCE.]

| <b>Northern DPS</b>            |                   |                       |
|--------------------------------|-------------------|-----------------------|
| <b>Impact Sources</b>          | <b>Acres</b>      | <b>Percent of DPS</b> |
| Cropland Conversion            | 4,423,081         | 25%                   |
| Petroleum Production           | 1,271,779         | 7%                    |
| Wind Energy Development        | 337,534           | 2%                    |
| Transmission Lines             | 1,180,603         | 7%                    |
| Woody Vegetation Encroachment  | 2,399,832         | 13%                   |
| Roads                          | 3,254,297         | 18%                   |
| <b>Total Northern DPS Area</b> | <b>17,979,152</b> |                       |

*Future Condition*

As discussed above, we conducted a geospatial analysis to characterize the current condition of the landscape for the lesser prairie-chicken by categorizing land cover data (into potential usable, potential restoration, or nonusable categories), taking into account exclusion areas and impacts to remove nonusable areas. We further refined the analysis to account for connectivity by use of our nearest neighbor analysis as described in *Rangewide Trends*. We then used this geospatial framework to analyze the future

condition for each ecoregion. To analyze future habitat changes, we accounted for the effects of both future loss of usable areas and restoration efforts by estimating the rate of change based on future projections (Service 2022, figure 4.1).

Due to uncertainties associated with both future conservation efforts and impacts, it is not possible to precisely quantify the effect of these future actions on the landscape. Instead, we established five future scenarios to represent a range of plausible outcomes based upon three plausible levels of conservation (restoration efforts) and three plausible levels of impacts. To account for some of the uncertainty in these projections, we combined the levels of impacts into five different scenarios labeled 1 through 5 (table 8). Scenario 1 represents the scenario with low levels of future impacts and high levels of future restoration, and Scenario 5 represents the scenario with high impacts and low restoration. Scenarios 1 and 5 were used to frame the range of projected outcomes used in our model as they represent the low and high of likely projected outcomes. Scenarios 2, 3, and 4 are model iterations that fall within the range bounded by scenarios 1 and 5 and have continuation of the current level of restoration efforts and vary impacts at low, mid, and high levels, respectively. These scenarios provide a wide range of potential future outcomes to consider in assessing lesser prairie-chicken habitat conditions.

TABLE 8—SCHEMATIC OF FUTURE SCENARIOS FOR LESSER PRAIRIE-CHICKEN CONSERVATION CONSIDERING A RANGE OF FUTURE IMPACTS AND RESTORATION EFFORTS.

| Scenario | Levels of Future Change in Usable Area |         |
|----------|--|---------|
|          | Restoration                            | Impacts |
| 1        | High                                   | Low     |
| 2        | Continuation                           | Low     |
| 3        | Continuation                           | Mid     |
| 4        | Continuation                           | High    |
| 5        | Low                                    | High    |

To project the likely future effects of impacts and conservation efforts to the landscape as described through our land cover model, we quantified the three levels of future habitat restoration and three levels of future impacts within the analysis area by ecoregion on an annual basis. In addition to restoration efforts, we also quantified those efforts that enhance existing habitat. While these enhancement efforts do not increase the amount of available area and thus are not included in the spatial analysis, they are summarized in the SSA report and considered as part of the overall analysis of the biological status of the species. We then extrapolated those results over the next 25 years. We chose 25 years as a period for which we had reasonable confidence in reliably projecting these future changes, and the timeframe corresponds with some of the long-term planning for the lesser prairie-chicken. A complete description of methodology used to quantify projections of impacts and future conservation efforts is provided in the SSA report (Service 2022, appendix C).

Quantifying future conservation efforts in terms of habitat restoration allows us to account for the positive impact of those efforts within our analysis by converting areas of land cover that were identified as potential habitat in our current condition model to usable land cover for the lesser prairie-chicken in the future projections. Explicitly quantifying three levels of impacts in the future allows us to account for the effect of these impacts on the lesser prairie-chicken by converting areas identified as usable land cover in our current condition model to nonusable area that will not be available for use by the lesser prairie-chicken in the future.

As we did for the current condition to assess habitat connectivity, after we characterized the projected effects of conservation and impacts on potential future usable

areas, we grouped the areas of potential usable, unimpacted land cover on these new future landscape projections using our nearest neighbor analysis (Service 2022, pp. 21–23; appendix B, parts 1, 2, and 3). Also, as done for the current condition, we evaluated the frequency of usable area blocks by size in order to evaluate habitat fragmentation and connectivity in the future scenarios (Service 2022, figure 4.2).

#### Threats Influencing Future Condition

Following are summary evaluations of the expected future condition of threats analyzed in the SSA for the lesser prairie-chicken: effects associated with habitat degradation, loss, and fragmentation, including conversion of grassland to cropland (Factor A), petroleum production (Factor A), wind energy development and transmission (Factor A), woody vegetation encroachment (Factor A), and roads and electrical distribution lines (Factor A); and other factors, such as livestock grazing (Factor A), shrub control and eradication (Factor A), fire (Factor A); and climate change (Factor E).

In this final rule, we do not present summary evaluations of the following threats as we have no information to project future trends, though we do expect them to have some effect on the species in the future: predation (Factor C), collision mortality from fences (Factor E), and influence of anthropogenic noise (Factor E). We also do not discuss the following threats, as they are having little to no impact on the species and its habitat currently, nor do we expect them to into the foreseeable future: hunting and other recreational, educational, and scientific use (Factor B); parasites and diseases (Factor C); and insecticides (Factor E).

For the purposes of this assessment, we consider the foreseeable future to be the amount of time on which we can reasonably determine a likely threat's anticipated

trajectory and the anticipated response of the species to that threat. For climate change, the time for which we can reliably project threats and the anticipated response is approximately 60 years. For many other threats impacting the lesser prairie-chicken throughout its range, we consider the time for which we can reliably project threats and the anticipated response to be 25 years. This time period represents our best professional judgment of the foreseeable future conditions related to conversion of grassland to cropland, petroleum production, wind energy, and woody vegetation encroachment, and, as discussed above, is the time period used to project these threats in our geospatial analysis. For this period, we had reasonable confidence in projecting these future changes, and the timeframe corresponds with some of the long-term planning for the lesser prairie-chicken. For other threats and the anticipated species response, we can reliably project impacts and the species response for less than 25 years, such as livestock grazing, roads and electrical distribution lines, shrub control and eradication, and fire.

#### Habitat Loss and Fragmentation

As discussed in “Threats Influencing Current Condition,” habitat loss and fragmentation is the primary concern for lesser prairie-chicken viability. We discuss how each of these activities may contribute to future habitat loss and fragmentation for the lesser prairie-chicken and present the outcomes of the projections.

##### *Conversion of Grassland to Cropland*

Because much of the lands capable of being used for row crops has already been converted to cultivated agriculture, we do not expect future rates of conversion to reach those witnessed historically; however, conversion has continued to occur (Lark 2020, entire). Rates of future conversion of grasslands to cultivated agriculture in the analysis

area will be affected by multiple variables including site-specific biotic and abiotic conditions as well as socioeconomic influences such as governmental agriculture programs, commodity prices, and the economic benefits of alternative land use practices.

For the purposes of the SSA, we conducted an analysis to project the future rates of conversion of grassland to cropland at three different levels. We used information from aggregated remote sensing data from the USDA Cropland Data layer (Lark 2020, entire; Service 2022, p. 83). Table 9 outlines the resulting three levels of projected habitat loss of future conversion of grassland to cultivated agriculture per ecoregion over the next 25 years. See the SSA report (Service 2022, appendix C) for further details and methodologies for these projections. While we do not expect future rates of conversion (from grassland to cropland) to be equivalent to those we have historically witnessed, the limited amount of large intact grasslands due to the historical extent of conversion means all future impacts are expected to have a disproportionate scale of impact.

TABLE 9—FUTURE PROJECTION OF THREE LEVELS OF IMPACTED ACRES OF POTENTIAL USABLE AREA FOR THE LESSER PRAIRIE-CHICKEN FROM CONVERSION OF GRASSLAND TO CROPLAND OVER THE NEXT 25 YEARS IN EACH ECOREGION.

[NUMBERS MAY NOT SUM DUE TO ROUNDING.]

| Ecoregion                          | Projected Impacts (acres) |                |                |
|------------------------------------|---------------------------|----------------|----------------|
|                                    | Low                       | Intermediate   | High           |
| Short-Grass/CRP                    | 89,675                    | 145,940        | 185,418        |
| Mixed-Grass                        | 4,220                     | 33,761         | 50,910         |
| Sand Sagebrush                     | 42,573                    | 95,678         | 142,438        |
| <b>Northern DPS totals</b>         | <b>136,468</b>            | <b>275,379</b> | <b>378,766</b> |
| <b>Shinnery Oak (Southern DPS)</b> | <b>21,985</b>             | <b>51,410</b>  | <b>93,946</b>  |
| <b>Rangewide Total</b>             | <b>158,454</b>            | <b>326,789</b> | <b>472,712</b> |

*Petroleum Production*

In the SSA report, we conducted an analysis to project the future rates of petroleum production at low, intermediate, and high levels. We compiled State well permitting spatial data from each State within each of the ecoregions to inform assumptions around future rates of development (Service 2022, p. 84). We converted the projected number of new wells at the three levels to acres of usable area impacted. Our analysis accounts for indirect impacts as well as potential overlap with other existing impacts to include colocation efforts by developers. Table 10 represents the extent of potential usable area impacted at the three levels of development per ecoregion over the next 25 years. See the SSA report (Service 2022, appendix C) for further details and methodologies regarding these projections.

Given current trends in energy production, we anticipate that oil and gas production across the lesser prairie-chicken range will continue to occur and that rates will vary both temporally and spatially. The rates of development will be dependent upon new exploration, advancements in technology, and socioeconomic dynamics that will influence energy markets in the future.

TABLE 10—FUTURE PROJECTION OF THREE LEVELS OF IMPACTED ACRES (INCLUDING BOTH DIRECT AND INDIRECT EFFECTS) OF POTENTIAL USABLE AREA FOR THE LESSER PRAIRIE-CHICKEN FROM OIL AND GAS DEVELOPMENT OVER THE NEXT 25 YEARS IN EACH ECOREGION.

[NUMBERS MAY NOT SUM DUE TO ROUNDING.]

| Ecoregion                          | Projected Impacts (acres) |                |                |
|------------------------------------|---------------------------|----------------|----------------|
|                                    | Low                       | Intermediate   | High           |
| Short-Grass/CRP                    | 26,848                    | 54,618         | 82,388         |
| Mixed-Grass                        | 82,716                    | 170,989        | 259,262        |
| Sand Sagebrush                     | 3,166                     | 9,054          | 14,942         |
| <b>Northern DPS totals</b>         | <b>112,730</b>            | <b>234,661</b> | <b>356,592</b> |
| <b>Shinnery Oak (Southern DPS)</b> | <b>136,539</b>            | <b>190,144</b> | <b>243,749</b> |
| <b>Rangewide Total</b>             | <b>249,269</b>            | <b>424,805</b> | <b>600,342</b> |

*Wind Energy Development and Transmission Lines*

As discussed in “Threats Influencing Current Condition,” the States in the lesser prairie-chicken analysis area have experienced some of the largest growth in wind energy development in the nation. Identification of the actual number of proposed wind energy projects that will be built within the range of the lesser prairie-chicken in any future timeframe is difficult to accurately discern. We conducted an analysis of current and potential future wind energy development for the SSA for the Lesser Prairie-Chicken, and the future development was estimated at three different levels within the analysis area of the lesser prairie-chicken at low, intermediate, and high levels (Service 2022, appendix C). Table 11 represents the wind development projects projected at three levels of development per ecoregion.

TABLE 11—PROJECTIONS OF FUTURE WIND ENERGY DEVELOPMENT PROJECTS FOR THE NEXT 25 YEARS AT THREE LEVELS IN EACH LESSER PRAIRIE-CHICKEN ECOREGION AND RANGEWIDE

| Ecoregion                          | Projected Wind Developments |              |           |
|------------------------------------|-----------------------------|--------------|-----------|
|                                    | Low                         | Intermediate | High      |
| Short-Grass/CRP                    | 7                           | 11           | 16        |
| Mixed-Grass                        | 10                          | 18           | 25        |
| Sand Sagebrush                     | 1                           | 2            | 3         |
| <b>Northern DPS totals</b>         | <b>18</b>                   | <b>31</b>    | <b>44</b> |
| <b>Shinnery Oak (Southern DPS)</b> | <b>4</b>                    | <b>7</b>     | <b>10</b> |
| <b>Rangewide Total</b>             | <b>22</b>                   | <b>38</b>    | <b>54</b> |

As outlined within “Threats Influencing Current Condition,” wind energy development also has indirect impacts on the lesser prairie-chicken. To determine the number of acres impacted by wind energy development in the current condition, we analyzed wind energy facilities recently constructed within and near our analysis area. We applied a 5,900-ft (1,800-m) impact radius to individual turbines to account for

indirect impacts and found that the last 5 years show a substantial increase in the relative density of wind energy projects (see Service 2022, appendix C, for further details). This analysis does not mean that all of the impacts occur to otherwise usable lesser prairie-chicken land cover. In fact, it is highly unlikely due to viable wind development potential outside lesser prairie-chicken usable areas that all projected impacts will occur in areas that are otherwise usable for the lesser prairie-chicken. Because we cannot predict the precise location of future developments and to simplify and facilitate modeling the locations for future projections for wind development, we created a potential wind energy development grid that was laid over the analysis area and which allowed the random placement for each development for each iteration (Service 2022, p. 86). The resulting projected impacts in 25 years using the median iteration for each of the range of future scenarios are shown in table 12. Scenarios 1 and 5 were used to frame the scenarios used in our model as they represent the low and high of likely projected outcomes. The rangewide projections range from 164,100 ac (66,400 ha) to 328,000 ac (133,000 ha).

TABLE 12—RANGE OF PROJECTIONS OF FUTURE WIND ENERGY DEVELOPMENT IMPACTS (INCLUDING BOTH DIRECT AND INDIRECT EFFECTS) IN ACRES FOR THE NEXT 25 YEARS FOR SCENARIOS 1 AND 5 OF EACH LESSER PRAIRIE-CHICKEN ECOREGION AND RANGEWIDE

| Ecoregion                          | Projected Wind Development Impacts (acres) |                |
|------------------------------------|--|----------------|
|                                    | Scenario 1                                 | Scenario 5     |
| Short-Grass/CRP                    | 68,300                                     | 134,200        |
| Mixed-Grass                        | 50,200                                     | 106,000        |
| Sand Sagebrush                     | 3,900                                      | 21,300         |
| <b>Northern DPS totals</b>         | <b>122,400</b>                             | <b>261,500</b> |
| <b>Shinnery Oak (Southern DPS)</b> | <b>41,700</b>                              | <b>66,500</b>  |
| <b>Rangewide Total</b>             | <b>164,100</b>                             | <b>328,000</b> |

Electrical transmission capacity represents a major limitation on wind energy development in the Great Plains. Additional transmission lines will be required to

transport future electricity production to markets; thus, we expect an expansion of the current transmission capacity in the Great Plains. As this expansion occurs, these transmission lines will, depending on their location, result in habitat loss as well as further fragmentation and could also be the catalyst for additional wind development affecting the lesser prairie-chicken. While we were able to analyze the current impacts of transmission lines on the lesser prairie-chicken, due to the lack of information available to project the location (and thus effects to lesser prairie-chicken habitat), we could not quantify the future potential effect of habitat loss and fragmentation on the lesser prairie-chicken that could be caused by transmission line development. However, we do acknowledge potential habitat loss and fragmentation from transmission lines is likely to continue depending upon their location.

#### *Woody Vegetation Encroachment*

Due to the past encroachment trends and continued suppression of fire across the range of the lesser prairie-chicken, we expect this encroachment of woody vegetation into grasslands to continue, which will result in further loss of lesser prairie-chicken habitat into the foreseeable future. The degree of future habitat impacts will depend on land management practices and the level of conservation efforts for woody vegetation removal.

To describe the potential future effects of encroachment of woody vegetation, we used available information regarding rates of increases in eastern red cedar and mesquite encroachment and applied this rate of change (over the next 25 years) to the amount of existing woody vegetation per ecoregion within the analysis area (appendix C). The estimated current condition analysis described in “Threats Influencing Current

Condition” provides the baseline of woody vegetation encroachment, and rates derived from the literature were applied to this baseline to project new acres of encroachment. We then adjusted the projected number of new acres of encroachment using relative density calculations specific to each ecoregion to account for indirect effects. Additionally, due to assumed differences in encroachment rates and tree densities we provide two projections for each of the Short-Grass/CRP and Mixed-Grass Ecoregions (East and West portions) in the Northern DPS, largely based on current tree distribution and precipitation gradient. We projected the extent of expected habitat loss due to encroachment of woody vegetation at low, intermediate, and high levels of encroachment (see the SSA report (Service 2022, appendix C) for rationale behind assumed rates of change). Table 13 outlines the three levels of this projected habitat loss by ecoregion caused by future encroachment of woody vegetation over the next 25 years for the purpose of the SSA report.

TABLE 13—PROJECTION OF IMPACTS FROM WOODY VEGETATION ENCROACHMENT (INCLUDING BOTH DIRECT AND INDIRECT EFFECTS) AT THREE LEVELS AT YEAR 25 IN THE LESSER PRAIRIE-CHICKEN ECOREGIONS  
[NUMBERS MAY NOT SUM DUE TO ROUNDING.]

| Ecoregion                          | Projected Impacts (acres) |                |                  |
|------------------------------------|---------------------------|----------------|------------------|
|                                    | Low                       | Intermediate   | High             |
| Short-Grass/CRP – East             | 38,830                    | 64,489         | 93,877           |
| Short-Grass/CRP – West             | 1,390                     | 3,598          | 5,963            |
| Mixed-Grass – East                 | 311,768                   | 517,784        | 753,739          |
| Mixed-Grass – West                 | 874                       | 2,261          | 3,748            |
| Sand Sagebrush                     | 7,650                     | 12,706         | 18,496           |
| <b>Northern DPS totals</b>         | <b>360,512</b>            | <b>600,838</b> | <b>875,823</b>   |
| <b>Shinnery Oak (Southern DPS)</b> | <b>11,548</b>             | <b>81,660</b>  | <b>170,653</b>   |
| <b>Rangewide Total</b>             | <b>372,060</b>            | <b>682,498</b> | <b>1,046,476</b> |

*Roads and Electrical Distribution Lines*

Roads and electrical distribution lines are another important source of habitat loss and fragmentation. In our geospatial analysis for the current condition of the lesser prairie-chicken, we were able to quantify the area affected by roads, but no data were available to quantify the potential independent impacts of distribution lines on habitat loss and fragmentation. We acknowledge that some additional habitat loss and fragmentation will occur in the future due to construction of new roads and power lines, but we do not have data available to inform projections on how much and where any potential new development would occur.

### Climate Change

Future climate projections for this region of the United States indicate general trends of increasing temperatures and increasing precipitation extremes over the 21<sup>st</sup> century (Karl et al. 2009, pp. 123–128; Kunkel et al. 2013, pp. 73–75; Shafer et al. 2014, pp. 442–445; Easterling et al. 2017, pp. 216–222; Vose et al. 2017, pp. 194–199). Average temperature has already increased between the first half of the last century (1901–1960) and present day (1986–2016), with observed regional average temperatures within the Southern Great Plains (including Kansas, Oklahoma, and Texas) increasing by 0.8 °F (0.4 °C) and within the Southwest (including Colorado and New Mexico) increasing by 1.6 °F (0.9 °C) (Vose et al. 2017, p. 187). By mid-century (2036–2065), regional average temperatures compared to near-present times (1976–2005) are projected to increase by 3.6–4.6 °F (2.0–2.6 °C) in the Southern Great Plains, and by 3.7–4.8 °F (2.1–2.7 °C) in the Southwest, depending on future emissions. By late-century (2071–2100), regional average temperatures are projected to rise in the Southern Great Plains by 4.8–8.4 °F (2.7–4.7 °C), and by 4.9–8.7 °F (2.7–4.8 °C) in the Southwest (Vose et al.

2017, p. 197). Annual extreme temperatures are also consistently projected to rise faster than annual averages with future changes in very rare extremes increasing; by late century, current 1-in-20-year maximums are projected to occur every year, while current 1-in-20-year minimums are not expected to occur at all (Vose et al. 2017, pp. 197–198).

Projecting patterns of changes in average precipitation across these regions of the United States results in a range of increasing and decreasing precipitation with high uncertainty in overall averages, although parts of the Southwest are projected to receive less precipitation in the winter and spring (Easterling et al. 2017, pp. 216–218; Wuebbles et al. 2017, p. 12). However, extreme precipitation events are projected to increase in frequency in both the Southern Great Plains and the Southwest (Easterling et al. 2017, pp. 218–221). Other extreme weather events such as heat waves and long-duration droughts (Cook et al. 2016, entire), as well as heavy precipitation, are expected to become more frequent (Karl et al. 2009, pp. 124–125; Shafer et al. 2014, p. 445; Walsh et al. 2014, pp. 28–40). The devastating “dust bowl” conditions of the 1930s could become more common in the American Southwest, with future droughts being much more extreme than most droughts on record (Seager et al. 2007, pp. 1181, 1183–1184). Other modeling also projects changes in precipitation in North America through the end of this century, including an increase in dry conditions throughout the Central Great Plains (Swain and Hayhoe 2015, entire). Furthermore, the combination of increasing temperature and drought results in greater impacts on various ecological conditions (water availability, soil moisture) than increases in temperature or drought alone (Luo et al. 2017, entire). Additionally, future decreases in surface (top 4 inches (10 centimeters)) soil moisture

over most of the United States are likely as the climate warms under higher scenarios (Wehner et al. 2017, p. 231).

Grasslands are critically endangered globally and an irreplaceable ecoregion in North America, and climate change is an emerging threat to grassland birds (Wilsey et al. 2019). In a review of potential effects of ongoing climate change on the Southern Great Plains and on the lesser prairie-chicken, results suggest increases in temperatures throughout the lesser prairie-chicken range and possible increases in average precipitation in the northern part of the range but decreasing precipitation in the southern portion of its range (Grisham et al. 2016b, pp. 222–227). Weather changes associated with climate change can have direct effects on the lesser prairie-chicken, leading to reduced survival of eggs, chicks, or adults, and indirect effects on lesser prairie-chicken are likely to occur through a variety of means including long-term (by mid and late twenty-first century) changes in grassland habitat. Other indirect effects may include more secondary causes such as increases in predation pressure or susceptibility to parasites or diseases. We have little information to describe future grassland conditions as a result of long-term climate changes, although warmer and drier conditions would most likely reduce overall habitat quality for lesser prairie-chicken in much of its range. In general, the vulnerability of lesser prairie-chicken to the effects of climate change depends on the degree to which it is susceptible to, and unable to cope with, adverse environmental changes due to long-term weather trends and more extreme weather events. Based on an analysis of future climate projections, the lesser prairie-chicken could have a net loss of more than 35 percent to 50 percent of its range due to unsuitable climate variables (Salas et al. 2017, p. 370).

One area of particular vulnerability for the lesser prairie-chicken is the need for specific thermal profiles in the microhabitats they use for nesting and rearing of broods. Warmer air and surface soil temperatures and the related decreased soil moisture near nest sites have been correlated with lower survival and recruitment in the lesser prairie-chicken (Bell 2005, pp. 16, 21). On average, lesser prairie-chicken avoid sites for nesting that are hotter, drier, and more exposed to the wind (Patten et al. 2005, p. 1275). Nest survival probability decreased by 10 percent every half-hour when temperature was greater than 93.2 °F (34 °C) and vapor pressure deficit was less than -23 mmHg (millimeters of mercury) during the day (Grisham et al. 2016c, p. 737). Thermal profiles from nests in some cases exceeded 130 °F (54.4 °C) with humidity below 10 percent at nests in Texas and New Mexico in 2011, which are beyond the threshold for nest survival (Grisham et al. 2013, p. 8). Increased temperatures in the late spring as projected by climate models may lead to egg death or nest abandonment of lesser prairie-chicken (Boal et al. 2010, p. 4). Furthermore, if lesser prairie-chicken shift timing of reproduction (to later in the year) to compensate for lower precipitation, then impacts from higher summer temperatures could be exacerbated. In a study of greater prairie-chickens, heterogeneous grasslands have high thermal variability with a range of measured operative temperatures spanning 41 °F (23 °C) with air temperatures >86 °F (30 °C) (Hovick et al. 2014b, pp. 1–5). In this setting, females selected nest sites that were as much as 14.4 °F (8 °C) cooler than the surrounding landscape.

Although the entire lesser prairie-chicken range is likely to experience effects from ongoing climate change, the southern part of the Southern DPS (the Shinnery Oak Ecoregion) may be particularly vulnerable to warming and drying weather trends, as this

portion of the range is already warmer and drier than northern portions and is projected to continue that trend (Grisham et al. 2013, entire; Grisham et al. 2016c, p. 742). Research in the Shinnery Oak Ecoregion relating projections in weather parameters in 2050 and 2080 to nest survival found with high certainty that the negative effects on future nest survival estimates will be significant, and the resulting survival rates are too low for population sustainability in the Southern Great Plains in the absence of other offsetting influences (Grisham et al. 2013, pp. 6–7). As late spring and summer daily high temperatures rise, the ability for lesser prairie-chicken to find appropriate nest sites and successfully rear broods is expected to decline. Lower rates of successful reproduction and recruitment lead to further overall declines in population abundance and resiliency to withstand stochastic events such as extreme weather events.

Extreme weather effects such as drought, heat waves, and storms can also directly affect lesser prairie-chicken survival and reproduction and can result in population crashes due to species responses including direct mortality from thermal stress, increased predation due to larger foraging areas, or decreased fitness when food resources are scarce. Like other wildlife species in arid and semiarid grasslands, lesser prairie-chicken on the Southern High Plains have adaptations that increase resilience to extreme environments and fluctuating weather patterns; however, environmental conditions expected from climate change may be outside of their adaptive potential, particularly in the timeframe weather changes are expected to occur (Fritts et al. 2018, p. 9556).

Extreme weather events and periods of drying of soil surface moisture are projected to increase across the lesser prairie-chicken range (Easterling et al. 2017, pp. 218–222; Wehner et al. 2017, pp. 237–239). In Kansas, extreme drought events in the summers

from 1981 through 2014 had a significant impact on lesser prairie-chicken abundance recorded at leks; thus, increases in drought frequency and intensity could have negative consequences for the lesser prairie-chicken (Ross et al. 2016a, pp. 6–7). Even mild increases in drought had significant impacts on the likelihood of population extirpation for lesser prairie-chicken (De Angelis 2017, p. 15).

Drought is a particularly important factor in considering lesser prairie-chicken population changes. The lesser prairie-chicken is considered a “boom–bust” species, meaning that there is a high degree of annual variation in population size due to variation in rates of successful reproduction and recruitment. These variations are largely driven by seasonal precipitation patterns (Grisham et al. 2013, pp. 6–7). Periods of below-normal precipitation and higher spring/summer temperatures result in less appropriate grassland vegetation cover and fewer food sources, resulting in decreased reproductive output (bust periods). Periods with favorable climatic conditions (above-normal precipitation and cooler spring/summer temperatures) will support favorable lesser prairie-chicken habitat conditions and result in high reproductive success (boom periods). The lesser prairie-chicken population failed to rebound for at least 4 years following the 2011 drought (Fritts et al. 2018, pp. 9556–9557). This information indicates either that the extreme environmental conditions during 2011 may have been beyond what the lesser prairie-chicken is adapted to or that the return period following the 2008–2009 dry period and ensuing low population numbers in 2010 was too short for the population to recover enough to be resilient to the 2011 drought.

The resilience and resistance of species and ecosystems to changing environmental conditions depend on many circumstances (Fritts et al. 2018, entire). As

climatic conditions shift to more frequent and intense drought cycles, this shift is expected to result in more frequent and extreme bust years for the lesser prairie-chicken and fewer boom years. As the frequency and intensity of droughts increase in the Southern Great Plains region, there will be diminishing opportunity for boom years with above-average precipitation. Overall, more frequent and intense droughts may lessen the intensity of boom years of the lesser prairie-chicken population cycle in the future, which would limit the ability of the species to rebound following years of drought (Ross et al. 2018, entire). These changes will reduce the overall resiliency of lesser prairie-chicken populations and exacerbate the effects of habitat loss and fragmentation. Because lesser prairie-chicken carrying capacities have already been much reduced, if isolated populations are extirpated due to seasonal weather conditions, they cannot be repopulated due to the lack of nearby populations.

Although climate change is expected to alter the vegetation community across the lesser prairie-chicken range (Grisham et al. 2016b, pp. 228–231), we did not account for the future effects of climate change in our geospatial habitat model, as we did not have information to inform specific land cover changes predicted to result from future climate change (Service 2022, p. 91).

The best available information supports that climate change projections of increased temperatures, increased precipitation extremes, increased soil drying, and an increase of severe events such as drought and storms within the Southern Great Plains are likely to have significant influences on the future resiliency of lesser prairie-chicken populations by mid to late 21<sup>st</sup> century. These trends are expected to exacerbate the challenges related to past and ongoing habitat loss and fragmentation, making it less

likely for populations to withstand extreme weather events that are likely to increase in frequency and severity.

#### Other Factors

##### *Livestock Grazing*

We expect that grazing will continue to be a primary land use on the remaining areas of grassland within the range of the lesser prairie-chicken in the future, and grazing influences habitat suitability for the lesser prairie-chicken (Diffendorfer et al. 2015, p. 1). When managed to produce habitat conditions that are beneficial for the lesser prairie-chicken, grazing is an invaluable tool for maintaining healthy prairie ecosystems. However, if grazing is managed in a way that is focused on maximizing short-term cattle production, resulting in rangeland that is overused, this could have significant negative effects on the lesser prairie-chicken. Grazing management varies both spatially and temporally across the landscape. Additionally, grazing management could become more difficult in the face of a changing climate with more frequent and intense droughts.

Our geospatial model does not account for impacts to habitat quality as data needed to characterize habitat quality for the lesser prairie-chicken at the scale and resolution needed for our analysis do not exist. While data do not exist to quantify rangewide extent of grazing practices and their effects on habitat, incompatible livestock grazing will continue to influence lesser prairie-chicken populations in the foreseeable future.

##### *Shrub Control and Eradication*

The removal of native shrubs such as sand shinnery oak is an ongoing concern to lesser prairie-chicken habitat availability throughout large portions of its range,

particularly in New Mexico, Oklahoma, and Texas. While relatively wide-scale shrub eradication has occurred in the past, we do not have geospatial data to evaluate the extent to which shrub eradication has contributed to habitat loss and fragmentation for the lesser prairie-chicken. While some Federal agencies such as BLM limit this practice in lesser prairie-chicken habitat, shrub control and eradication still occur through some Federal programs and on private lands, which make up the majority of the lesser prairie-chicken range. Though we expect this threat to continue to impact the species into the foreseeable future, we do not have data available to project the potential scale of habitat loss likely to occur in the future due to shrub eradication.

### *Fire*

As discussed in “Threats Influencing Current Condition,” the current lack of prescribed fire use in the range of the lesser prairie-chicken is contributing to woody plant encroachment and degradation of grassland quality.

As the effects of fire suppression continue to manifest throughout the Great Plains, the future impacts of wildfires on the lesser prairie-chicken are difficult to predict. If recent patterns continue with wildfires occurring at increasingly larger scales with less frequency and higher intensities than historical fire occurrence, there is an increasing potential of greater negative impacts on lesser prairie-chicken. Additionally, as climate change projections are indicating the possibility of longer and more severe droughts across the range of the lesser prairie-chicken, this could alter the vegetation response to fire both temporally and spatially. An expansive adoption of prescribed fire in management of remaining grasslands would be expected to have a moderating effect on risk of wildfires and concurrently would reduce woody plant encroachment and increase

habitat quality and diversity. We are not able to quantify these impacts on the future condition of the landscape in our geospatial analysis due to lack of data and added complexity, but we acknowledge that fire (both prescribed fires and wildfire), or its absence, will continue to be an ecological driver across the range of the lesser prairie-chicken in the future with potentially positive and negative effects across both short-term and long-term timelines in the foreseeable future.

#### Projected Future Habitat Conditions and Trends

To forecast the potential changes in future lesser prairie-chicken habitat, we used the projected levels of potential future impacts from conversion to cropland, petroleum production, wind energy development, and woody vegetation encroachment. We also worked with the primary conservation entities delivering ongoing, established lesser prairie-chicken conservation programs to develop estimated reasonable projections for rates of future conservation efforts (this included both restoration and enhancement efforts). We asked the entities to provide us with information to project three levels of conservation: low, continuation, and high. We asked the conservation entities not to provide aspirational goals for a given program but instead to solely use past performance, funding expectations, and expert opinion to provide plausible future rates for given conservation practices. We then used this information to estimate future conservation efforts over the next 25 years for the lesser prairie-chicken and incorporated the effects of restoration efforts on habitat availability into our spatial analysis.

The results of this future geospatial model (Service 2022, section 4.2 and appendices B and C) are provided in table 14; further details and maps are available in appendix E of the SSA report. The median results show a very modest increase in areas

available for use by lesser prairie-chicken in our nearest neighbor analysis under Scenario 1 (assuming high levels of restoration and low levels of impacts) (with an increase for the Shinnery Oak Ecoregion and a decrease for the other three ecoregions) and decreasing amounts of projected declines in areas available for use by lesser prairie-chicken under Scenarios 2–5 (table 14). Rangewide changes in areas available for use by lesser prairie-chicken in our nearest neighbor analysis range from a 0.5 percent increase under Scenario 1 to a 26 percent decrease in Scenario 5. This analysis indicated additional future habitat loss and fragmentation across the range of the lesser prairie-chicken is likely to occur, and conservation actions will not be enough to offset those habitat losses. Our analysis finds that the expected conservation efforts are inadequate to prevent continued declines in total habitat availability, much less restore some of what has been lost, and overall viability for this species will continue to decline.

TABLE 14—PROJECTED FUTURE MEDIAN ACREAGE OF LESSER PRAIRIE-CHICKEN AREAS AVAILABLE FOR USE AS A RESULT OF OUR NEIGHBORHOOD ANALYSIS IN ACRES, AND SHOWING PERCENT CHANGE IN ACREAGE FROM ESTIMATED CURRENT AREAS AVAILABLE FOR USE AS A RESULT OF OUR NEIGHBORHOOD ANALYSIS, IN 25 YEARS

| Ecoregion               | Total Area        | Current Condition | Scenario 1<br>Low Impacts, High Restoration |                | Scenario 2<br>Low Impacts, Continuation Restoration |                | Scenario 3<br>Moderate Impacts, Continuation Restoration |                | Scenario 4<br>High Impacts, Continuation Restoration |                | Scenario 5<br>High Impacts, Low Restoration |                |
|-------------------------|-------------------|-------------------|---|----------------|---|----------------|--|----------------|--|----------------|---|----------------|
|                         |                   |                   | Median                                      | Percent Change | Median  | Percent Change | Median   | Percent Change | Median   | Percent Change | Median                                      | Percent Change |
| Short-Grass/CRP         | 6,298,014         | 1,023,894         | 975,047                                     | -4.8%          | 956,190   | -6.6%          | 877,663  | -14.3%         | 808,152  | -21.1%         | 776,111                                     | -24.2%         |
| Mixed-Grass             | 8,527,718         | 994,483           | 974,200                                     | -2.0%          | 864,780   | -13.0%         | 742,855  | -25.3%         | 649,227  | -34.7%         | 630,633                                     | -36.6%         |
| Sand Sagebrush          | 3,153,420         | 1,028,523         | 992,632                                     | -3.5%          | 980,302   | -4.7%          | 932,477  | -9.3%          | 887,224  | -13.7%         | 884,851                                     | -14.0%         |
| Shinnery Oak            | 3,850,209         | 1,023,572         | 1,149,759                                   | 12.3%          | 988,072   | -3.5%          | 868,761  | -15.1%         | 771,923  | -24.6%         | 711,933                                     | -30.4%         |
| <b>Rangewide Totals</b> | <b>21,829,361</b> | <b>4,070,473</b>  | <b>4,091,638</b>                            | <b>0.5%</b>    | <b>3,789,343</b>                                    | <b>-6.9%</b>   | <b>3,421,756</b>   | <b>-15.9%</b>  | <b>3,116,525</b>                                     | <b>-23.4%</b>  | <b>3,003,529</b>                            | <b>-26.2%</b>  |

It is important to note that these acreages presented above in Table 14 consist of patches of fragmented habitat among developed areas and other unsuitable habitat. Based on our geospatial analysis, the vast majority of blocks of usable habitat and the total area within those blocks, both in the current condition and in future scenarios, are less than 12,000 ac (4,856 ha), and very few blocks were greater than 50,000 ac (20,234 ha) (Service 2022, figure 4.2). As discussed above, the space required by lesser prairie-chicken to support individuals from a single lek is approximately 12,000–50,000 ac (4,856–20,234 ha). The dominance of smaller blocks on the landscape further exhibits that those spaces are highly fragmented, even with the remaining potential usable area for the lesser prairie-chicken totaling approximately 4,000,000 ac (1,600,000 ha) in the current condition, and potentially declining to as low as 3,000,000 ac (1,200,000 ha) under scenario 5 for our future condition projections. High levels of fragmentation, as discussed in “Threats Influencing Current Condition,” do not provide the landscape composition needed for long-term stability of populations. Additionally, in spaces that are highly fragmented, relatively small amounts of additional impacts may have great consequences as landscape composition thresholds for the lesser prairie-chicken are surpassed.

Several habitat enhancement actions for the lesser prairie-chicken are being implemented across the analysis area. These enhancement actions are implemented on existing habitat to enhance the quality of that given area. As discussed above, we asked our conservation partners to provide us with a range of plausible rates for conservation efforts, including enhancement actions, occurring within the lesser prairie-chicken analysis area by ecoregion. We also requested information regarding effectiveness,

project lifespan, and spatial targeting of these efforts (Service 2022, appendix C, section C.3.4). Next, we converted those rates for each program and conservation effort to the total effort at year 25. Table 15 summarizes the three projected levels of future habitat enhancement over the next 25 years for each ecoregion. These efforts represent those above and beyond what is already accounted for within the current condition analysis. Acreage enrolled in CCAAs are assumed to continue to be enrolled in the future, and CCAA projections within this table represent enrollments in addition to existing enrollments. This table also does not include continued management actions on permanently protected properties (such as State-owned wildlife management areas or conservation banks), as it is assumed this management will continue. Additionally, the numbers reported for NRCS grazing plans are acres in addition to the number of acres reported above in “Conservation Efforts” that are being managed under prescribed grazing for the lesser prairie-chicken by NRCS, as we assume that as contract acres expire from the program additional acres will be enrolled.

TABLE 15—PROJECTED AMOUNT OF HABITAT ENHANCEMENT (IN ACRES) OVER THE NEXT 25 YEARS WITHIN THE FOUR LESSER PRAIRIE-CHICKEN ECOREGIONS

| Enhancement Efforts              | Total Level of Future Effort (Acres) at Year 25 |              |         |
|----------------------------------|---|--------------|---------|
|                                  | Low   | Continuation | High    |
| <b>Short-Grass/CRP Ecoregion</b> |   |              |         |
| KDWP Enhancement Contract        | 0   | 6,740        | 17,500  |
| NRCS LPCI Grazing Plan           | 0   | 0            | 4,000   |
| USFWS PFW Contract               | 14,000  | 14,000       | 20,000  |
| <b>Mixed-Grass Ecoregion</b>     |   |              |         |
| WAFWA Management Plan            | 0   | 0            | 118,245 |
| KDWP Enhancement Contract        | 0   | 120          | 3,100   |
| ODWC Management                  | 1,400   | 3,300        | 6,400   |
| ODWC Additional CCAA Enrollment  | 0   | 50,000       | 100,000 |
| NRCS LPCI Grazing Plan           | 0   | 0            | 58,000  |
| USFWS PFW Contract               | 50,000  | 50,000       | 70,000  |
| TPWD Additional CCAA Enrollment  | 0   | 0            | 50,000  |
| <b>Sand Sagebrush Ecoregion</b>  |   |              |         |
| KDWP Enhancement Contract        | 0   | 720          | 4,400   |
| CPW Enhancement Contract         | 0   | 12,200       | 37,900  |
| NRCS LPCI Grazing Plan           | 0   | 0            | 13,000  |
| USFWS PFW Contract               | 0   | 6,000        | 18,000  |
| <b>Shinnery Oak Ecoregion</b>    |   |              |         |
| WAFWA Management Plan            | 0   | 0            | 8,129   |
| NRCS LPCI Grazing Plan           | 0   | 0            | 39,000  |
| BLM Prescribed Fire              | 0   | 25,000       | 100,000 |
| NM CCAA Prescribed Fire          | 50,000  | 100,000      | 150,000 |
| USFWS PFW Contract               | 5,000   | 15,000       | 50,000  |
| TPWD Additional CCAA Enrollment  | 0   | 0            | 60,000  |

The actual conservation benefit provided to the lesser prairie-chicken by these programs varies greatly and is difficult to summarize because it depends on the location and the specific actions being carried out for each individual agreement. In addition, the level of future voluntary participation in these programs can be highly variable depending on available funding, opportunities for other revenue sources, and many other circumstances.

### *Future Population Trends*

Several estimates of lesser prairie-chicken population growth rates have been based on current conditions for the lesser prairie-chicken, with most derived from demographic matrix models (Fields 2004, pp. 76–83; Hagen et al. 2009, entire; Sullins 2017, entire; Cummings et al. 2017, entire). Most studies project declining lesser prairie-chicken populations; however, the magnitude of actual future declines is unlikely to be as low as some modeling tools indicate (Service 2022, table 4.10). Most positive population growth calculations were derived from 2014–2016 (Hagen et al. 2017, Supplemental Information; Service 2022, table 4.10), where estimates indicated populations have increased. However, we caution that any analysis using growth rates based upon short-term data sets can be problematic as they are very sensitive to the starting and ending points in the estimates. Additionally, these growth rates are accompanied by relatively large margins of error.

Estimates based on aerial surveys over the past 10 years have indicated a rangewide fluctuating population beginning with an estimated 30,682 (90 percent CI: 20,938–39,385) individuals in 2012 to an estimated 26,591 (90 percent CI: 16,321–38,259) individuals in 2022. Included within this timeframe was a population low of 16,724 (90 percent CI: 10,420–23,538) individuals in 2013. We caution against drawing inferences from point estimates based upon these data due to low detection probabilities of the species leading to large confidence intervals. We also caution that trend analyses from short-term data sets are highly sensitive to starting and ending population sizes. For example, if you use 2012, the first year of available rangewide survey data, as the starting

point for a trend analysis, it may appear that populations are relatively stable, but during the years of 2010–2013, the range of the lesser prairie-chicken experienced a severe drought and thus lesser prairie-chicken populations were at historic lows. If the data existed to perform the same analysis using the starting point as 2009, then the results would likely show a decreasing population trend.

The future risk of extinction of the lesser prairie-chicken has been evaluated using historical ground surveys (Garton et al. 2016, pp. 60–73). This analysis used the results of those surveys to project the risk of lesser prairie-chicken quasi-extinction in each of the four ecoregions and rangewide over two timeframes, 30 and 100 years into the future. For this analysis, quasi-extinction was set at effective population sizes (demographic  $N_e$ ) of 50 (populations at short-term extinction risk) and 500 (populations at long-term extinction risk) adult breeding birds, corresponding to an index based on minimum males counted at leks of  $\leq 85$  and  $\leq 852$ , respectively (Garton et al. 2016, pp. 59–60). The initial analysis using data collected through 2012 was reported in Garton et al. (2016, pp. 60–73), but it has since been updated to include data collected through 2016 (Hagen et al. 2017, entire). We have identified concerns in the past with some of the methodologies and assumptions made in this analysis, and the challenges of these data are noted in Zavaleta and Haukos (2013, p. 545) and Cummings et al. (2017, pp. 29–30). While these concerns remain, this work represents one of the few attempts to project risk to the species across its range, and we considered it as part of our overall analysis and recognize any limitations associated with the analysis.

Results were reported for each analysis assuming each ecoregion is functioning as an independent population and also assuming there is movement of individuals between

populations (Service 2022, table 4.11; table 4.12). The results suggest a wide range of risks among the ecoregions, but the Sand Sagebrush Ecoregion consistently had the highest risks of quasi-extinction and the Short-Grass/CRP Ecoregion had the lowest. This analysis was based only on simulating demographic variability of populations and did not incorporate changing environmental conditions related to habitat or climate.

### **Summary of Comments and Recommendations**

In the proposed rule published on June 1, 2021 (86 FR 29432), we requested that all interested parties submit written comments on the proposal by August 2, 2021. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. We published newspaper notices inviting general public comment in the USA Today. We held virtual public hearings on July 8, 2021, and July 14, 2021. On June 11, 2021, we received a request to extend the public comment period. On July 30, 2021, we published a notice extending the comment period for an additional 30 days to September 1, 2021 (86 FR 41000). During the public comment period, we received 32,126 comments, including 3 bulk comments with a total of 31,710 form letters.

State agencies, industry groups, and other commenters submitted additional information and data during the public comment period. We received information on conservation efforts, renewable energy projects, new survey data, threats, suggestions related to recovery planning, monitoring efforts, general information related to mitigation efforts, and more. All substantive information received during the comment periods has

either been incorporated into our SSA, directly into this final determination, or is addressed below.

*Peer Reviewer Comments*

As discussed in **Supporting Documents** above, we received comments from four peer reviewers. We reviewed all comments we received from the peer reviewers for substantive issues and new information regarding the information contained in the SSA report. The peer reviewers generally concurred with our methods and conclusions and provided support for thorough and descriptive narratives of assessed issues, additional information, clarifications, and suggestions to improve the final SSA report. Peer reviewer comments are addressed in the following summary and were incorporated into the final SSA report as appropriate.

*Comment 1:* One peer reviewer suggested that we consider adding to the SSA report a statement that the percent reduction of habitat and the percent reduction in population more or less parallel (or pace) each other. They stated that pointing this out might emphasize that improvements in actions that restore habitat should result in more birds.

*Our response:* While we agree that there is a direct relationship between habitat availability and population trends, the location of additional habitat losses or gains will dictate the magnitude of population response to those changes. Thus, while we can conclude there is a direct relationship between population trends and habitat availability, we cannot conclude that a given percent reduction of habitat will result in a given percent reduction in population abundance.

*Comment 2:* One peer reviewer suggested that we were too optimistic regarding the persistence of lesser prairie-chicken in the Short-Grass Prairie/CRP Ecoregion. The reviewer points out the lesser prairie-chicken in that ecoregion are wholly dependent on CRP and minor landscape changes can affect lesser prairie-chicken persistence.

*Our response:* Our SSA is based on the best available science. In our SSA report, we state that the Short-Grass Prairie/CRP Ecoregion represents the most resilient ecoregion of the four evaluated based upon the large number of birds present. The existing populations of lesser prairie-chicken in this ecoregion are largely dependent upon CRP, a point which we acknowledge in the SSA report, and in the SSA report we project additional habitat loss to occur within the future. All of these points were included in our SSA analysis.

*Comment 3:* One peer reviewer suggested that juniper twig blight, one of several possible species of fungi, has been decimating eastern red cedar in some areas and could potentially reverse some of the woody encroachment.

*Our response:* We reviewed the available information in our files and found no documentation of extensive areas of eastern red cedar decimated by any fungi or other diseases. Two locations where this fungus exists are significantly east of lesser prairie-chicken range. Additionally, as an example, one of the fungi, *Kabatina (Kabatina juniperi)*, requires specific weather conditions, limiting the expectation of extensive spread of this fungus. This context makes widespread and sustained removal of eastern red cedar by fungi infection from invaded grasslands or prairies unlikely within the range of the lesser prairie-chicken.

*Comment 4:* One peer reviewer suggested there is no evidence to support available lesser prairie-chicken habitat has been reduced by 80–90 percent, citing Spencer et al. 2017.

*Our response:* The SSA report summarizes the best available scientific information related to this point. The lesser prairie-chicken was once distributed widely across the Southern Great Plains, and currently occupies a substantially reduced portion of its presumed historical range (Rodgers 2016, p. 15). There have been several estimates of the potential maximum historical range of the lesser prairie-chicken (e.g., Taylor and Guthery 1980a, p. 1, based on Aldrich 1963, p. 537; Johnsgard 2002, p. 32; Playa Lakes Joint Venture 2007, p. 1) with a wide range of estimates on the order of about 64 to 115 million ac (26 to 47 million ha). The more recent estimate of the lesser prairie-chicken encompasses an area of approximately 115 million ac (47 million ha). Presumably, not all of the area within this historical range was evenly occupied by lesser prairie-chicken, and some of the area may not have been suitable to regularly support lesser prairie-chicken populations (Boal and Haukos 2016, p. 6). However, experts agree that the current range of the lesser prairie-chicken has been significantly reduced from the historical range at the time of European settlement, although there is no consensus on the exact extent of that reduction as estimates vary from greater than 90% reduction (Hagen and Giesen 2005, unpaginated) to approximately 83% reduction (Van Pelt et al. 2013, p. 3). We refer to the context of the entire estimated historical range, while Spencer et al. 2017 only addresses areas present in the recent delineation of the EOR in Kansas from the 1950s to 2013.

*Comment 5:* One reviewer suggested we used inappropriate representation of lesser prairie-chicken historical range and suggested that there are areas included within the historical range included in the SSA report that were never occupied by the lesser prairie-chicken.

*Our response:* We used the best available information to characterize the historical range of the lesser prairie-chicken, including peer-reviewed publications and the map produced and used by the State fish and wildlife agencies and cited in nearly all scientific publications discussing the historical range (Service 2022, figure 2.2). Additionally, we acknowledge caveats associated with the historical ranges including statements such as “Presumably, not all of the area within this historical range was evenly occupied by [lesser prairie-chicken], and some of the area may not have been suitable to regularly support [lesser prairie-chicken] populations.” The reviewer did not suggest a source that would better represent the historical range of the lesser prairie-chicken.

*Comment 6:* One reviewer suggested we inappropriately assumed that once land is converted to cropland those acres are no longer habitat.

*Our response:* Lesser prairie-chickens are a grassland obligate species. We do not assume that cropland is not habitat, but rather apply the information available in the scientific literature that indicates that cropland does not provide for the full life-history needs of the species. Additionally, once cropland exceeds 10 percent of the landscape, lesser prairie-chicken populations begin to decline, in large part due to the loss of nesting habitat. As discussed within the SSA report, we considered that cropland may have some limited value for opportunistic foraging but does not support vegetative structure and composition necessary to fulfill all the life-history needs of the species.

*Federal Agency Comments and Comments From Tribes*

We did not receive any comments from Federal agencies or from Tribes.

*Comments from States*

*Comment 7:* Several State agencies and one commenter argued that rare and endangered species are better managed at the State level than the Federal level, and that the Service lacks the resources and relationships to properly manage the species.

*Our response:* The Act requires the Service to make a determination using the best available scientific and commercial data after conducting a review of the status of the species and after taking into account those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation to protect such species. We appreciate the interest in lesser prairie-chicken conservation and look forward to continuing our coordination with State agencies as we begin recovery planning and implementation for the lesser prairie-chicken.

*Comment 8:* One State and one commenter stated the Service did not account for habitat quality improvements through enhancements in the characterization of past and ongoing conservation actions in the SSA.

*Our response:* Throughout the SSA process, the Service worked with the States and other partners to compile and evaluate the best available data to inform our decision with regard to the status of the lesser prairie-chicken. This included working with our conservation partners to ensure we accurately characterized existing conservation efforts for the species and projecting the benefits of these efforts into the future. Within chapter 3 of the SSA report, we detail past and current conservation efforts, including enhancement efforts. While projecting the benefits of conservation efforts into the future,

we include projections that account for those efforts to enhance existing habitat for the lesser prairie-chicken, which are summarized in chapter 4, table 4.8 of the SSA report (Service 2022).

*Comment 9:* As a followup to Comment 8, a commenter asked for clarification on the implications of not being able to assess habitat quality (and inclusion of degraded areas) in the spatial analysis and how those implications might have affected our decision.

*Our response:* Spatial data do not exist at the scale and resolution needed to adequately evaluate the condition of the vegetative structure and composition of the landscape. This impacted our spatial analysis because to accurately evaluate habitat availability for the lesser prairie-chicken, one would need to identify areas that are in grassland or shrubland that could support the species and then evaluate the vegetative composition and structure of those areas to determine if the area has been degraded and to what degree. Many areas that remain grassland do not have either the vegetative composition or structure to provide for habitat for the lesser prairie-chicken; unfortunately, no spatial data exist that would allow for a characterization of vegetative structure and composition at the scope or scale needed to inform the evaluation of the lesser prairie-chicken. Thus, within our spatial analysis, we could not directly estimate available habitat. Instead, we estimate the amount of grassland and shrubland within the analysis area that could potentially serve as lesser prairie-chicken habitat if the correct vegetative structure and composition on the given site are present. The implications of this limitation, as outlined in the SSA report, is that the actual amount of available habitat

is likely overestimated in the analysis. This limitation was fully considered while making our determination.

*Comment 10:* One State commented that USDA did not provide data to the Service regarding habitat restoration and enhancement efforts that are conducted outside of the Lesser Prairie-Chicken Initiative, and that means the SSA is lacking some of the best available information.

*Our response:* We worked directly with USDA to describe the conservation benefits being provided by their programs for consideration in this decision. We acknowledge that there are programs available outside of the Lesser Prairie-Chicken Initiative, as outlined in chapter 3 of the SSA report. These programs, the Environmental Quality Incentives Program, the Conservation Stewardship Program, and the Agricultural Conservation Easement Program, all provide funding for the Lesser Prairie-Chicken Initiative, which in turn provides technical and financial assistance to landowners. While these programs do not include all programs implemented by USDA, it does include the primary programs and benefits being provided to the lesser prairie-chicken. We are not aware of and the commenter did not provide any additional data regarding conservation benefits that we could include in our analysis.

*Comment 11:* One State agency asserted that there were no threats in the Kansas portion of the Northern DPS under any of the five factors. They also stated that lesser prairie-chicken populations and habitat are either stable or growing.

*Our response:* We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the Northern DPS of the lesser prairie-chicken and its habitat. We analyzed effects associated with habitat

loss, fragmentation, and fragmentation including conversion of grassland to cropland (Factor A), petroleum production (Factor A), wind energy development and transmission (Factor A), woody vegetation encroachment (Factor A), and roads and electrical distribution lines (Factor A); other factors, such as livestock grazing (Factor A), shrub control and eradication (Factor A), collision mortality from fences (Factor E), predation (Factor C), influence of anthropogenic noise (Factor E), and fire (Factor A); and extreme weather events (Factor E). We also analyzed existing regulatory mechanisms (Factor D) and ongoing conservation measures.

Habitat loss, fragmentation, and degradation is the primary threat to the lesser prairie-chicken in this DPS, with other threats such as fire, incompatible livestock grazing, and extreme weather events further decreasing population resiliency and species redundancy. We do not assess the species on a State-by-State basis, but rather based on the Act's definition of species. The State of Kansas is included in the Northern DPS and consists of portions of three ecoregions for the species. The largest impacts in this DPS are conversion of grassland to cropland and woody vegetation encroachment. The Sand Sagebrush Ecoregion, which includes the species within Kansas, is also experiencing habitat degradation due to incompatible grazing management.

Our future scenario analysis demonstrates that the current threats acting on the landscape are expected to either continue at the same levels or increase in severity in the foreseeable future. Habitat loss is projected to outpace conservation efforts to restore habitat. Though we do not expect rates of habitat conversion to cropland to be equivalent to the rates that we historically witnessed, we expect any additional conversion that does occur will have a disproportionately large effect on resiliency and redundancy due to the

limited amount of remaining large intact grasslands. Conversion of habitat due to oil, gas, and wind energy will continue to occur. Woody vegetation encroachment is also expected to continue, particularly in the Mixed-Grass Ecoregion. Increased drought and severe weather events associated with climate change are expected to decrease population resiliency and redundancy into the foreseeable future, and as habitat availability continues to decline, and available habitat blocks decrease in size, populations may decline to below quasi-extinction levels.

Conservation measures and regulatory mechanisms are acting to reduce the magnitude of threats impacting the lesser prairie-chicken and its habitat. However, our analysis demonstrates that future restoration efforts will not be enough to offset the impacts of habitat loss and fragmentation and conservation efforts focused on localized management to affect habitat quality, while not addressing the overarching limiting factor of habitat loss and fragmentation, is not addressing the long-term population needs for the lesser prairie-chicken. Thus, these measures are having only minimal impacts on threats acting throughout the DPS.

*Comment 12:* One State asked the Service to detail how the listing of the lesser prairie-chicken and potential incidental take would affect the hunting season in Kansas for the greater prairie-chicken and any other species.

*Our response:* The listing will have no direct effect on hunting seasons established by a State fish and wildlife agency for any other species. However, because Kansas falls within the Northern DPS, the 4(d) rule prohibits take, as defined in 50 CFR 17.21(c)(1), or possession, as defined in 50 CFR 17.21(d)(1), of lesser prairie-chicken.

We do not expect this to be of significant effect as hunting regulations already in place by KDWP were intended to minimize impacts to the lesser prairie-chicken.

*Comment 13:* One State asked if seeding nonnative plant species within the range of the lesser prairie-chicken would be considered take and noted that they strongly recommend only planting of native species.

*Our response:* While we strongly recommend planting of native species as well, the Act only prohibits actions that would result in a violation of the prohibitions outlined in section 9 of the statute or specifically prohibited by the 4(d) rule. Not all seeding of nonnative plant species would result in take of the lesser prairie-chicken, and each scenario would have to be evaluated. There are potential scenarios in which seeding of nonnative plant species could result in a section 9 violation if such seeding occurred in existing habitat for the lesser prairie-chicken and results in a long-term alteration of the vegetative structure and composition necessary to support the lesser prairie-chicken. While the seeding of nonnative species, such as converting a row crop agriculture field to a nonnative stand of grass, may not provide any conservation value to the lesser prairie-chicken, it would also not result in a section 9 violation.

*Comment 14:* One State asked if suppressing (as opposed to eradicating) shinnery oak and sand sagebrush would be prohibited.

*Our response:* Alterations to vegetation resulting from appropriate herbicide application in order to better meet the habitat requirements of the lesser prairie-chicken, such as suppression of sand shinnery oak and sand sagebrush, would not be considered a violation of section 9. Herbicide applications that would result in a violation of section 9 would be those in which the application on existing lesser prairie-chicken habitat results

in sustained alteration of preferred vegetative characteristics of lesser prairie-chicken habitat.

*Comment 15:* One State asked about residents that may have lesser prairie-chicken specimens in their possession that were legally harvested less than 100 years ago. They noted that under section 10(h)(1) of the Act, possession of such specimens or import or export of them is prohibited.

*Our response:* Simple possession of specimens of a listed species does not constitute a violation of either the Act or the 4(d) rule. The statute and 4(d) rule prohibit possession (and other acts) of specimens taken in violation of the Act. If the specimen was taken lawfully, there would be no violation for possession of the specimen. The Act does prohibit certain interstate and foreign commerce activities, such as shipping, transporting, selling, or offering to sell, listed species, regardless of when the specimen was taken.

*Comment 16:* Multiple commenters, including five State wildlife agencies, provided comments outlining existing conservation efforts and participation in and accomplishments of those efforts. Many of those commenters stated that the lesser prairie-chicken should not be listed due to all of those efforts.

*Our response:* We fully evaluated and considered all of these efforts while making our determination. The past, current, and likely future benefits of these efforts were evaluated through the SSA process and are summarized in the SSA report. The mere existence of conservation efforts does not necessarily result in a species not meriting the protections of the Act. Instead, we must evaluate the effects of the efforts on the status of the species and on the threats affecting the species. To ensure that we

accurately characterized the benefits being provided by existing efforts, we worked directly with the entities responsible for implementing those efforts. We first asked them to assist us in describing the program and the program accomplishments that are included in chapter 3 of the SSA report. To help us project the likely future benefits of their efforts, we worked directly with those entities to estimate the rate of future practices likely to be implemented based upon accomplishments from past years and expectations for the program. A summary of these likely future efforts are included in chapter 4 of the SSA report and a detailed summary of how the conservation projections were calculated is included in appendix C of the SSA report. By working with these entities through the SSA process, we have ensured that we fully and accurately evaluated the benefits of these existing efforts to the lesser prairie-chicken and its habitat. Based on our analysis and the full consideration of all efforts, we still conclude that listing is warranted for both the Northern and Southern DPSs of the lesser prairie-chicken as detailed in this rule.

*Comment 17:* Multiple commenters, including three State wildlife agencies, submitted comments related to population trends. Some commenters stated that the results of aerial surveys demonstrate that, rangewide and/or for each DPS, populations of lesser prairie-chicken are stable or increasing. Some attributed this increase to success of conservation efforts. Other commenters stated that while there may be short-term increases in populations due to precipitation patterns, the long-term trends indicated declines in lesser prairie-chicken populations.

*Our response:* We acknowledge that aerial surveys can demonstrate stable, increasing, or declining population trends, depending on the range of dates reviewed and the range of the confidence intervals in the population estimates. We conclude it is

critical therefore to focus on long-term trends to measure population viability for lesser prairie-chickens. Annual fluctuations and short-term trends can be misleading. The lesser prairie-chicken is considered a “boom–bust” species with a high degree of annual variation in rates of successful reproduction and recruitment. These annual and short-term fluctuations are almost entirely driven by seasonal precipitation patterns. Periods of below-average precipitation and higher spring/summer temperatures result in less appropriate vegetative cover and less food available, resulting in decreased reproductive output (bust periods). Periods with above-normal precipitation and cooler spring/summer temperatures will support favorable habitat conditions and result in high reproductive success (boom periods). Based upon this life history strategy, when evaluating lesser prairie-chicken populations one should not draw conclusions based upon annual fluctuations or short-term trends. Instead, the best use of population data is for long-term trend analysis, which covers a timeframe that spans multiple boom and bust periods.

We find the most likely scientific conclusion to explain the 2013–2021 observed increase in the lesser prairie-chicken populations is precipitation patterns. We acknowledge that voluntary conservation efforts were also acting on the species during this time. In 2013, there were historically low population estimates. We conclude this was due to the severe drought that the southern Great Plains experienced in the period 2009–2012. Following the drought, precipitation had been largely at or above average within the lesser prairie-chicken range through 2020. The predicted population response is increases in lesser prairie-chicken populations. This conclusion is consistent with the population data from 2013 through 2021. Within the SSA report, we provide a detailed summary of the best available science with regard to population trends including a

summary of all results from the aerial surveys and the best available science with regard to historical population estimates. As presented in this rule and the SSA report, the best available scientific information indicates that the lesser prairie-chicken populations have experienced long-term population declines. Additionally, most efforts to project future lesser prairie-chicken population abundance and our analysis of future habitat conditions indicate likely continued declines in lesser prairie-chicken abundance and habitat.

*Comment 18:* Multiple commenters, including one State wildlife agency, submitted comments related to the relationship between population trends, habitat loss, and precipitation. Some comments asked for clarification around these relationships while others stated that habitat loss is not the driver of population trends because the SSA estimated habitat losses but populations have increased since 2013.

*Our response:* As detailed in the response to Comment 17, due to the life history strategy of the lesser prairie-chicken, annual and short-term variations in lesser prairie-chicken populations are directly tied to localized precipitation patterns. Long-term population trends for the lesser prairie-chicken that span multiple precipitation cycles, are a better measure of population health as they will better reflect the true trajectory of the population. Analyzing long-term trends will minimize the influence of short-term precipitation cycles and the associated fluctuations that are associated with a species with this life history strategy. Long-term population trends for the lesser prairie-chicken are associated with habitat availability and connectivity.

*Comment 19:* Multiple commenters, including one State, stated that ground-based surveys in New Mexico for 2021 show higher populations than the aerial survey estimates and thus conclude we should base our 2021 population estimate for the

Shinnery Oak Ecoregion on the ground-based survey work from New Mexico. Two commenters also stated that, in general, aerial survey estimates are less accurate and that ground-based surveys would possibly reveal higher numbers.

*Our response:* The aerial survey methodology was designed to provide a statistically valid sampling framework to allow a more accurate evaluation of long-term population trends. It is clear, based on the best available science, that the aerial survey framework is the most rigorous sampling design to provide population estimates and trends. Ground-based surveys are not designed to allow for an accurate extrapolation to a population estimate. Ground-based surveys can be used to detect species presence and at best provide an index. More specifically, the best use of this information is to indicate presence of the species when there is a positive detection and at most to monitor a specific lek or group of leks through time to give an estimate of documented attendance for that lek. Beyond that, these surveys have limited utility for analyzing population abundance due to: variation in sampling methodologies within and between States; selective sampling; variance in lek attendance and detection rates; and lack of ability to account for what proportion of the population is being sampled in any given year (Applegate 2000; Cummings et al. 2017; Ross et al. 2019). The aerial surveys were designed to address these shortcomings with the design and statistical limitations associated with the ground-based surveys and thus allow for evaluation of long-term population trends with a calculation of the level of certainty associated with those estimates.

*Comment 20:* One State agency stated that based upon population estimates resulting from ground-based surveys in New Mexico that populations have remained

relatively stable since 1998 despite a significant range contraction in the northern and the southern portion of the lesser prairie-chicken range in New Mexico. They attributed the stability to conservation efforts in the core areas.

*Our response:* As discussed in our response to Comment 19, ground-based survey efforts are not designed to produce population estimates. Even if the ground-based survey estimates provided precise annual population estimates and the population was relatively stable, the extent of the total range decline leads us to conclude that the lesser prairie-chicken in the Shinnery Oak Ecoregion faces an elevated extirpation risk due to the negative effects of reduction in potentially usable area, which has negatively affected redundancy.

*Comment 21:* Multiple commenters, including two State wildlife agencies, stated that listing of the lesser prairie-chicken would undermine existing conservation efforts and create a disincentive for participation in conservation efforts. Some commenters suggested that rather than listing the Service should continue to work with partners and landowners to develop conservation agreements. One commenter stated that conservation efforts are more likely to increase and improve without a listing as these voluntary programs provide flexibility in determining how best to conserve the species.

*Our response:* In compliance with the requirements of the Act and its implementing regulations, we determined that the Northern and Southern DPSs of the lesser prairie-chicken warrant listing based on our assessment of the best available scientific and commercial data. We recognize that the lesser prairie-chicken remains primarily on lands where habitat management has supported survival, due in large part to voluntary actions incorporating good land stewardship, and we want to continue to

encourage land management practices that support the species. We recognize the need to work collaboratively with private landowners to conserve and recover the lesser prairie-chicken.

*Comment 22:* Multiple commenters, including one State wildlife agency, submitted comments related to the effectiveness of conservation efforts. Some commenters stated that existing efforts were not effective at addressing the conservation needs of the species while others stated that existing efforts are effective at addressing the conservation needs of the lesser prairie-chicken. Additionally, some commenters stated that while we acknowledged existing efforts, we then disregarded them and did not fully factor in their effectiveness.

*Our response:* We included all existing conservation efforts within our analysis in the SSA report. We described each conservation effort individually and then analyzed how effective those efforts were at addressing the threats to the lesser prairie-chicken. This analysis showed that the overarching limiting factor to the lesser prairie-chicken is habitat availability and that the primary threat is habitat loss and fragmentation. Our analysis indicates that, despite conservation efforts, habitat loss and fragmentation continues to negatively impact viability for the species. Additionally, our analysis indicated that despite the projected level of conservation efforts moving forward, habitat loss and fragmentation is expected to outpace habitat restoration efforts, resulting in further decreases in viability in the future. As discussed in the SSA report, there are additional threats to the lesser prairie-chicken that will continue to impact the species, which are not addressed or ameliorated by existing conservation efforts to the extent that the species does not warrant listing.

*Comment 23:* One State wildlife agency stated that decreasing groundwater aquifer levels are likely to lead to restoration of cropland acres to native grasses in the Sand Sagebrush Ecoregion in the future, which will increase habitat availability and populations in the future but the extent will be hard to quantify.

*Our response:* While we agree that decreasing aquifer levels may impact the agricultural practices within the Sand Sagebrush Ecoregion, there is no information to indicate that landowners will convert those areas back to vegetative composition that will support the lesser prairie-chicken or that they will manage it in a way that is compatible with the habitat needs of the lesser prairie-chicken.

*Comment 24:* One State commented that there must be more and improved coordination among Federal agencies because the Service failed to acquire CRP data from USDA for use in the SSA.

*Our response:* We used the best available information in our analyses. Access to geospatial conservation practices information is available to entities such as other Federal agencies only through a signed agreement with USDA (Rissman et al. 2017). As stated in Appendix B, Part 5. Supplemental Analysis: Evaluation of CRP, due to privacy concerns associated with sharing these data, we were not able to establish an agreement with FSA to provide the CRP data for our use. Because we were not able to acquire the spatially explicit data for CRP enrollment, we worked with FSA to complete an analysis to understand the implications of not having CRP data included in our spatial model. The results of this analysis indicated up to a 1.33 percent increase in potentially usable space if we had CRP data for our model. We found this minor difference in potentially usable space to be negligible in the scope of the SSA analysis.

*Comment 25:* Multiple commenters, including four State wildlife agencies, submitted comments requesting that the 4(d) rule for the Northern DPS of the lesser prairie-chicken include an exception for take resulting from grazing activities. Some commenters requested a 4(d) exception for all grazing activities, some requested a 4(d) exception for grazing that was being managed in ways that were compatible with the conservation of the species, and other commenters requested clarity on what would be considered compatible grazing management.

*Our response:* After evaluating all comments from States and from public commenters, we have included in the 4(d) rule an exception for take that would be associated with routine grazing activities when the landowner or land manager is following a site-specific grazing plan that was developed by an entity that has been approved by the Service. Please see **Provisions of the 4(d) Rule** for more details.

*Comment 26:* Four State agencies and multiple public commenters requested that activities conducted pursuant to the WAFWA Range-wide Plan be excepted from take prohibitions under the 4(d) rule for the Northern DPS. They stated that we had approved a 4(d) provision for the plan previously and that including such a provision would provide an overall benefit to the conservation of the species. Several commenters, however, stated it was inappropriate to include an exception from take prohibitions for activities conducted pursuant to the WAFWA Range-wide Plan, given issues revealed in the recent audit and the lack of clarity on how these issues will be resolved.

*Our response:* We did not find that a provision excepting activities conducted under the mitigation framework within the RWP implemented by WAFWA is necessary and advisable for the conservation of the species at this time. We acknowledge that our

previous 4(d) rule had excepted these activities from take. However, we have reevaluated that decision based on the updated status of the species and recent information regarding the mitigation program. A July 2019 audit of the mitigation program found a variety of deficiencies with the program. These deficiencies include concerns regarding the financial management, accounting, compliance, and conservation delivery. After the audit was completed, WAFWA hired a consultant to assist them with evaluating options to address any deficiencies with the oil and gas CCAA. The consultant focused on the oil and gas CCAA, which has the same mitigation framework as the RWP. This consultant led a focused conversation with the WAFWA, the State fish and wildlife agencies, the Service, and representatives of the oil and gas industry enrolled in the program. This process culminated with a report titled “Range-wide Oil and Gas Candidate Conservation Agreement with Assurances Realignment Phase 1 Findings and Recommendations” finalized in December 2020. This report reaffirms the deficiencies identified in the 2019 program audit and identifies steps to address those concerns.

While this realignment process was directly related to the CCAA, because the same mitigation framework is included in both the RWP and the CCAA, the concerns outlined in the Findings and Recommendations Report are directly applicable to the mitigation program within the RWP. The WAFWA has made some changes, but most of the noted deficiencies with relation to the mitigation framework and other aspects directly related to the RWP have not been remedied. Specifically, due to the identified deficiencies, we are concerned that the implementation of the mitigation framework is not offsetting impacts to the species.

*Comment 27:* One State noted that the 4(d) rule excepted prescribed fire from take prohibitions. They asked that, given the importance of prescribed fire, that it be added to the list of actions unlikely to result in a violation of section 9 for the Southern DPS.

*Our response:* While fire plays an important role, potential exists for some short-term negative impacts to the lesser prairie-chicken while implementing prescribed fire. The potential impacts depend upon what time of the year the fire occurs; extent of habitat burned; and burn severity including, but not limited to, disturbance of individuals, destruction of nests, and impacts to available cover for nesting and concealment from predators. Section 9(a)(1) of the Act, codified at 50 CFR 17.21, sets out the prohibitions related to endangered species. While section 4(d) of the Act allows alteration of prohibitions for actions likely to result in take of threatened species, neither the Act nor its implementing regulations have such a mechanism for endangered species. For parties interested in implementing any action that may result in take of a listed species, the Service has multiple mechanisms under the Act to permit those actions and interested parties can reach out to their local Service office for further assistance.

*Comment 28:* Two State agencies and several commenters asked for additional vegetation removal, treatment, and management actions to be added to the 4(d) rule. For example, commenters asked that all removal of nonnative and invasive native vegetation be included as an exception from take in the 4(d) rule (for example, Eastern red cedar, honey mesquite, Russian olive, black locust, Siberian elm). Additionally, multiple commenters (including both State agencies) asked that herbicide application for control of these species be included in the 4(d) rule.

*Our response:* As outlined in the Available Conservation Measures section of the rule, actions that could result in a section 9 violation would be those that would result in sustained alteration of preferred vegetative characteristics of lesser prairie-chicken habitat. Application of herbicides for removal of invasive brush species identified would not fall into this category. Areas dominated by those species are not considered lesser prairie-chicken habitat; thus, applying herbicides would not alter preferred vegetative characteristics of lesser prairie-chicken habitat. It is not necessary to create an exemption to the take prohibition for removal of nonnative or invasive vegetation identified in the comments because these activities will not be occurring in occupied habitat.

*Comment 29:* One State agency requested clarification on restrictions on farming in the Southern DPS. The commenter asked if farming activities would be prohibited in the Southern DPS, and noted that because those areas do not support lesser prairie-chickens, that take would likely not occur.

*Our response:* Any action that would result in "take," as defined in the Act, of a listed species would be prohibited under section 9 of the Act. Farming activities in areas where lesser prairie-chickens are not present would not be prohibited because they would not result in take. However, in other (likely limited) situations where lesser prairie-chickens are using cultivated lands during certain times, farming activities could result in take of the species. We suggest that interested parties discuss reach out to their local Service office to discuss specific situations and get further details.

#### *Public Comments*

Comments on Endangered Species Act and Service Policies

*Comment 30:* Multiple commenters stated that we had not used the best available information in the SSA report and/or the proposed rule. They pointed to our conclusions on drought, climate change, and population trends, and estimates of impact distances for various energy projects or the impacts of grazing. One commenter thought the rule used too many estimates and assumptions overall. They stated that the data we used are uncertain and inconclusive.

*Our response:* Section 4(b)(1)(A) of the Act requires that we make our determinations solely on the basis of the best scientific and commercial data available. Additionally, our Policy on Information Standards under the Act (published in the *Federal Register* on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106–554; H.R. 5658)), and our associated Information Quality Guidelines (<https://www.fws.gov/program/information-quality>), provide criteria and guidance, and establish procedures to ensure that our decisions are based on the best scientific data available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to list a species as an endangered or threatened species. In preparing our SSA report and this final rule, we used information from many different sources, including articles in peer-reviewed journals, scientific status surveys and studies completed by qualified individuals, Master’s thesis research that has been reviewed but not published in a journal, other unpublished governmental and nongovernmental reports, reports prepared by industry, personal communication about management or other relevant topics, conservation plans developed by States and

counties, biological assessments, other unpublished materials, experts' opinions or personal knowledge, and other sources. We have relied on published articles, unpublished research, habitat modeling reports, digital data publicly available on the internet, and the expert opinion of subject biologists to aid in our determination.

Also, in accordance with our peer review policy published on July 1, 1994 (59 FR 34270) and our 2016 memo on peer review, we solicited peer review of the lesser prairie-chicken SSA report from knowledgeable individuals with scientific expertise that included familiarity with the species, the geographic region in which the species occurs, and conservation biology principles; their feedback was incorporated into the SSA report (Service 2022, entire), which remains the foundation of our research along with our 2021 proposed rule and this final rule. Additionally, we requested comments or information from other concerned governmental agencies, Native American Tribes, the scientific community, industry, and any other interested parties during the comment period for the proposed rule. Comments and information we received helped inform this final rule. We found that the best available science indicates that the two DPSs of the lesser prairie-chicken warrant listing under the Act.

*Comment 31:* Multiple commenters argued that we should have come to a variety of different conclusions on the DPSs: that the Northern DPS should have been endangered rather than threatened, that the Southern DPS should have been threatened rather than endangered, or that the whole range should have been either endangered or not warranted for listing.

*Our response:* Sections 3(6) and 3(20) of the Act, respectively, define an endangered species as one that is in danger of extinction throughout all or a significant

portion of its range, and a threatened species as one that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. We have thoroughly assessed the best available scientific and commercial data for the species, as laid out in our SSA report and this final rule. We have determined that the primary threat impacting both DPSs is the ongoing loss of large, connected blocks of grassland and shrubland habitat. The Southern DPS has low resiliency, redundancy, and representation and is particularly vulnerable to severe droughts due to its location in the dryer and hotter southwestern portion of the range. Because the Southern DPS is currently at risk of extinction, we are listing it as endangered.

In the Northern DPS, as a result of habitat loss and fragmentation, resiliency has been reduced across two of the ecoregions when compared to historical conditions. However, this DPS still has redundancy across the three ecoregions and genetic and environmental representation. We expect habitat loss and fragmentation across the Northern DPS to continue into the foreseeable future, resulting in even further reduced resiliency. Because the Northern DPS is at risk of extinction in the foreseeable future, we are listing it as threatened.

*Comment 32:* Multiple commenters requested additional time to provide public comments on the proposed rule, requesting between 90 days and 6 months of additional time. The commenters pointed to the large amount of data available on the species and the difficulty of the issues. One commenter noted that the Service has the obligation to consider the best available data at any time, and others noted that multiple new studies would be published in the months following the closing of the public comment period.

*Our response:* We acknowledge the public/stakeholder interest surrounding this species and thus we extended the public comment period by an additional 30 days to give a total of 90 days for public review and comments. We consider the comment period described in the “Summary of Comments and Recommendations” of this final rule to have provided the public a sufficient opportunity for submitting both written and oral public comments. We followed Service practice and policy in managing the public comment process. We provided multiple opportunities and avenues for public involvement. Notifications of the comment period, meetings, and hearings were provided in the proposed rule, which was published in the *Federal Register*, posted on our website, and publicized in newspapers. The public comment period on the proposed rule was open for a total of 90 days, during which time we received more than 32,000 comments. We offered a variety of options for submitting comments; the public could submit their comments electronically, using a specified website, via U.S. mail, or orally at our two online public hearings. In addition, the Act requires the Service to publish a final rule within 1 year from the date we propose to list a species, unless there is substantial disagreement regarding the sufficiency or accuracy of the available data relevant to the determination. During development of this final rule, we did not receive any substantial new data that would necessitate us reopening the public comment period or necessitate us taking a 6-month extension due to substantial disagreement.

*Comment 33:* Several commenters asked why there was no NEPA analysis of the proposed listing rule. Some added that even if the Service holds the position that NEPA is not needed for a listing rule that it is needed for a 4(d) rule.

*Our response:* The courts have ruled that NEPA does not apply to listing decisions under section 4(a) of the Act, nor to 4(d) rules issued concurrent with listing (see *Pacific Legal Foundation v. Andrus*, 657 F.2d 829 (6th Cir. 1981); and *Center for Biological Diversity v. U.S. Fish and Wildlife Service*, No. 04-4324, 2005 WL 2000928, at \*12 (N.D. Cal. Aug. 19, 2005).

*Comment 34:* Several comments asked why there was no regulatory flexibility analysis prepared for the listing and 4(d) rule; some stated that the Service was required to complete those analyses.

*Our response:* In 1982, Congress added to the Act the requirement that classification decisions be made solely on the basis of the best scientific and commercial data available. In addition, the Conference Report accompanying those amendments made clear that one purpose of adding that language was to ensure that requirements like those in E.O. 12866 do not apply to classification decisions. Specifically, it states that "[E]conomic considerations have no relevance to determinations regarding the status of species and the economic analysis requirements of Executive Order 12291 [the predecessor of E.O. 12866], and such statutes as the Regulatory Flexibility Act and the Paperwork Reduction Act, will not apply to any phase of the listing process" (H.R. Conf. Rep. No. 97-835, at 20). We consider the 4(d) rule a necessary phase of the listing process to put in place protections for threatened species.

*Comment 35:* One commenter asked why the peer review comments were not made available at the time of the proposed rule, and requested that we make them available now.

*Our response:* In our August 22, 2016, memorandum updating and clarifying the role of peer review of listing actions under the Act, we state that we will summarize the opinions of all peer reviewers in the final decision document, and that our general practice will be to also post the peer review letters on <https://www.regulations.gov>. We have provided those reviews in the supplemental materials for this final rule that we have uploaded at this final rule's docket on <https://www.regulations.gov>.

*Comment 36:* Multiple commenters stated that we should assess the economic costs of listing. Some also stated that we should not list the lesser prairie-chicken because of the harm it would cause to local economies, including ranchers, farmers, and other small businesses.

*Our response:* Section 4 of the Act (16 U.S.C. 1533), and its implementing regulations at 50 CFR part 424, set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, the Secretary may determine whether any species is an endangered or threatened species because of any of the following five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination. The Act does not provide any language allowing the consideration of economic impacts when making listing decisions for species; listing decisions must be made solely on the basis of the best scientific and

commercial data available (16 U.S.C. 1533(b)(1)(A)) pertaining to the biological status of and threats to the persistence of the species in question.

*Comment 37:* Three commenters stated that the 4(d) rule cannot be "necessary and advisable" because it does not discuss the effects on private landowners. Two of those commenters stated that the necessary and advisable standard of the Act requires economic analysis of the costs of 4(d) rules on landowners, assessment of previous conservation provided by landowners and other groups, and calculation of what incentives for conservation 4(d) rules provide.

*Our response:* As discussed in our response to the previous comment, the Act clearly prohibits us from considering economic or similar information when making listing, delisting, or reclassification decisions. Congress added this prohibition in the 1982 amendments to the Act when it introduced into section 4(b)(1) an explicit requirement that all decisions under section 4(a)(1) of the Act be based "solely on the basis of the best scientific and commercial data available." Congress further explained this prohibition in the Conference Report accompanying the 1982 Amendments: "The principal purpose of these amendments is to ensure that decisions in every phase of the process pertaining to the listing or delisting of species are based solely upon biological criteria and to prevent non-biological considerations from affecting such decisions. These amendments are intended to expedite the decision-making process and to ensure prompt action in determining the status of the many species which may require the protections of the Act." (H.R. Conf. Rep. No. 97-835, at 19 (1982).)

Therefore, following statutory framework and congressional intent, we do not conduct or develop economic impact analyses for classification decisions. Additionally,

4(d) rules concurrently issued with a revised classification rule are inherently a part of a classification decision for a threatened species and are similarly exempt from any consideration of economic impacts.

*Comment 38:* One commenter stated that the Service did not attempt to reproduce all scientific information and data on the lesser prairie-chicken, in accordance with the Data Quality Act, and did not state which data were reproduced, and that this lack of explanation raises uncertainty in the SSA and listing process for the species, particularly where proxy species were used.

*Our response:* We strove to summarize the key findings of past research and publications, as they relate to the future viability of the lesser prairie-chicken and our decisions under the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.) (Service 2022, pp. 2–3). The response to Comment 30 lays out our policies and procedures for assessing information in our scientific documents. We affirm that we have complied with the policies laid out in that comment, and that we have provided a full and complete accounting of the data we used and the areas where we relied upon proxy species.

*Comment 39:* One commenter stated that the Service should provide statements from each peer reviewer regarding what data were reproduced, and on the degree of imprecision used in the SSA.

*Our response:* Our peer review policy published on July 1, 1994 (59 FR 34270), states that, for listing actions, we must solicit peer review regarding pertinent scientific or commercial data and assumptions relating to the taxonomy, population models, and supportive biological and ecological information for species under consideration for

listing. We have solicited complete and thorough peer review of our SSA in accordance with these policies.

*Comment 40:* One commenter asserted that we did not consider the appropriate factors in making our listing determination. They stated that we (1) inappropriately focused on the population trends of the species rather than determining whether the species met the definition of endangered or threatened, that we inappropriately focused on a decline in habitat, and that we inappropriately focused on whether conservation measures offset habitat loss. They added that courts have found that declines in habitat alone are not sufficient to make a threatened or endangered finding, and that a failure to offset habitat loss is not a required finding.

*Our response:* As discussed in our response to Comment 36, we must make listing determinations solely on the basis of the five factors and on the basis of the best scientific and commercial data available pertaining to the biological status of and threats to the persistence of the species in question. Data such as population trends and declines in habitat can help us understand the current status of the species and whether or not it meets the definition of an endangered or threatened species under the Act. However, as we describe in our response to Comment 31 and the **Final Listing Determination** sections for both species, we are not listing simply due to declines in habitat or declines in populations, but on the combined effect of threats associated with the five factors and our conclusion that the Northern DPS is at risk of extinction in the foreseeable future and that the Southern DPS is currently at risk of extinction.

*Comment 41:* One commenter noted that the proposed rule did not set forth any procedures for its implementation. The commenter suggested that a group of interested

parties and stakeholders be assembled to discuss procedures for implementation and their effects on landowners, and that separate groups be formed for the Northern and Southern DPSs.

*Our response:* The proposed rule and this final rule describe ways in which the provisions of the Act will be implemented. In **Available Conservation Measures**, we set out requirements under section 7 of the Act for Federal Agencies, describe issuance of permits, and list activities that would or would not constitute a violation of section 9 for the Southern DPS. For the Northern DPS, under **Final Rule Issued Under Section 4(d) of the Act**, we describe prohibitions and exceptions to those prohibitions that affect that DPS. Any additional questions regarding implementation of this final rule should be directed to the Southwest Regional Office (see **FOR FURTHER INFORMATION CONTACT**).

Throughout its work on the species, the Service has placed an emphasis on working with stakeholders to develop conservation options that are beneficial to both the species and stakeholders. We will continue to work with all stakeholders and realize that conservation of the lesser prairie-chicken cannot happen without this approach. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process begins with development of a recovery outline made available to the public soon after a final listing determination; see Available Conservation Measures for more details. The Act encourages cooperation with the States; we will continue to work with our partners, stakeholders, and the public throughout the recovery planning process.

*Comment 42:* Two commenters noted that the Service's definition of foreseeable future extended to only those effects we can reasonably forecast. They noted that one population trend analysis (Hagen et al. 2011) stated it could only be forecast 5 years into the future. The commenters concluded that the Service should thus only consider the foreseeable future to be the next 5 years. Another commenter stated that if we were to list any species with any chance at all to someday become extirpated, we would list nearly all species.

*Our response:* The Act does not define the term “foreseeable future,” which appears in the statutory definition of “threatened species.” Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis. The term “foreseeable future” extends only so far into the future as the Service can reasonably determine that both the future threats and the species’ responses to those threats are likely. In other words, the foreseeable future is the period of time in which we can make reliable predictions. “Reliable” does not mean “certain”; it means sufficient to provide a reasonable degree of confidence in the prediction. Thus, a prediction is reliable if it is reasonable to depend on it when making decisions.

As discussed in "Threats Influencing Future Condition," we consider the foreseeable future to be the amount of time on which we can reasonably determine a likely threat’s anticipated trajectory and the anticipated response of the species to those threats. We used all of the available data in creating our determination of the length of the foreseeable future. While the study quoted by the commenters only projects 5 years into the future, we used multiple other reliable data sources to project conditions of the species further into the future. Our judgment of foreseeable future was based on available

data related to habitat conditions, threats, and our geospatial analysis; we have a reasonable degree of confidence in projecting the future condition of the species beyond a 5-year timeframe.

*Comment 43:* One commenter asserted that the Service must not simply err on the side of caution when listing a species. They stated that if we were to list any species with any chance at all to someday become extirpated, we would list all nearly species.

*Our response:* As discussed in our response to Comment 30, we have made our determination solely on the basis of the best available information. As discussed in our response to Comment 42, for impacts in the foreseeable future, a prediction is reliable if it is reasonable to depend on it when making decisions. Therefore, we list any species where we reach the conclusion that it meets the definition of threatened or endangered, not any species that may have a chance to be extirpated at some unknown point in the future.

*Comment 44:* Multiple commenters provided input on future threats and the Southern DPS. Two commenters stated that future forecast climate trends in the Southern DPS did not support an endangered finding. Three commenters stated that our future projection analysis does not support endangered status for the Southern DPS, and that Scenario 5 is too pessimistic in regard to the Southern DPS.

*Our response:* As discussed in our response to Comment 31, the Act defines an endangered species as one that is in danger of extinction throughout all or a significant portion of its range. Under the Act, the statutory definition of "endangered species" as a species that "is in danger of extinction" clearly connotes an established, present condition. In contrast, the definition of a "threatened species" as one that is "likely to

become an endangered species within the foreseeable future" equally clearly connotes a predicted or expected future condition. Thus, in the context of the Act, an "endangered species" may be viewed as a species that is presently at risk of extinction. A "threatened species," on the other hand, is not currently at risk of extinction, but is likely to become so. In other words, a key statutory difference between a threatened and endangered species is the timing of when a species may be in danger of extinction, either now (endangered) or in the foreseeable future (threatened). Given that we concluded that the Southern DPS is in danger of extinction now, in the current condition, this determination is not based on future scenarios or future projections of climate trends or other threats.

*Comment 45:* One commenter asserted that if we considered the future effects of climate change, which were not included in our geospatial model, we would definitely conclude that the Northern DPS was endangered.

*Our response:* As discussed in our SSA report, the implications of climate change were not incorporated into the geospatial analysis related to habitat availability as there is no available data to inform specific land cover changes predicted to result from future climate change. However, our analysis of the status of the Northern DPS was not limited to the geospatial model. We fully considered all potential future effects of climate change in making our determination regarding the Northern DPS. Additionally, as noted in Comment 44, we consider only the current condition of a species when making an endangered finding.

*Comment 46:* Two commenters asserted that the Service had inappropriately identified actions that may result in a violation of section 9; specifically, actions that might alter lesser prairie-chicken habitat such as shrub removal and energy

infrastructure/power lines that could cause seasonal avoidance. The commenters state that neither of these actions meet the statutory definition of take under the Act.

*Our response:* While identifying actions that may result in a violation of the prohibitions outlined in section 9 of the Act, we understand that the prohibitions on take apply to the individual and not necessarily its habitat. However, there are instances where impacts to habitat would result in negative effects to individuals that rise to the level of take. Specifically, impacts that result in modifications to habitat would constitute a taking of a listed species under the definition of "harm" if the action results in significant modification of habitat that significantly impairs an essential behavioral pattern that would likely result in killing or injuring that species. This approach is consistent with judicial interpretations of the Act, as explained in *Babbitt v. Sweet Home Chapter of Communities for a Greater Oregon*, 515 U.S. 687 (1995) and *Arizona Cattle Growers' Association v. Fish and Wildlife Service*, 273 F.3d 1229 (9<sup>th</sup> Cir. 2001).

After reviewing the best available science and reviewing the statutory definitions within the Act, we have determined that actions that would result in sustained alteration of preferred habitat for the lesser prairie-chicken, such as conversion of native vegetation to other land uses or the construction of anthropogenic features that result in direct removal of habitat and avoidance of otherwise suitable areas, could significantly modify habitat to the point where essential behavioral patterns could be disrupted resulting in harm of individual lesser prairie-chickens.

*Comment 47:* One commenter requested that, given the wide range of the lesser prairie-chicken and the number of land uses affected by this final rule, the Service

provide a much more precise description of the activities that would be prohibited by the final listing.

*Our response:* The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to endangered wildlife: The prohibitions of section 9(a)(1) of the Act, codified at 50 CFR 17.21. We list some examples of activities in Available Conservation Measures that are and are not likely to result in a violation of section 9. However, it is impossible to create an exhaustive list of activities that would result in take because it is highly site-specific for each action as to whether take would occur. For those activities not covered in this final rule, we will assist the public in determining whether they would constitute a prohibited act under section 9 of the Act. Interested parties may contact their local U.S. Fish and Wildlife Service Ecological Services Field Office for any assistance.

*Comment 48:* One commenter was surprised that we listed the Southern DPS as endangered given that we listed the entire species as threatened in 2014. They argued that, since that time, populations have increased and many more conservation measures have been implemented.

*Our response:* This listing determination is a stand-alone determination, based on the most recent analysis of the status of the species. This determination benefitted from the SSA and the in-depth analysis, peer review, and partner review that went into that analysis. We acknowledge that significant habitat protection and restoration has been underway for the past 8 years. These efforts were fully evaluated within the SSA report and thus were fully considered when making our listing determination. As detailed in the

response to Comment 17, conclusions cannot be drawn regarding lesser prairie-chicken populations based upon short-term trends.

*Comment 49:* Several commenters stated that, if listing was warranted, we should "follow precedent" and find that it was warranted but precluded. One stated it was inappropriate for the Service to have withdrawn that option in litigation. One commenter stated that the Service should have used the warranted but precluded option given that we have discretion to prioritize critically impaired species, while giving lower priority to those species for which conservation efforts are in place. They noted because there are already extensive conservation efforts by States, landowners, and stakeholders underway or being developed that benefit the lesser prairie-chicken, it should be a low priority species for the Service.

*Our response:* The Act requires that we make a determination that listing is warranted, warranted but work to complete the determination is precluded by other listing proposals, or not warranted. The stipulated settlement agreement for lesser prairie-chicken only established a date by which we were to make 12-month petition finding, it did not remove the option of "warranted but precluded." While making a finding, we may consider using the "warranted but precluded" option where appropriate. We recognize the extensive conservation efforts in place by States, landowners, and other stakeholders. However, in this instance, we conclude that listing is warranted for both the Northern and Southern DPSs of the lesser prairie-chicken, and that completing this determination is not precluded by work on other pending proposals.

*Comment 50:* Two commenters asserted that the listing rule should apply only to areas that meet the definition of habitat as stated in the SSA report. They also stated that

project managers should not have to undergo section 7 consultation in areas that did not meet the definition of habitat for the lesser prairie-chicken. One example commenters provided was that companies should not have to consult on existing infrastructure, roads, or similar structures, as they do not provide habitat for the lesser prairie-chicken.

*Our response:* This rule would apply the prohibitions established under section 9 of the Act and outlined in the section 4(d) rule for the Northern DPS wherever take of the species may occur. Consultation under section 7 of the Act is required if a Federal agency has a discretionary Federal action that may affect a listed species. Actions that do not result in effects to a listed species would not require consultation under section 7 of the Act. This may include activities taking place in areas that are not habitat for the species, where there will be no direct or indirect effects to the species.

*Comment 51:* One commenter asked if additional data would be used to supplement the habitat quality analysis between the proposed and final rule. They also asked if field data collected as part of the mitigation framework could be used to provide more information on habitat quality conditions.

*Our response:* No additional data has become available at the scale or resolution necessary to evaluate habitat quality for the lesser prairie-chicken for incorporation into our spatial analysis. While there are some data available on properties enrolled in conservation programs (including the mitigation framework associated with the Rangewide plan), the monitoring and data collection is not standardized across programs, making it not possible to compare across programs. Additionally, this data is not collected at a scale that would be informative for an evaluation at the ecoregion or DPS scale. Because these data are selectively collected on properties being managed for the

lesser prairie-chicken, they would not be representative of habitat quality across the larger landscape. While spatial data were not available to include habitat quality in our spatial analysis, this does not mean that we ignored or did not incorporate efforts by conservation programs to increase habitat quality. Within chapters 3 and 4 of the SSA report, we include past and current benefits of conservation programs. We also project the likely future benefits of these efforts to improve habitat quality.

*Comment 52:* One commenter asked how we will regulate land use within the designated occupied range of the lesser prairie-chicken, given that it only occupies patchy areas within the larger occupied range.

*Our response:* The Act does not allow the FWS to regulate land use. Instead, the Act establishes prohibited actions in order to promote the conservation of listed species. In furtherance of this objective, we maintain a map depicting the current range of the species on publicly accessible websites. We suggest that project proponents contact U.S. Fish and Wildlife Service Ecological Services Field Offices within their State for specific information for their locality and assistance in evaluating potential impacts of their projects. As discussed within the SSA report, many acres included in the EOR are not lesser prairie-chicken habitat because either they are impacted by anthropogenic features, or they do not possess the vegetative composition and structure necessary to support the species.

*Comment 53:* Two commenters asked us to describe what recovery would look like for the lesser prairie-chicken; one of them noted that we had not described preferred conservation areas, goals, or objectives.

*Our response:* Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species; however, this planning process begins after we make final the listing of a species. The recovery planning process then begins with development of a recovery outline made available to the public soon after a final listing determination; see Available Conservation Measures for more details. The Act encourages cooperation with the States and other countries. We will continue to work with our partners and the public throughout the recovery planning process.

*Comment 54:* Two commenters asked about how E.O. 13985 (Advancing Racial Equity and Support for Underserved Communities) would affect implementation of the proposed rule and small electric cooperatives or individual landowners. One of those commenters asked us to make sure we distinguish between large-scale energy transmission projects and smaller transmission lines that support rural land and homeowners. The other commenter was concerned that the listing proposal would cause too much cost to those landowners and not provide enough benefit to landowners.

*Our response:* We acknowledge that some economic impacts are a possible consequence of listing a species under the Act; for example, there may be costs to a landowner to avoid potential impacts to the species or associated with the development of a habitat conservation plan. In other cases, if the landowner does not acquire a permit for incidental take, the landowner may choose to forego certain activities on their property to avoid violating the Act, resulting in potential lost income. However, as noted in our response to Comment 36 above, the statute does not provide for the consideration of such impacts when making a listing decision, nor would it be affected by E.O. 13985. Section

4(b)(1)(A) of the Act specifies that listing determinations be made solely on the basis of the best scientific and commercial data available. Such costs are therefore precluded from consideration in association with a listing determination.

*Comment 55:* One commenter stated that, because the lesser prairie-chicken is hybridizing with the greater prairie-chicken, the distinctness of both species is questionable, and the listing should be reconsidered.

*Our response:* We have included a review of the best available scientific information around the taxonomy of the lesser prairie-chicken in chapter 2 of the SSA report. For the SSA report and our listing determination, we followed the American Ornithologist's Union taxonomic classification for the lesser prairie-chicken, which is based on observed differences in appearance, morphology, behavior, social interaction, and habitat affinities. The simple fact that hybridization can or does occur is not an indication that the lesser and greater prairie-chicken are not distinct species. The best available science clearly indicates they are separate species.

#### Comments on Population Trends and Analysis

*Comment 56:* Multiple commenters submitted statements asserting that the lesser prairie-chicken had survived many threats over the past two thousand years. They made reference to the species surviving the Dust Bowl and the severe drought of the 1950s. The commenters concluded that because the species has survived these threats before, it will be able to continue to survive them into the future.

*Our response:* As discussed in response to Comment 17, the lesser prairie-chicken is a boom–bust species. This population characteristic highlights the need for habitat conditions to support large population growth events during favorable climatic conditions

so they can withstand the declines during poor climatic conditions without a high risk of extirpation. Since the 1930s and 1950s, the lesser prairie-chicken has seen a significant amount of habitat loss and fragmentation resulting in population declines. This reduction in redundancy and representation has resulted in a decrease in population resiliency. In past decades, fragmentation of lesser prairie-chicken habitat was less extensive than it is today, connectivity between occupied areas was more prevalent, and populations were larger, allowing populations to recover more quickly. In other words, lesser prairie-chicken populations were more resilient to the effects of stochastic events such as drought. As lesser prairie-chicken population abundances decline and usable habitat declines and becomes more fragmented, their ability to rebound from prolonged drought is diminished. Because lesser prairie-chicken carrying capacities have already been much reduced, if isolated populations are extirpated due to seasonal weather conditions, they cannot be repopulated due to the lack of nearby populations. An evaluation of the resiliency of populations (ability to withstand stochastic events) within these four ecoregions takes into account the already reduced species' range and associated reduction in redundancy and representation compared to historical conditions. Population resiliency has been reduced in the remaining areas making the species more susceptible to extirpation.

*Comment 57:* One comment stated that because the proposed rule did not include figures showing raw data from all survey efforts, including maps, GPS locations, and flight paths, the proposed rule could not be fully or accurately evaluated by the public.

*Our response:* The Service does not have access to some raw data that is considered confidential; therefore, we made our determination based on the best available

scientific information as required by the statute. The commenters did not explain how access to the raw data associated with surveys would have led to different conclusions relative to population trends within either DPS.

*Comment 58:* One commenter stated that the lesser prairie-chicken is a boom–bust species, but the proposed listing focused only on the population decreases and disregarded the population increases.

*Our response:* In our response to Comment 17, we outlined the boom–bust cycle of the lesser prairie-chicken. Within the analysis presented in the SSA report we present the best available scientific information regarding population abundance and trends. Population declines are an important metric because risk of extirpation and extinction increase as population abundance decreases. While populations will increase during years with increased precipitation, long-term population trends indicate continual declines in abundance, to the point that the species warrants listing.

*Comment 59:* One commenter noted that the proposed listing stated that loss of the Shinnery Oak Ecoregion would result in loss of the entire southwestern portion of the species' range; that commenter stated that there is no threat of loss of the entire Shinnery Oak Ecoregion.

*Our response:* As outlined in the SSA report, the Shinnery Oak Ecoregion has experienced a significant amount of habitat loss and fragmentation, which has resulted in depleted lesser prairie-chicken populations. With the existing level of habitat loss and fragmentation resulting in such low population numbers, under current climactic conditions, another wide-scale severe drought could occur in this ecoregion at any time, and the species may not be able to recover due to the reduced and fragmented nature of

the remaining habitat. Therefore, we determined that the species in danger of extinction in the Shinnery Oak Ecoregion.

*Comment 60:* One commenter stated that the listing should be delayed until further unbiased analysis could be completed by both State agencies and outside parties with regard to populations.

*Our response:* The SSA report includes the best available scientific information regarding past, current, and likely future population trends for the lesser prairie-chicken. While we compiled this information as part of our SSA report, it is important to note that all of these data were collected and analyzed by the State fish and wildlife agencies, including contractors working on their behalf, and outside experts. Additionally, after compiling this information into the SSA report, with which the State fish and wildlife agencies contributed, the State fish and wildlife agencies and independent experts reviewed the report prior to finalization of the report and our proposed listing. The SSA report includes an unbiased view of the best available science with regard to past, current, and likely future population trends.

*Comment 61:* Two commenters stated that the validity of the population data presented in the SSA report and the proposed rule, including the aerial survey results and population reconstruction data from Hagen et al. (2017), are questionable. They also stated that we made arbitrary decisions about which part of the data to use and that we manipulated data to support our position.

*Our response:* The SSA report contains the best available scientific information regarding past, current, and future populations for the lesser prairie-chicken. The SSA

report is explicit about the limitations associated with the information. The data for past and current lesser prairie-chicken populations largely fall into three categories.

First, the most robust and statistically sound abundance estimates for the species are the result of the aerial surveys that have been conducted annually since 2012 (with the exception of 2019). These surveys were designed to provide a statistically valid method to evaluate long-term population trends for the species. Again, there are limitations associated with this data as the survey was designed to track long-term trends and has been conducted for only 10 years. Since the aerial surveys were not conducted prior to 2012, we also provide the best available scientific information for the species prior to 2012.

Prior to 2012 the only surveys conducted for lesser prairie-chickens were ground-based surveys conducted by each State wildlife agency. Hagen et al. (2017) compiled and analyzed the ground-based survey data in the period 1965–2016 using population reconstruction techniques. Again, these data have limitations, as discussed in the SSA report, but represent the best available scientific information for populations from 1965 through 2012. Lastly, the only information on populations prior to 1965 consists of anecdotal observations, which we also provided within the SSA report. All of these data have limitations, and we make any interpretations of that information with those limitations in mind. We used the best available scientific information for each time period to describe population trends. However, we did not “manipulate” any data, or make arbitrary decisions about what data to use. The SSA report contains an accurate representation of the best available science and acknowledges the limitations associated with those data. Our characterization of the population data (and the larger SSA report)

has undergone peer review and review by the State wildlife agencies to ensure we have accurately characterized the best available scientific information. All interpretations and conclusions drawn by the Service were done so with the assumptions and limitations of all data regarding population abundance estimates fully considered.

*Comment 62:* One commenter noted that the SSA report says that currently the population in the Shinnery Oak Ecoregion makes up approximately 11 percent of the rangewide population estimate then goes on to state that the rangewide population estimate in 1960 was 50,000 birds. The commenter then asserted that, assuming that the Shinnery Oak Ecoregion made up 11 percent of the population in 1960, that would mean that the Shinnery Oak population would have been 5,500 individuals, which is not much different than the population estimate in 2020 from the aerial surveys.

*Our response:* The assumption that an ecoregion's current percentage of the rangewide population would be representative of the percentage from 1960 is not supported by the science. For example, historically lesser prairie-chicken populations in the Sand Sagebrush Ecoregion were among the highest in the range and currently the Sand Sagebrush has the lowest population estimates for any ecoregion. Additionally, historically the Short-Grass/CRP Ecoregion contained few if any lesser prairie-chickens. Today it has the largest population of any ecoregion. Similarly, there is no scientific evidence to support the assumption that the Shinnery Oak ecoregions current percent of the rangewide population would represent the same percentage that it did in the 1960s.

Second, the comment places too great an emphasis on the population estimate for 1960. As noted previously, the survey effort used to estimate population abundance in 1960 was very limited. This led to population reconstruction data that is imprecise for

specific years. It is crucial that these limitations be considered in any analysis of the data. Third, even assuming that the population estimates from 1960 were accurate, those are estimated numbers of males only, while the 2020 survey was a total population estimate. Thus, if one were to assume a 1:1 sex ratio, the total population estimate would be 100,000 birds in 1960 (not 50,000). As discussed in our responses to Comments 17 and 18, the best use of the population data is not to focus on any given year but instead to focus on long-term trends.

*Comment 63:* Two commenters stated that, according to the aerial survey results from 2020, lesser prairie-chicken populations are increasing in the Shinnery Oak Ecoregion.

*Our response:* As discussed in our responses to Comments 17 and 18, evaluating population health of the lesser prairie-chicken based upon short-term trends is not an appropriate use of the data to analyze long-term viability. When viewed in context of precipitation patterns as discussed in the response to Comment 17, from 2013–2020 we would expect populations to increase. The results of the aerial surveys show a significant decline in the Shinnery Oak Ecoregion in both 2021 and 2022 from an estimated 4,881 birds in 2020 to an estimated 1,569 birds in 2021 and an estimated 519 birds in 2022. This decline occurred due to a drought in the southern portion of the species' range, which negatively impacted populations. These new data from the 2021 and 2022 aerial surveys illustrate the influence of precipitation on annual abundance estimates and demonstrate the importance of analyzing long-term population trends. According to the most recent aerial survey results, lesser prairie-chicken populations in the Shinnery Oak Ecoregion have declined from an estimated 2,967 birds in 2012 to an estimated 519 birds

in 2022 but more telling is the evaluation included in the SSA report of long-term population declines.

*Comment 64:* One commenter stated that, because the Short-Grass/CRP Ecoregion supports the largest population of lesser prairie-chickens and the USGS modeling efforts projected the highest level of risk for that ecoregion, the Northern DPS should be listed as endangered.

*Our response:* Although the demographic model from Cummings et al. 2017, which the commenter refers to as the USGS modeling efforts, projected the Short-Grass Ecoregion had the lowest median growth rate among the ecoregions, it also has the greatest uncertainty in projected abundance. This uncertainty is likely due to the fewer years of demographic observations available in this ecoregion, making it difficult to infer a clear trend. We considered these modeling results, including the associated uncertainties and limitations, as part of our larger analysis and as one source of information. We evaluated all available science regarding modeling of future populations and conclude that while the declines may not be as drastic as predicted in the Cummings et al. (2017) report, multiple lines of evidence support likely declines in lesser prairie-chicken abundance in the future. While we considered the results of Cummings et al. (2017), we also incorporated all of the best available information to inform our decision. After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we find that the lesser prairie-chicken maintains populations in all three ecoregions in the Northern DPS, and has genetic and ecological representation in those ecoregions, as well as population redundancy across the entirety of the DPS. Thus, lesser prairie-chickens in the Northern DPS are not currently in danger

of extinction, and thus the Northern DPS does not meet the definition of endangered. Our future projections do indicate that habitat will become increasingly fragmented and less able to support lesser prairie-chickens. Overall, after assessing the best available information, we conclude that the Northern DPS of the lesser prairie-chicken is not currently in danger of extinction but is likely to become in danger of extinction within the foreseeable future throughout all of its range.

*Comment 65:* One commenter noted that populations in the Shinnery Oak and Sand Sagebrush Ecoregions have shown limited ability to increase in numbers recently following drought periods.

*Our response:* As discussed in our response to Comment 17, the lesser prairie-chicken is a boom–bust species. As outlined in the SSA report, habitat loss and fragmentation has resulted in boom years that have lower overall population abundance over time, and during the bust years population abundance is continually getting lower. In some ecoregions, like the Shinnery Oak Ecoregion in particular, the population abundance in bust years is dangerously close to zero. As relevant to the Sand Sagebrush Ecoregion, we project the increased impacts of threats on the species will continue to drive the population abundance in bust years closer to zero.

*Comment 66:* One commenter cited an interim assessment of lesser prairie-chicken population trends from 1997 through 2011 that was completed in 2012 for the Lesser Prairie-Chicken Interstate Working Group and noted that this assessment concluded largely increasing numbers with low extinction risks.

*Our response:* We considered the 2012 interim report in the SSA report (see the citation to Garton et al. 2016). This report has been updated and refined since that time.

The updated information was included in chapter 4 of the SSA report (see the citation to Hagen et al. 2017). It is important to note that this analysis does have some limitations in that it was based only on simulating demographic variability of populations and did not incorporate changing environmental conditions related to habitat or climate. This information, including its limitations, was included in the overall analysis and considered as part of the decision.

*Comment 67:* One commenter stated that, due to northward expansion, stable rangewide populations, and extraordinary conservation efforts, the lesser prairie should not be listed.

*Our response:* As detailed in responses to Comments 17, 18, and 61, the Service fully considered the best available scientific information regarding past, current, and future population trends for the lesser prairie-chicken. We also fully detailed and considered the expansion of the lesser prairie-chicken in the Short-Grass/CRP Ecoregion in the SSA report. Lastly, we worked directly with conservation entities delivering the conservation efforts for the species to ensure we accurately characterized those efforts within our SSA report. In summary, the Service fully considered population trends, the northern expansion in the Short-Grass/CRP Ecoregion, and the benefits of conservation efforts in our analysis and decision.

*Comment 68:* One commenter stated that, due to changes in survey protocols over time, direct comparison across time is not possible and the proposed listing is based upon assumptions, opinions, and speculation as opposed to the best available science.

*Our response:* As detailed in response to Comment 61, the Service included and fully considered the best available scientific information on past, current, and future

population trends. In recognition of the fact that there have been advancements in survey methodology and increased survey efforts since the 1960s, we used the best available science for each time period to characterize population trends for the species.

*Comment 69:* Multiple commenters provided statements relating rangewide and ecoregional precipitation patterns to annual and short-term population fluctuations. Specifically, the comments stated that the Service did not give enough consideration to the effects of drought related to population trends.

*Our response:* As discussed in our responses to Comments 17 and 18, precipitation patterns play a significant role in annual fluctuations in the estimated abundance of lesser prairie-chickens at both the rangewide and ecoregional scales. The analysis included in the SSA report accounts for this relationship and bases our conclusions regarding population status on long-term trends.

*Comment 70:* One commenter stated that populations of the lesser prairie-chicken have been stable to increasing over the past 60 years.

*Our response:* The SSA report provides a detailed summary of the best available scientific information with regard to historical and current population estimates and a summary of long-term population trends. This information was reviewed by independent peer reviewers as well as State and Federal partners. This information clearly indicates that the lesser prairie-chicken has experienced population declines over the last 60 years. While Hagen et al. (2017) estimated the minimum number of male lesser prairie-chicken annually based upon ground-based survey estimates as far back as 1960, those estimates for the years of 1960–1961 were based upon very limited survey efforts and thus not reliable. It was not until approximately 1970 that survey efforts had increased. In 1970 it

was estimated that there was a total of approximately 350,000 (assuming a 1:1 sex ratio) total lesser prairie-chickens and the most recent aerial surveys indicate total abundance in 2022, across all four ecoregions, of approximately 26,600 birds.

*Comment 71:* One commenter noted evidence that populations are declining and stated that populations are well short of the 10-year average population size established as part of the Range-wide Lesser Prairie-Chicken Conservation Plan.

*Our response:* We acknowledge that the current population levels are less than the 10-year average population goal established for each Ecoregion in the RWP. However, we evaluated the best available science regarding past, current, and likely future population trends for the lesser prairie-chicken. The determination of whether the species warrants listing under the Act was informed by an evaluation of the species' viability as presented in the SSA report, which does not establish defined population targets. We have not made any determination as to whether achieving the population goals established in the Range-wide Lesser Prairie-Chicken Conservation Plan would mean that the species would not warrant listing under the Act.

*Comment 72:* One commenter stated that, due to uncertainties associated with population estimates, the data are insufficient to determine that the populations have declined.

*Our response:* As discussed in response to Comment 61, the SSA and our determination used the best available scientific information regarding past, current, and likely future population trends for the lesser prairie-chicken. As with any science, there are limitations associated with these data and the Service has been explicit about these limitations for transparency and to ensure that these limitations were fully considered

while making our decision regarding the status of the species under the Act. We did not only consider population trends but also used our analysis of threats, conservation efforts, and habitat to inform our listing determination.

*Comment 73:* One commenter stated that the Service ignored the 2020 aerial survey results and relied too heavily upon the Hagen et al. 2017 study of quasi-extinction risks and pointed out limitations associated with that analysis.

*Our response:* We included the results of the aerial surveys, including the 2020 aerial survey, within our SSA report, and those survey results were fully considered in making our determination. While the Service considered the results of the Hagen et al. 2017 study in our analysis, we explicitly acknowledged the limitations associated with that study. One key limitation is that the analyses were based only on simulating demographic variability of populations and did not incorporate changing environmental conditions related to habitat or climate. Other limitations include the challenges of these data resulting from ground-based survey efforts as noted in Zavaleta and Haukos (2013, p. 545) and Cummings et al. (2017, pp. 29–30). While summarizing the information on the likely future population trends of the lesser prairie-chicken, we provide a summary of all available studies that project future trends. Each of these studies has specific limitations associated with them, and those limitations were fully considered while making our determination with regard to the status of the species.

*Comment 74:* Multiple commenters stated that using the 5-year average to report the current population estimate is misleading and that by doing so the Service precluded the aerial survey results from prior to 2015.

*Our response:* As stated in the SSA report, the results of the aerial survey efforts should not be taken as precise estimates of the annual lesser prairie-chicken population abundance, as indicated by the large confidence intervals. The best use of this data is for long-term trend analysis, and conclusions should not be drawn based upon annual fluctuations. This is why we report the population estimate for the current condition as the average of the past 5 years of surveys. The decision on how to best present the aerial survey data was made in close coordination with the State wildlife agencies who recommended this approach to the Service. While we use the 5-year average to estimate current population abundance for each ecoregion, this does not mean that we precluded the inclusion of aerial survey results prior to 2015 from our analysis. The figures in chapter 3 of the SSA report include the annual results from aerial survey efforts since 2012 when the surveys began, and this information was fully considered as part of our decision.

*Comment 75:* One commenter stated that Garton et al. (2016) concluded that populations are unlikely to fall below critical thresholds in the next 30 years, and that Hagen et al. 2017 concluded that the lesser prairie-chicken now occupies areas in northern Kansas that previously did not support the lesser prairie-chicken. The commenter concluded that these studies indicate that the species is healthy and that the Service must therefore revise the SSA.

*Our response:* Garton et al. (2016) used data collected through 2012, but Hagen et al. 2017 has since been updated to include data collected through 2016 and is included in the SSA report. The documented occupancy of areas that previously supported very limited numbers of lesser prairie-chicken in the Short-Grass/CRP Ecoregion was fully

discussed in the SSA report, included in our analysis, and fully considered as part of our determination. We have concluded that the best available science does not support the commenter's assertion that the species is healthy, and we are finalizing the proposal to list the species under the Act.

*Comment 76:* Multiple commenters noted that since 2013 the number of estimated leks included as part of the aerial survey report has nearly doubled. The commenters stated that the Service must revise the SSA report to include this information.

*Our response:* The abundance estimates included in the aerial survey report are a function of the estimated number of leks and the average number of birds per lek. The number of estimated leks will fluctuate annually depending upon precipitation. The inclusion of this metric in the SSA would not be a metric that would further inform our decision with regard to the status of the species under the Act because it does not accurately reflect the population health of the species.

*Comment 77:* One commenter stated that the Shinnery Oak Ecoregion historically had lower populations as compared to other ecoregions because it contained less preferable habitat, and when analyzing population trends the Service should use the 2012 aerial survey results as our baseline for this ecoregion to determine if populations have declines.

*Our response:* The best available science indicates that the Shinnery Oak Ecoregion did not historically have lower population estimates as compared to other ecoregions. Estimates for the Shinnery Oak Ecoregion included in the SSA report show that in the mid-1980s there were an estimated 20,000 males (40,000 total birds if one assumes a 1:1 sex ratio) in this ecoregion. For comparison purposes, the Short-Grass/CRP

Ecoregion, which now supports the largest population of lesser prairie-chickens, historically supported few, if any, lesser prairie-chickens. The SSA report provides a detailed summary of the best available scientific information with regard to habitat preferences by the lesser prairie-chicken in each ecoregion and provides a summary of the best available information related to population abundance per ecoregion. As discussed in response to Comments 17 and 18, the best available science does not support evaluating population status based upon annual fluctuations or short-term trends.

*Comment 78:* One commenter discussed the 50/500 rule introduced by Franklin (1980) and noted that the effective population sizes of the lesser prairie-chicken both rangewide and in each specific ecoregion are unlikely to fall below 50 or 500 individuals and thus the data indicate that current populations of lesser prairie-chicken are more than sufficient to perpetuate the species.

*Our response:* We note that the 50/500 rule is a general rule and should not be conflated with meeting the definition of a threatened or endangered species under the Act. The 50/500 rule is a theory that states that any population with an effective breeding size of less than 50 is at immediate risk of extinction purely due to demographic fluctuations, which occur in all populations. The theory also outlines that populations of less than 500 are at long-term risk of extinction due to loss of genetic variation resulting in loss of ability to respond to environmental variation. It is also important to note that many authors have questioned whether 500 individuals is adequate to prevent loss of genetic variation. For example, Lande (1995, entire), suggested that populations of less than 5,000 individuals would be subject to loss of genetic variation and increased risk of extinction. There is no single minimum population size number for all taxa, and

extinction risk depends on a complex interaction between life-history strategies, environmental context, and threat (Flather et al. 2011, entire). As referenced in the SSA report, the data and methodology used Hagen et al. (2017) to both calculate population abundance estimates in the past as well as to project future populations and extinction risks has limitations. A key limitation associated with this study is that the analysis was based only on simulating demographic variability of populations and did not incorporate changing environmental conditions related to habitat or climate. We consider all of the context presented with each study, and we make our listing determination based on all factors evaluated.

*Comment 79:* One comment stated that the Service should not be considering the lesser prairie-chicken for listing as the Service has analyzed listing for nearly two decades and found the species to be not warranted for listing in the past despite previous populations being lower than current numbers.

*Our response:* Beginning in 1998, we annually determined that the species warranted listing but was precluded by higher priority actions until 2012, when we proposed the lesser prairie-chicken for listing. On April 10, 2014, we published a final rule listing the lesser prairie-chicken as a threatened species under the Act (79 FR 19974) and concurrently published a final 4(d) rule for the lesser prairie-chicken (79 FR 20073). However, on September 1, 2015, the final listing rule for the lesser prairie-chicken was vacated by the United States District Court for the Western District of Texas, which also mooted the final 4(d) rule. We received a new petition to list in 2016 and on November 30, 2016, we published a substantial 90-day finding (81 FR 86315) and have been evaluating the status of the species since that time. Please see the **Previous Federal**

**Actions** section of the proposed listing rule for more details on the listing history of the lesser prairie-chicken (86 FR 29432, June 1, 2021). Regardless, any past decisions regarding the status of the species do not have any impact on the current decision. This listing determination is made based on the best available information.

*Comment 80:* One commenter stated that based upon current estimates from the aerial survey efforts, population abundance is similar to levels observed in 2003 and the 1960s.

*Our response:* As discussed in our response to Comment 62, the SSA report and our determination used the best available scientific information regarding past, current, and likely future population trends for the lesser prairie-chicken. As with any science, there are limitations with this information and any interpretations of those data must be made with those limitations in mind. One specific limitation associated with the population reconstruction data is that survey effort used to estimate population abundance in 1960 was very limited, and it was not until approximately 1970 that survey effort increased. In 1964 those data estimated approximately 50,000 males (100,000 total birds if a 1:1 sex ratio), by 1967 estimates were greater than 100,000 males (200,000 total birds if assume 1:1 sex ratio is assumed), and in the early 2000s there were greater than 50,000 males (100,000 total birds if a 1:1 sex ration is assumed). Current aerial survey estimates indicate the 5-year average range-wide population of 32,210 total birds. The best available scientific information does not support the statement that lesser prairie-chicken population abundance is similar today to what was estimated for the 1960s and 2003.

*Comment 81:* Multiple commenters discussed the methodology used in the Garton et al. (2016) and Hagen et al. (2017) population reconstruction effort. They stated that

this information is incomplete and misleading due to concerns with the methodology and lack of availability of underlying data. Additionally, multiple commenters noted that the population reconstruction estimates provided by Hagen et al. 2017 for the years of 1963–1969 indicate a rapid population increase and that precipitation patterns for those same periods show drought conditions. The commenters concluded that this estimate would indicate that the population data in that data set are not reliable.

*Our response:* As discussed in our response to Comment 30, we must make listing determinations based upon the best available scientific data. Additionally, as discussed in response to Comment 61, the SSA and this final rule used the best available scientific information regarding past, current, and likely future population trends for the lesser prairie-chicken. As with any scientific analysis, there are limitations with this information and any interpretations of those data must be made with those limitations in mind. While the data and methodology used to produce the population reconstruction estimates provided by Garton et al. (2016) and Hagen et al. (2017) certainly have limitations, they still represent the best available scientific information regarding past population estimates. Within the SSA report, we explicitly identify these limitations by noting, "The Service has identified concerns in the past with some of the methodologies and assumptions made in this analysis which largely still remain," and the challenges of these data are noted in Cummings et al. (2017, pp. 29–30) and Zavaleta and Haukos (2013, p. 545). While these concerns remain, including the very low sample sizes particularly in the 1960s, Garton et al. (2016) and Hagen et al. (2017) represent the only attempts to compile the extensive historical ground lek count data collected by State agencies to

estimate rangewide population sizes. We fully considered these limitations within our evaluation and this final rule.

*Comment 82:* Two commenters suggested that the Service should combine survey data from the various methodologies and data sets used to estimate population abundances in the period 1995–2020 to analyze trends for the Shinnery Oak Ecoregion.

*Our response:* As discussed in response to Comment 61, the SSA report and our determination used the best available scientific information regarding past, current, and likely future population trends for the lesser prairie-chicken. As with any scientific analysis, there are limitations associated with these data. While these studies represent the best available data for those timeframes, each methodology contains assumptions and limitations specific to that specific study and thus it is not appropriate to combine estimates from across methodologies into one graphic or table. When evaluating populations, we use these data only to compare trends. These trends consistently reveal declining populations.

*Comment 83:* Three commenters provided their own population projections based upon their assumption that a percentage of habitat loss would result in an equivalent decrease in populations. They both concluded that the lesser prairie-chicken would fall below the critical thresholds of 50 or 500.

*Our response:* As discussed in our response to Comment 1, there is not scientific support to indicate that a loss of a certain percentage of habitat would result in an equivalent loss of that same percentage of the population. While we agree that there is a direct relationship between habitat availability and population trends, the location of additional habitat losses or gains will dictate the magnitude of population response to

those changes. Thus, while we can conclude there is a direct relationship between population trends and habitat availability, we cannot conclude that a given percent reduction of habitat will result in a given percent reduction in population abundance. Additionally, as discussed in our response to Comment 78, it is important to note that the 50/500 rule is a general rule that was intended to project future risk of populations falling below a certain level. This concept should not be conflated with meeting the definition of a threatened or endangered species under the Act.

#### Comments on Conservation Efforts

*Comment 84:* One commenter stated that, instead of listing, the Service should work with USDA to get wildlife food plots included as a part of CRP, as this effort would benefit the lesser prairie-chicken.

*Our response:* The CRP already provides substantial benefits to the lesser prairie-chicken as outlined throughout the SSA report. We are not aware of any evidence that inclusion of wildlife food plots as part of CRP would result in additional conservation benefits for the lesser prairie-chicken, nor did the commenter provide any data to support this suggestion.

*Comment 85:* Multiple commenters stated that the Service did not consider conservation efforts as required by PECE (our policy for evaluation of conservation efforts when making listing decisions). They stated that we did not conduct a rigorous analysis of conservation efforts as required by PECE of each conservation effort and thus that we had not given adequate consideration or weight to those existing efforts. Commenters also noted that we did perform a PECE analysis for the existing conservation banks.

*Our response:* PECE is inapplicable in this situation because the purpose of PECE (68 FR 15100, March 28, 2003) is to ensure consistent and adequate evaluation of recently formalized conservation efforts when making listing decisions. The policy provides guidance on how to evaluate conservation efforts that have not yet been implemented or have not yet demonstrated effectiveness. The evaluation focuses on the certainty that the conservation efforts will be implemented and the certainty of effectiveness of the conservation efforts. The policy presents nine criteria for evaluating the certainty of implementation and six criteria for evaluating the certainty of effectiveness for conservation efforts. The result of a PECE analysis is that either there is adequate certainty that the new effort can be considered in the listing determination or there is not adequate certainty that the effort will be implemented and effective and thus it should not be considered.

The conservation efforts cited are ongoing (not new) and have a track record of implementation and effectiveness. Because these have already been in place and have a track record regarding effectiveness, we did not conduct a PECE analysis. Rather, the current and projected future effects of these conservation measures are fully included in our SSA. Because these conservation measures were fully considered within the SSA, they are also fully incorporated into the resulting listing determination. Therefore, separate analyses for these efforts are not needed under PECE.

*Comment 86:* One commenter stated that, in addition to the existing conservation efforts currently in place, other programs that have not been given an opportunity to operate can further encourage and enhance lesser prairie-chicken conservation efforts. Programs such as the Stakeholder Conservation Plan that was developed by a coalition of

oil and gas, agriculture, and environmental groups have not been given the opportunity to be introduced to landowners.

*Our response:* We are not aware of any other conservation efforts that are reasonably certain to occur and have beneficial impacts to the species. Specifically, the Stakeholder Conservation Plan is not a formalized plan or effort. This strategy was being developed for the purposes of seeking a section 10(a)(1)(B) permit under the Act. The strategy has not yet been finalized and thus is not considered in our analysis.

*Comment 87:* Multiple commenters noted deficiencies and corrections that are needed to the Range-Wide Conservation Plan for the Lesser Prairie-Chicken administered by the Western Association of Fish and Wildlife Agencies. Some commenters simply noted their concerns while others noted that the Service should not rely upon the plan while making determinations around the status or 4(d) rule.

*Our response:* While we fully incorporated the current and likely future conservation benefits being provided by the Range-Wide Conservation Plan for the Lesser Prairie-Chicken, we acknowledge the uncertainties associated with the plan and the potential effects of those uncertainties on the current and likely future benefits within the SSA report. These uncertainties were considered as part of the listing determination.

*Comment 88:* Two commenters stated that listing the lesser prairie-chicken would not provide any additional conservation for the species beyond what already exists.

*Our response:* The Act requires the Service to make a listing determination using the best available scientific and commercial data after conducting a review of the status of the species and after taking into account those efforts, if any, being made by any State or foreign nation, or any political subdivision of a State or foreign nation to protect such

species. Listing of the lesser prairie-chicken will result in significant new conservation for the species. The prohibitions outlined in this listing rule will now provide additional protections for the lesser prairie-chicken and its habitat beyond what is already outlined within the existing regulatory mechanisms section of the SSA report and this rule.

Additionally, conservation measures provided to species listed as endangered or threatened species under the Act include recognition as a listed species, planning and implementation of recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies, including the Service, and the prohibitions against certain activities are discussed, in part, in the **Available Conservation Measures** section of this document.

Voluntary programs, such as the Service's Partners for Fish and Wildlife program and the Natural Resources Conservation Service's Farm Bill programs offer opportunities for private landowners to enroll their lands and receive cost-sharing and planning assistance to reach their management goals while providing take coverage. The recovery of endangered and threatened species to the point that they are no longer in danger of extinction now or in the future is the ultimate objective of the Act, and the Service recognizes the vital importance of voluntary, nonregulatory conservation measures that provide incentives for landowners in achieving that objective. We are committed to working with landowners to conserve this species and develop workable solutions.

*Comment 89:* One commenter cited a report generated by Defenders of Wildlife, which estimated the amount of habitat lost since the 2015 court decision that removed the protections of the Act for the lesser prairie-chicken, and stated that this is evidence that conservation efforts have not adequately protected the species.

*Our response:* We are aware of the report and cited it in our SSA report. Pursuant to the requirements of the Act, we used the best available information to complete a thorough analysis of existing impacts and existing conservation efforts, and we considered the likely future implications of impacts and conservation efforts on the lesser prairie-chicken. The Defenders report includes some limitations; for example, much of their analysis areas falls outside of the lesser prairie-chicken estimated range (Defenders of Wildlife 2020, entire). Thus, it is not directly comparable to our analysis of habitat loss.

*Comment 90:* One commenter stated that NRCS and FSA did not provide formal comments on the SSA report and noted that NRCS and FSA could have provided input to inform the conservation projections included in the SSA.

*Our response:* We provided the opportunity for Federal partners delivering conservation programs benefiting the lesser prairie-chicken and the State wildlife agencies an opportunity to review the draft SSA report. While neither NRCS nor FSA provided comments related to the SSA report during the public comment period, the agencies did previously provide input that was used to inform the conservation projections in the SSA analysis. Specifically, while characterizing the past, current, and likely future benefits of the programs administered by NRCS and FSA, we worked directly with staff from both agencies. Employees from both agencies first assisted us by

providing the detailed information presented in chapter 3 of the SSA report regarding past and current benefits of their programs. Next, they assisted the Service in detailing the assumptions around the likely future benefits of the programs by providing the Service with program-specific information and discussing the likely future expected benefits of those programs.

*Comment 91:* One commenter asked how much long-term conservation has been achieved, how effective that conservation has been, and how much more is needed to achieve recovery.

*Our response:* We detail all conservation efforts within chapter 3 of the SSA report, including long-term conservation, for the lesser prairie-chicken. After a final listing determination, the Service will begin the recovery planning process where we identify conservation goals that could lead to either downlisting or delisting.

*Comment 92:* One commenter stated that our assumption around no net change in acreage under CRP fails to take into account the number of new acres of CRP that will likely convert cropland to grassland as a result of increased CRP payments under E.O. 14008 section 216.

*Our response:* From discussions with conservation partners within the range of the lesser prairie-chicken, the increase in rental payment included under E.O. 14008 will simply prevent declines in program participation, not result in increased acreage within the range of the lesser prairie-chicken. We do not expect that E.O. 14008 would result in increased participation over the next 25 years to a level that would impact our assumptions around no net change in future CRP acreage within the range of the lesser prairie-chicken.

*Comment 93:* Multiple commenters stated that the Service did not fully consider conservation efforts designed for industry enrollment. Specifically, comments noted that one of the key principles of agreements such as the Range-Wide Conservation Plan for the Lesser Prairie-Chicken and the associated oil and gas CCAA is to create financial incentives to minimize impacts to the species by minimizing new acreage impacted through co-location of development.

*Our response:* We fully considered efforts to co-locate impacts from conservation efforts designed for industry enrollment and specifically the industry enrollment in the efforts administered by WAFWA. We accomplished this by including assumptions, detailed below, which were informed by analyses conducted by WAFWA, within our analysis projecting the future effects of oil and gas development within the SSA report. For details on this, please see appendix C of the SSA report (Service 2022). After projecting the number of new wells that will be drilled per ecoregion that would impact potentially usable space for the lesser prairie-chicken, we then converted the number of wells to the number of acres that will be impacted by those wells. To calculate the actual estimated impacts, we begin with 69.9 ac (28.3 ha) per well, which is the area of a circle with a 984-ft (300-m) radius, which we concluded for this analysis is the impact of an individual well on the lesser prairie-chicken. We then estimated how much of the area for each well is likely to be already impacted by existing features. WAFWA estimated that, on average, new wells mitigated through their mitigation strategy overlapped existing features by 56.7 percent. Additionally, WAFWA had previously estimated that, prior to the range-wide conservation plan implementation, wells overlapped existing features by 42 percent. In February 2019, WAFWA also estimated that approximately 25 percent of

wells drilled within the range of the lesser prairie-chicken were being mitigated for under their mitigation strategy in 2017. Based on that information, we concluded that 25 percent of new wells would have an overlap of 56.7 percent with existing infrastructure, and 75 percent of new wells would have an overlap of 42 percent. Using the weighted average, we estimated that, when overlap is considered, each new well would impact 38 acres. We fully incorporated the efforts to co-locate infrastructure while projecting the likely future impacts of oil and gas development within the SSA report and thus we fully considered those efforts in our decision.

*Comment 94:* Multiple commenters stated that we did not fully consider that the CHAT (crucial habitat assessment tool) categories that were included under the Range-Wide Plan implemented as part of the oil and gas CCAA administered by WAFWA have created avoidance of those priority conservation areas and that industry is avoiding high-quality habitat.

*Our response:* The best available information that we have does not indicate that the Range-Wide Plan and the associated oil and gas CCAA have resulted in industry avoiding higher quality lesser prairie-chicken habitat and placing wells in spaces of less value to the lesser prairie-chicken. To evaluate this assertion, a comprehensive analysis is needed of wells being processed under the mitigation framework and also those wells for which companies are choosing not to mitigate. WAFWA provided a snapshot of this scenario when they analyzed all the wells drilled in the range of the lesser prairie-chicken in 2017 and provided a summary of their findings to the Advisory Committee of the RWP in February of 2019. This analysis indicated that a total of 656 wells were drilled across the lesser prairie-chicken range in 2017. Of those, 308 were drilled by companies

enrolled in the rangewide plan or CCAA, and the remaining 348 wells were drilled by companies not participating in those agreements. Of those 308 wells drilled by participating companies, only 161, or less than 25 percent of the total number of drilled wells, were enrolled in the mitigation program. This information, while limited in its scope, represents the best available information regarding this issue, and we fully considered it in making our determination.

WAFWA also produced a habitat quality index, which combined the habitat quality and the CHAT category, and found that wells that were drilled by participating companies that were not mitigated for had a higher habitat quality index, which would have resulted in increased mitigation costs as compared to wells that the same enrolled companies did mitigate. Based upon this finding, WAFWA concludes, "Oil and gas companies appear to be making a conscious choice to avoid mitigating for wells in higher quality habitat," and "Wells drilled by participants that were not mitigated under the plan had the highest habitat quality and per well mitigation costs" (WAFWA 2019, unpaginated). While there are financial incentives to minimize impacts on wells mitigated for going through the mitigation framework, there is no evidence to support the assertions that the industry is completely avoiding high-priority CHAT areas or areas with higher habitat quality.

*Comment 95:* One comment stated that having two DPSs will reverse the gains that have been made by the WAFWA CCAA to work on increased dispersal between and amongst ecoregions using focal areas and connectivity zones.

*Our response:* The CCAA covering oil and gas development administered by WAFWA adopted a mitigation framework outlined in the Range-wide Conservation Plan

for the Lesser Prairie-Chicken, which was also developed by WAFWA. While this mitigation strategy incorporates focal areas and connectivity zones, it is important to note that there are no focal areas or connectivity zones connecting the Southern DPS (Shinnery Oak Ecoregion) to the Northern DPS (Mixed-Grass, Sand Sagebrush, and Short-Grass/CRP Ecoregions). Through this effort, there has been no attempt at reestablishing dispersal between the Shinnery Oak Ecoregion and the rest of the range and thus there have been no gains that would be reversed.

*Comment 96:* One comment stated we ignored conservation efforts by private entities. In regard to the removal of infrastructure by private entities, the commenter notes that we stated we do not have data but points out that we did project future well drilling based upon past rates.

*Our response:* We only project restoration efforts for the removal of energy infrastructure occurring through the identified entities delivering conservation. We acknowledge that some removal of infrastructure likely occurs outside of the entities identified, but no data exist to provide an estimate specific to the likely future efforts on lesser prairie-chicken usable area within our analysis area. As accurately noted in the comment, we were able to project future drilling of oil and gas wells but we did not project future removal of infrastructure. Data are available to evaluate past trends and rates with regard to drilling of new oil and gas wells, and thus we were able to evaluate those data and project future development. However, no data are available to evaluate past trends and rates with regard to voluntary removal of infrastructure across our analysis area, and the commenter provides no data or source of information that could further inform our analysis, so we have no basis to project future rates of removal. This

situation was explicitly acknowledged in our SSA report and was fully considered while making our listing determination.

*Comment 97:* One comment stated that the Service failed to quantify or estimate the positive effect the cessation of hunting had on the population.

*Our response:* As described in the SSA report, the lesser prairie-chicken has not been hunted since 1973 in Colorado, 1996 in New Mexico, 1998 in Oklahoma, 2009 in Texas, and 2014 in Kansas. The positive benefits of the cessation of hunting restrictions are already reflected in the current condition status of the species, and we do not expect any additional benefits to arise.

*Comment 98:* One comment stated that the Service dismissed existing efforts and the proposed rule provides insight that conservation efforts are not worthwhile because they are "targeted toward voluntary, incentive-based actions in cooperation with private landowners" and that the "level of future voluntary participation in these programs can be highly variable depending on available funding opportunities for other revenue sources, and many other circumstances."

*Our response:* The quoted statements were included in the SSA report and the proposed rule to acknowledge the uncertainty associated with projecting the likely future benefit of conservation actions. It is because of this uncertainty that we project a range of plausible outcomes (low, medium, and high projections for each conservation effort). This uncertainty is important for the Service to consider while evaluating the status of the species as well as making a listing determination. These statements in the SSA do not imply that these efforts are not worthwhile or beneficial.

*Comment 99:* One comment stated that the Service failed to consider the Service's Land-Based Wind Energy Guidelines (LWEG) as a conservation effort and its effects on how wind energy development impacts the lesser prairie-chicken.

*Our response:* Our analysis of current condition accounts for all existing wind energy developments in and adjacent to the lesser prairie-chicken range. These include wind developments that were constructed before and after the creation of the LWEG. The extent of avoidance of impacts to lesser prairie-chickens from proactive conservation and subsequent use of the LWEG by wind energy developers is reflected in the degree of impacts identified in the current condition. The SSA fully analyzed and considered these efforts within our analysis of the current condition in chapter 3 of the SSA report as we evaluated the actual effects of constructed projects. For future impacts, we projected acres of future development based upon past rates and realized impacts of past development and thus we have incorporated any realized minimization resulting from voluntary siting considerations (including the LWEG) on the lesser prairie-chicken.

*Comment 100:* One commenter stated that the renewable energy industry has addressed lesser prairie-chicken conservation through voluntary research and mitigation. The commenter stated that these efforts support reducing ongoing and future threats to the species, thereby obviating the need for listing.

*Our response:* A variety of conservation efforts have considered impacts to the lesser prairie-chicken. We note that while funding for research can advance the understanding of impacts to the species, it does not necessarily result in conserving the species. Within the SSA report, our analysis indicates that, despite conservation efforts, the lesser prairie-chicken has experienced habitat loss and fragmentation that has

negatively impacted viability of the species. Additionally, our analysis indicated that despite the level of conservation efforts in the future, habitat loss and fragmentation is expected to outpace habitat restoration efforts, resulting in further decreases in viability. As discussed in the SSA report, additional threats to the lesser prairie-chicken will further impact the species' status.

*Comment 101:* One commenter stated that, to allow for independent evaluation of program effectiveness to inform the conservation status of the species, spatial data for mitigation areas for programs like the RWP needs to be publicly available.

*Our response:* The spatial data associated with mitigation areas within programs like the RWP and the associated Oil and Gas CCAA are not publicly available due to privacy concerns of both surface landowners and mineral development companies. Each agreement establishes how data will be managed. The relevant data is summarized, without information identifying specific parcels or mineral interests, to both provide privacy for private landowners and allow an evaluation of the effectiveness of the program. We determined that the data that are publicly available for these programs provide both the public and the Service enough detail to evaluate the program while still protecting privacy concerns of landowners and development companies.

*Comment 102:* One commenter quoted from the proposed rule that the actual conservation benefit provided to the lesser prairie-chicken by voluntary conservation programs varies greatly and is difficult to summarize because it depends on the location and the specific actions being carried out for each individual agreement. The commenter went on to say that this statement means that voluntary conservation agreements, while possibly helpful for conservation, provide no certainty of success due to their very nature.

They stated that there is no secured funding and no guarantee that participants will enroll in programs, and programs may need to be severely modified in order to attract participants.

*Our response:* We have found voluntary conservation agreements, based upon their track record, are providing conservation benefits for the lesser prairie-chicken, and we have no information to indicate those included in our analysis will not continue to provide benefits. Within the SSA report we state, “the actual conservation benefit provided to the lesser prairie-chicken by programs varies greatly and is difficult to summarize because it depends on the location and the specific actions being carried out for each individual agreement” (Service 2022, p. 96). This statement acknowledges that simply a total number of acres where conservation efforts are implemented would not be informative for a biological evaluation of the species. For that reason, we did not provide the total acres of conservation within chapter 4 of the SSA report or this final rule. We believe that the voluntary conservation efforts we discuss in the SSA report and this rule have demonstrated a history of effectiveness and a certainty to remain in place. That is why we incorporated the beneficial results of these efforts into the analysis for the listing determination.

*Comment 103:* One commenter stated that habitat avoidance by companies enrolled in the New Mexico CCA/CCAA should be considered. The comment also stated that because of the New Mexico CCA/CCAA there has been no loss of habitat to cropland or wind energy development because private landowners have agreed not to implement these land uses.

*Our response:* The conservation benefits of the New Mexico CCA/CCAA were fully considered within the SSA report and the listing determination. The New Mexico CCA/CCAA does not require avoidance of lesser prairie-chicken habitat by industry participants but does charge a fee to participants for impacts in areas that may impact the lesser prairie-chicken. These fees are then used to implement conservation actions to benefit the species. We worked with the administrator of the New Mexico CCAA to ensure that we accurately characterized the conservation benefits arising from the program. While landowners enrolled in the CCAA are prohibited from converting lesser prairie-chicken habitat to cropland or wind energy development, this does not mean there has been no additional habitat loss in New Mexico as not all acres of lesser prairie-chicken habitat in New Mexico are enrolled. We are aware of multiple impacts, such as energy development from both wind development and petroleum extraction, which have resulted in additional habitat loss and fragmentation. Additionally, impacts to the lesser prairie-chicken beyond cropland and wind energy development, such as mesquite encroachment, have resulted and will continue to result in habitat loss for the species as discussed in the SSA report.

*Comment 104:* Two commenters stated that the Service incorrectly discounted the restoration efforts completed by WAFWA within the Sand Shinnery Oak Ecoregion by not counting efforts to chemically suppress sand shinnery oak as restoration efforts.

*Our response:* We define restoration efforts as activities that convert nonusable area to usable area for the lesser prairie-chicken. We define enhancement efforts as those activities that enhance area that is already habitat for the lesser prairie-chicken; these efforts serve to maintain or increase habitat quality for the lesser prairie-chicken. While

evaluating the benefits being provided by WAFWA through the RWP and the associated Oil and Gas CCAA, we did not include efforts to chemically suppress sand shinnery oak as restoration efforts, even though within their annual reports WAFWA terms these actions as restoration. We did not include those acres as restoration because these actions are occurring on acres that are already lesser prairie-chicken habitat and because the purpose of these efforts is to enhance or optimize the quality of existing habitat by manipulating the vegetative composition to reduce the percentage of sand shinnery oak and increase the percentage of grasses and forbs. As a result, we considered these actions as enhancement efforts in the SSA analysis.

*Comment 105:* One commenter stated that the Oil and Gas CCAA administered by WAFWA has been successful. The comment stated that the July 2019 audit found no conservation deficiencies and that the Service provided no indication that steps should be taken to reduce or eliminate the possibility of listing the lesser prairie-chicken.

*Our response:* The audit completed in July 2019 found a variety of deficiencies with the program. These deficiencies included concerns regarding financial management, accounting, compliance, and conservation delivery. Since the audit was completed, WAFWA hired a consultant to assist them with evaluating options to address any deficiencies with the CCAA. This process culminated with a report titled "Range-wide Oil and Gas Candidate Conservation Agreement with Assurances Realignment Phase 1 Findings and Recommendations" finalized in December 2020. This report reaffirms the deficiencies identified in the 2019 program audit and identifies steps that address those concerns. This report contains a summary of the financial concerns and CCAA compliance concerns associated with the CCAA. Additionally, the Findings and

Recommendations report also provides a summary of concerns that the Service identified regarding the effectiveness of the mitigation program and the Service' recommended solutions in section 2.5.2. These concerns are related to the lack of emphasis on restoration efforts, needed increase in the proportion of permanent mitigation required by the program, adjustments needed to the metrics used to quantify impacts and offsets, and adjustments needed to the impact radii assigned to various anthropogenic features. Additionally, within section 3.3 the Findings and Recommendation report states, "After extensive review, ICF concurs with the four defensibility concerns identified by USFWS staff" and recommends that WAFWA amend the mitigation framework and adopt the changes recommended by the Service.

*Comment 106:* One commenter stated that the grazing analysis is incomplete. The comment stated that, within the proposed rule, the Service recognizes that grazing is a dominant land use within the lesser prairie-chicken range; however, the proposed rule states there are no data. The comment points out that the Service has annual reports resulting from two agriculture CCAAs and states that it is wrong for the Service to make the statement that data do not exist to quantify rangewide extent of grazing practices and their effects on habitat.

*Our response:* Within the SSA report we state, "while domestic livestock grazing is a dominant land use on untilled range land within the lesser prairie-chicken analysis area, geospatial data do not exist at a scale and resolution necessary to calculate the total amount of livestock grazing that is being managed in a way that results in habitat conditions that are not compatible with the needs of the lesser prairie-chicken" (Service 2022, p. 39). We have annual reports summarizing the enrollment and actions

implemented on enrolled acres for the agricultural CCAAs to assist us in summarizing the conservation benefits provide by these programs, which were included within the SSA report and our determination. We do not have spatially explicit data at the scale and resolution needed to determine which grazed areas possess the vegetative composition and structure necessary to support the lesser prairie-chicken.

*Comment 107:* One commenter detailed the excess mitigation credits which are currently enrolled through the mitigation framework being administered by the Western Association of Fish and Wildlife Agencies as evidence that the oil and gas industry is committed to the conservation of the lesser prairie-chicken and thus listing is not warranted.

*Our response:* We are aware that in the past the WAFWA has had excess mitigation credits enrolled through their mitigation framework. Specifically, WAWFA had more conservation acres enrolled than what was needed to offset the impacts realized through their mitigation framework. The conservation benefit provided by these acres providing the excess mitigation were fully evaluated and considered in chapter 3 of the SSA report. The WAFWA recently completed a process to “right-size” the mitigation program to ensure that program is financially stable. The end result of this process was a reduction in the amount of excess mitigation enrolled and thus a decrease in the number of enrolled conservation acres reported in the "Conservation Efforts" section and section 3.4.1.1 of the SSA report (Service 2022). The unimpacted acres enrolled to provide mitigation decreased from 128,230 acres to a total of 49,717 acres across all five states. This includes 17,000 acres in the mixed grass ecoregion (with 2,708 of those acres under permanent conservation), 17,708 acres in the sand sagebrush ecoregion (with 15,810 of

those acres under permanent conservation), 6,036 acres in the short grass ecoregion (with 2,915 of those acres under permanent conservation), and 8,973 acres in the shinnery oak ecoregion (with 1,208 of those acres under permanent conservation). After fully evaluating and considering the benefits of the conservation programs (this includes the benefits of the excess mitigation as referenced in the comment) we have concluded that the best available science does not support the commenter's assertion that listing is not warranted, and we are finalizing the proposal to list the species under the Act.

*Comment 108:* One commenter asserted that, due to success of the RWP, the species is now more resilient to drought as evidenced by the relative rates of population decrease during two recent drought periods. Specifically, the comment stated during the drought period from 2012 to 2013 (i.e., before the RWP was in effect), there was a substantial population decline of approximately 47 percent. More recently, in 2019 to 2020, there was another drought period over some of the lesser prairie-chicken range; however, there was much less of a decrease in lesser prairie-chicken populations at approximately 14 percent. The commenter believes this data validates that the conservation strategy is working and the species is now more resilient to stochastic events.

*Our response:* Within the SSA report, we fully evaluated the benefits being provided by existing conservation efforts, including the Range-Wide Conservation Plan and associated Oil and Gas CCAA, and thus those benefits were fully considered within our decision. The drought occurring from 2019 to 2020 was not as severe or as widespread as the drought from 2012 to 2013, so we do not expect the effect on abundance of lesser prairie-chickens to be as extensive. There is no evidence to support

the conclusion that population response to the recent drought was less severe due to the success of the rangewide conservation plan.

*Comment 109:* One commenter noted a new conservation program that could potentially benefit the lesser prairie-chicken. The Southern Plains Grassland Program through the National Fish and Wildlife Foundation seeks to work closely with nonprofit and government partners and the ranching community to bring important financial and technical resources to address the health and resilience of the grasslands of the Southern Great Plains with plans to make more than \$10 million in grants available over the next 5 years.

*Our response:* We added information about this effort to chapter 3 of the SSA report, but we did not make changes to future projections because no data is available on what actions will be implemented and where those actions will occur. The actual benefits of this program will depend upon what applications are submitted and chosen for funding. This program is a grassland conservation program and not focused solely on the lesser prairie-chicken, and thus projects will focus on all grasslands in the Southern Great Plains (not restricted to lesser prairie-chicken habitat). We acknowledge that the program will likely result in some future benefits to the lesser prairie-chicken and considered this idea while making our listing determination but were not able to quantify the future benefits to the lesser prairie-chicken.

*Comment 110:* One commenter stated that the Service failed to consider the benefits of the Dunes Sagebrush Lizard Conservation Agreements in Texas and the Nationwide Monarch Butterfly CCAA for Energy and Transportation Lands within our analysis.

*Our response:* While these conservation programs are being implemented, we do not believe they are providing or will provide conservation for the lesser prairie-chicken such that they will impact the overall viability of the species. While the Dunes Sagebrush Lizard Conservation Agreements in Texas are being implemented in areas that overlap with portions of the historical range of the lesser prairie-chicken, there is no overlap with areas that are currently or have recently been known to be occupied by the lesser prairie-chicken. The Nationwide Monarch Butterfly CCAA for Energy and Transportation Lands largely implements conservation measures to benefit monarch butterflies within the rights-of-way of existing anthropogenic features. As discussed in the SSA report, the lesser prairie-chicken largely avoids areas adjacent to anthropogenic disturbances and these areas are not considered lesser prairie-chicken habitat. Thus, any conservation within these areas would not provide conservation benefits for the lesser prairie-chicken that would affect our analysis related to species viability.

#### Comments on Lesser Prairie-Chicken Biology and Threats

*Comment 111:* Multiple commenters noted the increased populations and expanded range of the species in the Short-Grass/CRP Ecoregion and concluded that resilience and adaptability of the species was reflected by the success of this ecoregion.

*Our response:* We fully evaluated and considered the increase in lesser prairie-chicken populations in the Kansas portion of the Short-Grass/CRP Ecoregion. As discussed in the SSA report, extensive planting of native mixed- and tall-grass plant species starting in the mid-1980s resulted in an increase of suitable habitat for the species and an increase in population abundance. The continued existence of these newly expanded populations is almost exclusively reliant upon continued implementation of

voluntary, short-term conservation efforts, primarily CRP. Within our analysis included in the SSA report, we project that habitat in the Short-Grass/CRP Ecoregion and in the Northern DPS will decrease. A review of the best available scientific information indicates that, despite the recent population increases in this one ecoregion, habitat will continue to decrease across the Northern DPS and viability of the lesser prairie-chicken in this area will continue to decrease.

*Comment 112:* One commenter stated we should have executed more searches for the species in southwest Nebraska.

*Our response:* We recognize that lesser prairie-chickens have been documented in Nebraska based on specimens collected during the 1920s. Sharpe (1968, pp. 51, 174) considered the occurrence of lesser prairie-chickens in Nebraska to be the result of a short-lived range expansion facilitated by settlement and cultivation of grain crops. We coordinated with the State fish and wildlife agencies related to our analysis area and determined that there is not enough evidence to indicate that areas within Nebraska are occupied by the lesser prairie-chicken; thus, we did not include those areas within our analysis.

*Comment 113:* One commenter disagreed with our decision to define usable habitat as areas with at least 60 percent potential usable, unimpacted land cover within 1 mile. The commenter asserted that lesser prairie-chickens can carry out their life cycle in areas with a lower percentage of suitable habitat. They quoted several studies (Hagen and Elmore 2016; Ross 2016a; Spencer et al. 2017; Sullins et al. 2018) and concluded that these studies showed that lesser prairie-chickens use areas with less suitable habitat. The commenter also noted that many leks currently containing lesser prairie-chickens fall

outside the analysis area defined by these parameters. The commenter concluded that it was inappropriate for the Service to use the 60 percent number to define habitat.

*Our response:* As identified by many authors (Ross et al. 2016a, entire; Hagen and Elmore 2016, entire; Spencer et al. 2017, entire; Sullins et al. 2019, entire), maintaining grassland in large blocks is vital to conservation of the lesser prairie-chicken. Multiple analyses support our conclusion that landscapes consisting of greater than 60 percent grassland are required to support lesser prairie-chicken populations.

Appendix B, part 3 of the SSA report provides a comparison of publicly available lek data and the areas that met the 60 percent threshold. This analysis indicates that 90 percent of current leks detected over the previous 5 years occurred on areas that met the 60 percent potential usable habitat within 1 mile. This analysis is not used for specific determinations of habitat suitability. We used this information only as a rough guide to determine if our model captured the majority of known leks. We interpret this information with caution as the lek data have limitations, specifically the fact that the presence of a known lek does not indicate anything about the current condition of the landscape as all leks from the past 5 years are considered active. Additionally, the presence of a lek within the past 5 years does not indicate anything about local population health. For example, lesser prairie-chicken may still be attending a lek site in a highly fragmented landscape, but those populations may be in the midst of long-term declines and no longer be capable of maintaining themselves. This is because lesser prairie-chicken populations will not disappear immediately but instead would see declines over an extended period of time before eventually becoming extirpated.

*Comment 114:* One commenter asked how the lesser prairie-chicken could be endangered when the Service had stated that only 25,000 ac (10,120 ha) were needed for conservation of the species, and yet we have stated that over a million acres are present across the range of the species.

*Our response:* Neither the SSA report nor the listing determination state that only 25,000 ac are needed for the conservation of the species. The commenter may be referring to a 2012 white paper that references the need for a minimum of one stronghold per ecoregion that is a minimum of 25,000 ac, has an easement that addresses both surface and subsurface management, and is connected to other strongholds (Service 2012). However, this white paper does not state that only 25,000 ac are needed for the species as a whole, nor does the paper state that conserving this amount would prevent the need to list the species as endangered or threatened. We simply recommended that conservation partners incorporate these concepts into their conservation planning and delivery efforts for the species. We have not established a minimum number of acres needed to conserve the species.

*Comment 115:* One commenter stated that listing was not warranted because habitat loss has decreased in recent years.

*Our response:* The comment does not provide any support for this statement, and we are not aware of any analysis that indicates habitat loss has decreased in recent years. Our analysis presented in the SSA report indicates the lesser prairie-chicken has experienced significant habitat loss and fragmentation and the remaining habitat is highly fragmented, which has resulted in decreased species viability. Additionally, we evaluated likely future impacts of habitat loss and conservation efforts on lesser prairie-chicken

habitat and concluded that habitat loss is likely to outpace efforts to restore habitat and that we expect the landscape to become more fragmented in the future.

*Comment 116:* Two commenters asked that we describe what has changed between the 2013 listing decision and the current listing decision, including trends in habitat loss.

*Our response:* We have conducted a comprehensive analysis of the status of the species that includes new data and new projects on the impact of conservation efforts. This new analysis, captured in the SSA report, includes a comprehensive discussion of trends in habitat loss.

*Comment 117:* One commenter noted that we had stated that (1) areas containing 20–37 percent cropland negatively affects lesser prairie-chickens, and (2) per our numbers in the proposed listing rule, we reported that 2 percent of the total area in the Sand Sagebrush Ecoregion, 13 percent of the total area in the Mixed-Grass Ecoregion, and 14 percent of the total area in the Shinnery Oak Ecoregion of grassland had been converted to cropland in the analysis area of the lesser prairie-chicken. The commenter concluded that, because all regions had below 20 percent cropland, agriculture should not be a risk in these areas.

*Our response:* The SSA report summarizes recent studies that have found a response to the gradient of cropland-to-grassland land cover. Specifically, the studies found that abundances of lesser prairie-chicken increased with increasing cropland until a threshold of 10 percent cropland was reached and then abundance declined with increasing cropland cover (Service 2022, pp. 26–27). Also, it is important to note that we did not conclude that conversion of grassland to agriculture on its own is the primary

concern for the lesser prairie-chicken but instead we indicate that conversion of grassland to cropland is one of several activities that contribute to habitat loss and fragmentation, which has and will continue to result in decreased viability for populations of lesser prairie-chicken.

*Comment 118:* Several commenters noted that 2021 was a good rain year, and they expected that the lesser prairie-chicken populations would recover as a result of that rain, and thus the two DPSs should not be listed. Some suggested we needed an additional year of data post-rain, and another requested we conduct a count to monitor population trends post-rain.

*Our response:* As discussed in previous comments, the Act requires that we use the best available scientific and commercial data when we make decisions to list a species. Although additional years of data will be useful in monitoring the status of the species, the Act does not require us to meet a certain threshold of data before we can list, and it does not require that we produce new science to fill knowledge gaps. We affirm that we have used the best available data to make our listing determination. In addition, as discussed in our response to Comment 17, we should not evaluate the status of the lesser prairie-chicken based upon short-term population trends but instead we focus on long-term population trends tied to habitat availability. One additional year of survey data would not immediately change our overall analysis related to the long-term viability of the species.

*Comment 119:* One commenter stated that the proposed rule had not provided any information that conversion of lands to agriculture continues to occur, nor did it assess the impact of increased food sources from agricultural crops.

*Our response:* Within section 4.3.1.1 of the SSA report, we include an extended discussion regarding the future impacts of conversion of grassland to cropland and we explicitly project the likely future impacts of this action to the lesser prairie-chicken.

*Comment 120:* One commenter asserted that our decision to list both DPSs was based solely on future projections related to habitat loss and that the Service assumed that population trends would decline to historical lows.

*Our response:* As we detail in the SSA report, long-term population trends for the lesser prairie-chicken that span multiple precipitation cycles are the best measure of population health as they will better reflect the true trajectory of the population. While we do analyze and consider all future impacts and conservation efforts within the SSA report, we detail that long-term population trends for this species are largely tied to habitat availability and thus analyzing habitat availability is the best index for species viability based upon the best available scientific information. Additionally, as noted in Comment 44 in regard to the Southern DPS, we found that this DPS meets the definition of an endangered species based on our review of its current condition.

*Comment 121:* Multiple commenters felt the assessment of predation in the proposed rule and the effect on lesser prairie-chicken was understated and inadequate, and research needs to be done into the effect of predation on lesser prairie-chicken or how to ameliorate the threat of predation.

*Our response:* We reviewed the best available scientific information with regard to predation in the SSA report (Service 2022, p. 43). We conclude that the potential influence of predation on lesser prairie-chicken, beyond natural levels, is primarily tied to habitat quantity and quality; thus, the habitat quantity and quality factors discussed in the

SSA report are likely to influence future predation risk for the lesser prairie-chicken. Further discussion is in the Predation section of the SSA report. While additional research could be conducted on all of the threats to the lesser prairie-chicken, as discussed in our response to Comments 30 and 118, we must make listing decisions based solely upon the information available to us at the time of the decision. We cannot wait for additional science to become available.

*Comment 122:* One commenter disputed the fact that predation from raptors is a threat and mentioned a study stating that only one percent of lesser prairie-chicken mortality was due to raptors; however, they did not specify which study they were referring to. The commenter stated that our conclusion on avian predators as a threat was contrary to that study and to another by Behney et al (2012).

*Our response:* In the SSA report, we review the best available science, including the Behney et al. (2012) study related to predation and the lesser prairie-chicken, and note that raptor predation is likely not a large influence on the species. It is important to note that we use the term “threat” to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. As discussed in **Regulatory and Analytical Framework**, the term “threat” includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). A negative impact on an animal does not need to meet a certain threshold of harm to a species or its habitat in order to be considered a threat, and the mere identification of any threat(s) necessarily mean that the species meets the statutory definition of an endangered species or a threatened species.

The potential influence of predation on lesser prairie-chicken, beyond natural levels, is primarily tied to habitat quality; thus, the factors that we discussed in the SSA report that are likely to influence habitat quality or influence predators in a way that increases predation risk for the lesser prairie-chicken could have an influence on the lesser prairie-chicken in the future. As more thoroughly discussed in section 3.3.2.6 of the SSA report, some level of predation, including by raptors, is natural and would not affect the lesser prairie-chicken at a population level (Service 2022, pp. 43–44). For the lesser prairie-chicken the primary concerns related to predation are associated with increases in raptors associated with anthropogenic disturbances and habitat degradation resulting increased exposure of individual to predators. Within the SSA report, we do not quantify any of the potential future effects associated with predation and simply acknowledge that they could influence the lesser prairie-chicken in the future.

*Comment 123:* One commenter stated that, because lesser prairie-chicken populations are small and isolated, disease could not be a threat as it could not spread easily.

*Our response:* Within the SSA report we reviewed the best available science related to disease and concluded that, currently, no information exists to suggest that parasites or diseases play a significant role in the population trends for the lesser prairie-chicken (Service 2022, p. 44).

*Comment 124:* One commenter asked about a statement in the SSA report that impacts from collision could not be quantified, then mentioned a study that provides some quantification of fence mortality; however, they did not specify which study they meant. The commenter then noted that the impact from collisions was very small.

*Our response:* The commenter did not provide a specific page number, but they may have been quoting the general statement in the SSA report that there were several factors that could not be quantified as a part of our geospatial model (Service 2022, p. 21). This does not mean that quantitative data do not exist on collision, but that they do not exist on the scale that would allow us to include them in our geospatial model. We concur with the commenter that the impact from fences is likely small and will continue to be small into the future, except for localized effects in areas with high densities of fences (Service 2022, p. 43, 92).

*Comment 125:* Several commenters stated that cultivated grain seems important for lesser prairie-chicken, and asked if the decline of the species may be related to less available sorghum, milo, and other cultivated grains.

*Our response:* The role of cultivated grains is considered within chapter 3 of the SSA report. Specifically, grain crops are used by lesser prairie-chickens, but the best available information does not indicate that they are necessary for the species. We found that food is likely rarely limiting for lesser prairie-chickens, and grains are likely used opportunistically and are not necessary for survival. Because cultivated grain crops may have provided increased or more dependable winter food supplies for lesser prairie-chicken (Braun et al. 1994, p. 429), the initial conversion of smaller patches of grassland to cultivation may have been temporarily beneficial to the short-term needs of the species as agricultural practices made grain available as a food source (Rodgers 2016, p. 18). However, as agricultural conversion of native prairie to cropland increased, more recent information suggests that landscapes having greater than 20 to 37 percent cultivated grains may not support stable lesser prairie-chicken populations (Crawford and Bolen

1976a, p. 102). More recently, Ross et al. (2016b, entire) found a response to the gradient of cropland-to-grassland land cover. Specifically, they found abundances of lesser prairie-chicken increased with increasing cropland until a threshold of 10 percent cropland was reached and then abundance declined with increasing cropland cover. While lesser prairie-chicken may forage in agricultural croplands, croplands do not provide for the habitat requirements of the species' life cycle (cover for nesting and thermoregulation), and thus lesser prairie-chickens avoid landscapes dominated by cultivated agriculture, particularly where small grains are not the dominant crop (Crawford and Bolen 1976a, p. 102).

*Comment 126:* One commenter stated the impact of farming has been overstated in the proposed rule, that little conversion has occurred in recent decades, and in fact, woody vegetation has much greater projected future impacts.

*Our response:* Within chapter 3 of the SSA report, we quantify how many acres have been converted from grassland to cropland. We acknowledge in the SSA report that conversion associated with farming was mostly historical in nature and that is no longer occurring at the same rates. While projecting future impacts related to the conversion of grassland to cropland, we conclude that, based upon the best available science, we do not expect conversion to occur at the same rates that were historically witnessed. We project future rates based upon the best available data regarding recent rates of conversion. We also analyzed the impacts of woody vegetation encroachment in our SSA report. Our analysis indicates that while historically impacts from conversion to cropland has outpaced woody vegetation encroachment, overall, the future impacts from woody

vegetation encroachment are likely to be greater than future conversion of grassland to cropland.

*Comment 127:* Multiple commenters asserted that drought and/or climate change are the primary threats impacting the lesser prairie-chicken, and, because there is no way for humans to affect the magnitude and severity of drought, listing the species would not change drought, and therefore the species should not be listed. Additional commenters argued that the Service should focus on various natural threats overall rather than human-caused threats. For example, some stated that the Service should address predation or drought first rather than limiting human activities like oil and gas.

*Our response:* Within the SSA report and the listing rule, we provide information regarding the implications of both drought and climate change to the lesser prairie-chicken, and we identified habitat loss and fragmentation as the primary threat to the lesser prairie-chicken. As discussed in our responses to Comments 30 and 36, we must make listing determinations solely on the five factors identified in the Act, and on the best scientific and commercial data available. We cannot consider other factors such as whether a species can easily be recovered or the source of threats.

Once the DPSs are listed as endangered or threatened, we then begin the recovery planning process where we fully evaluate what conservation actions are needed to address the threats to each DPS. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The recovery planning process begins with development of a recovery outline made available to the public soon after a final listing determination; see Available Conservation

Measures for more details. We will continue to work with our partners and the public throughout the recovery planning process.

*Comment 128:* Two commenters stated that the Service did not consider the positive effects of climate change on lesser prairie-chickens. They asserted that one of the main food items for lesser prairie-chickens, grasshoppers, do much better in hot, dry weather, and continued that this increase in grasshoppers during drought periods would increase chick survival. They concluded that the Service needs to consider positive effects of climate change with the same rigor as negative ones.

*Our response:* Chapter 4.3.2 of the SSA report contains a summary of the best available science related to the implications of climate change on the lesser prairie-chicken. The best available scientific information related to drought and lesser prairie-chicken is included throughout the SSA report, and we discuss prolonged and extreme drought in section 3.3.3 of the SSA report. One of the primary points outlined in the SSA report is that in past decades, fragmentation of lesser prairie-chicken habitat was less extensive than it is today, connectivity between occupied areas was more prevalent, and populations were larger, allowing populations to recover more quickly. In other words, lesser prairie-chicken populations were more resilient to the effects of stochastic events such as drought. As lesser prairie-chicken population abundances decline and usable habitat declines and becomes more fragmented, their ability to rebound from prolonged drought is diminished.

Our SSA report further acknowledges that periods with favorable climatic conditions will support times of high reproductive success (Service 2022, p. 91); we fully considered increased incidence of these favorable boom years and other potential

favorable effects of climate change (such as increases in grasshopper populations) in examining the status of the species. However, a shift in climatic conditions to more frequent and intense drought cycles is expected to result in more frequent and extreme bust years for the lesser prairie-chicken and fewer boom years. As the frequency and intensity of droughts increase in the Southern Great Plains region, there will be diminishing opportunity for boom years with above-average precipitation. Overall, this may lessen the intensity of boom-and-bust lesser prairie-chicken population cycles in the future (Ross et al. 2018, entire). These changes will reduce the overall resiliency of lesser prairie-chicken populations and exacerbate the effects of habitat loss and fragmentation.

*Comment 129:* One commenter asked if protections of the Act would extend to parasites and viruses of the lesser prairie-chicken, as they affect the breeding behavior of the species.

*Our response:* No. This final rule relates solely to the Northern and Southern DPSs of the lesser prairie-chicken, and not to any other species.

*Comment 130:* One commenter asked if the listing would require sources of collisions, such as fences and power lines, to be removed.

*Our response:* The prohibitions set forth in section 9 of the Act, and included under our section 4(d) rule for the Northern DPS, would prohibit any individual implementing an action after the effective date of this listing that results in "take" of lesser prairie-chickens, as defined in the Act. The installation of features such as fences or powerlines has the potential to impact the species and, in some cases, result in take. Continued operations and maintenance of existing features that the lesser prairie-chicken are known to avoid is unlikely to result in take as the impacts to species primarily occur

upon construction. For those features that the lesser prairie-chicken do not avoid, collisions with those features which cause death or injury would meet the definition of “take.” In the case where infrastructure is causing take, we will work with operators to reduce such take through section 7 or 10 of the Act.

*Comment 131:* One commenter noted that the research on noise impacts from wind energy on lesser prairie-chickens is not settled, and that the effects are poorly understood. They urged us not to base the listing of the lesser prairie-chicken on noise impacts.

*Our response:* We agree that further research on the specific impacts of noise, from wind energy development and other sources, to lesser prairie-chickens would be beneficial. Our discussion of noise as a threat to the lesser prairie-chicken uses information to the extent it is available to acknowledge our consideration of possible impacts. While we analyzed the potential effects of noise on the lesser prairie-chicken, we are not listing based effects of noise on the lesser prairie-chicken.

*Comment 132:* One commenter referenced a study which stated that, in past times of changing climate, species had shifted their ranges as a result of changing temperatures. They stated it was likely that the lesser prairie-chicken would continue to move north as climate conditions became unsuitable in their current range and as habitat is destroyed by other factors.

*Our response:* The commenter did not provide a reference to the specific study quoted; however, it appears to be, "Glaciation as a migratory switch" published in Science Advances in 2017 (Zink and Gardner 2017). That study examines the shifting ranges of migratory tropical birds. However, the lesser prairie-chicken is not a migratory

or tropical species. Regardless, such shifts in range usually occur over a scale of tens of thousands of years as a species adapts to new habitat types and conditions. Our estimates on the extinction risk of the species indicates that extinction of the species will occur well before the time necessary for a nonmigratory species to adapt to changing conditions. Additionally, were the lesser prairie-chicken to shift north, it would encounter additional land converted for agriculture, which is not suitable habitat for the species.

*Comment 133:* One commenter argued that the Service overstated the effects of climate change. They provided a graph of forecast rain in the United States that demonstrates that average rain across the country had increased in the period 1901–2020. They then asserted that it was inappropriate to examine climate effects at the ecoregion level.

*Our response:* In conducting our analysis of the effects of climate change on the lesser prairie-chicken and its habitat, we used data that have been “downscaled” to an appropriate regional or local level, as these techniques yield higher resolution projections at a scale typically more appropriate for species analysis than nationwide forecasts. We consider downscaled data, where available, to constitute the best available information concerning a changing climate. Our downscaled analysis using Multimodel systems projects complicated forecasts of future precipitation patterns that we find are more accurate and useful to our assessment than nationwide yearly annual precipitation. We conclude that our approach satisfies the requirement to use the best available scientific data. For our complete analysis of downscaled climate models for the range of the lesser prairie-chicken, please see chapter 4.3.2 of our SSA report (Service 2022).

*Comment 134:* Two commenters stated that our forecasted climate/drought impacts were speculative and that our findings were speculative, arbitrary, and capricious. They stated that scientific studies could not accurately predict how forecast impacts from climate change (drought, fire, storms) could adversely affect the lesser prairie-chicken such that it would meet the definition of threatened or endangered. They also argued that the Service had based forecasted drought on assumptions rather than evidence, and that we had not defined what the length of an extended drought or its geographical extent would be.

*Our response:* As discussed in our responses to previous comments, the Act requires that we use the best scientific data available when we make decisions to list a species, and we followed all Service policies and standards on data and information quality in our SSA report and this final rule. In regard to defining the length or extent of a drought, those numbers are indeed uncertain; however, we have presented a thorough assessment of likely future impacts of climate change and likely characteristics of future droughts in chapter 4.3.2 of our SSA report and in our response to Comment 128 above. We acknowledge that there is uncertainty inherent in any future predictions. In light of that uncertainty, we made certain assumptions and provided justification for these assumptions. We conclude that our approach satisfies the requirement to use the best available scientific data. Additionally, climate change is one of many threats currently impacting the lesser prairie-chicken and its habitat causing the DPSs to meet the definition of threatened (Northern DPS) and endangered (Southern DPS).

*Comment 135:* One commenter argued that the lesser prairie-chicken life cycle is closely tied to drought; they provided information that they state demonstrates that

drought is linked to population fluctuations in other grassland bird species. They provided graphs demonstrating the changes in rainfall over time in the contiguous United States alongside graphs showing trends from 1995 through 2015 in grassland bird species, including the lesser prairie-chicken. They concluded that these graphs showed that the lesser prairie-chicken could survive future droughts.

*Our response:* The best available scientific information related to drought and lesser prairie-chicken is included throughout the SSA report, and we discuss prolonged and extreme drought in section 3.3.3 of the SSA report. One of the primary points outlined in the SSA report is that, in past decades, fragmentation of lesser prairie-chicken habitat was less extensive than it is today, connectivity between occupied areas was more prevalent, and populations were larger, allowing populations to recover more quickly. In other words, lesser prairie-chicken populations were more resilient to the effects of stochastic events such as drought. As lesser prairie-chicken population abundances decline and usable habitat declines and becomes more fragmented, the species' ability to rebound from prolonged drought is diminished.

*Comment 136:* As further support for their rationale as described in Comments 132, 133, 134, and 135 above that climate change is the primary threat impacting the lesser prairie-chicken, a commenter submitted a graph depicting a regression analysis of the lesser prairie-chicken and January–June rainfall in the Mixed-Grass Ecoregion. They interpret the results of their analysis to be that rainfall explains 25 percent of lesser prairie-chicken population trends. The commenter concluded that this graph shows that there is a definitive link between rain and lesser prairie-chicken population growth.

*Our response:* As discussed in our responses to Comments 16 and 17 as well as in our SSA report, there is a strong relationship between precipitation patterns and lesser prairie-chicken population trends (Service 2022, p. 48). The model provided by the commenter looks at only one possible driver for lesser prairie-chicken population trends and does not consider the multiple other potential explanatory variables that have been documented in the best available science as impacting the species, and does not provide a full documentation or list of assumptions used in the creation of their analysis. They also do not provide any supporting information for us or others to assess whether the scale of population and weather stations are geographically aligned. Finally, a regression analysis does not show cause and effect relationships. Instead, the regression analysis indicates a correlation between the two variables without any information on causation. Finally, the commenter's conclusion that rainfall explains 25 percent of the response variable (lesser prairie-chicken population fluctuations) is not statistically significant.

#### Comments Related to the Geospatial Analysis in the SSA Report

*Comment 137:* Multiple commenters disagreed with impact radii that we applied to anthropogenic features, such as wind turbines and oil wells, within our spatial analysis to account for the indirect effects of those features. Some comments stated that the lesser prairie-chicken still uses those spaces and so it is not accurate to characterize the areas as habitat loss. Others simply stated we should have used the impact radii used within WAFWA's Range-Wide Plan.

*Our response:* We analyzed the best available scientific information, which is summarized in chapter 3.3 of the SSA report, to determine the direct and indirect impacts associated with anthropogenic features. For the lesser prairie-chicken, the primary

concern is related to avoidance of features. Thus, our determination of impact radii is based upon an evaluation of impacts that result in avoidance of otherwise suitable habitat by the species during all or portions of the life cycle of the species. Many of these features do not result in complete avoidance. Instead, the best available scientific information suggests that the lesser prairie-chicken avoids these features during certain critical periods of their life cycle. While some limited use of portions of areas occurring within these impact radii may occur, these areas no longer have the ability to provide for all the life history needs of the species. As a result, we do not consider these areas to support the full needs of the species in their current state for the purposes of our SSA analysis and listing determination. While multiple commenters stated that they do not agree with the impact radii assigned, they did not provide additional data or studies that were not included in our analysis or did not provide any evidence that we misrepresented those studies. No single study can be used to determine what the appropriate impact radii is; therefore, we analyzed all of the available literature, which is summarized in the SSA report, and determined the impact radii within the context of all of these studies and considering all information and limitations.

*Comment 138:* Multiple commenters stated the Service did not account for overlap of impact features when calculating the area of habitat affected by impact radii.

*Our response:* In chapter 3 of the SSA report, when summarizing the acres of impact by individual source we state, "Impacts are not necessarily cumulative because of overlap of some impacted areas by more than one impact source." This method of reporting impacts by individual source is accurate and does not result in double counting. The areas of overlap mean that there are places where multiple features occur on the

landscape. Because of the areas of overlap, readers should not add up the acres impacted across all of the sources to get a total area impacted, which is why we do not report total acres impacted from all sources within the current condition impact tables of the SSA report (e.g., table 3.4). In our estimates of total potential usable area, we do not double-count acres of impact. For future condition projections, we documented our methods for estimating rates and amounts of impacts from past data and their application across the low, continuation, and high scenarios in section 4.3 and Appendix C. Within our projections we account for overlap with existing infrastructure and project future impacts only to unimpacted usable space, so these were new non-overlapping impacts. Our estimates for rates and amounts accounted for the overlap from existing data.

*Comment 139:* Several commenters stated that the Service's geospatial model is flawed and not capable of modeling current lesser prairie-chicken population and habitat status or potential future scenarios on a scale relevant to the Service's listing analysis. Comments specifically noted resolution issues with land cover data sets and questioned our analysis area which defined the spatial extent of our geospatial analysis.

*Our response:* We used the best available information in our analyses. The geospatial model portion of the SSA report is a transparent application of concepts of conservation biology with the best available commercial and scientific information and a robust discussion of limitations and constraints of the data and model. Commenters did not provide alternative analytical approaches. The LandFire land cover data that was the foundation for the analysis is a 30-meter spatial resolution dataset (i.e., the data comprised cells that measured 30 meters by 30 meters). We used the spatial extent of the EOR as defined by the States and WAFWA's Interstate Working Group as the maximum

spatial extent of the analysis. Both of these elements of scale were considered and implemented in a manner that informs the statutory decision by the Service. All information was processed and aggregated as described in appendix B and appendix C of the SSA report, which allowed us to summarize the results by ecoregion and rangewide.

*Comment 140:* One commenter stated the change from 40 percent to 60 percent potential usable unimpacted land cover within 1 mile as cited between the 2021 SSA report and the 2017 USGS report is not explained and has an outsized effect on the results.

*Our response:* We discuss the basis for our use of a 60 percent threshold used for our geospatial analysis in the SSA report (3.2 Geospatial Analysis Summary, p. 22, and Appendix B, Part 4. Supplemental Analysis: Frequency Analysis of Usable Area Blocks) to understand the importance of the size of habitat areas and their connectivity to conservation of lesser prairie-chicken. One critical factor requiring us to change from 40 percent potential usable unimpacted land cover within 1 mile to 60 percent is the inclusion of new scientific information (e.g., Ross et al. 2019, entire; Hagen and Elmore 2016, entire; Spencer et al. 2017, entire; Sullins et al. 2019, entire), further emphasizing that larger blocks of habitat are important for conservation of the species. The 40 percent threshold was part of an early analysis for the SSA initiated in 2015. This approach allowed for large landscapes with 40 percent nonusable area due to habitat loss and fragmentation to be considered potentially usable area. The change in threshold was suggested during the review of the SSA report by one of our independent peer reviewers of the earlier version of the SSA report. As a result of our review of the new information,

we determined that 60 percent potential usable unimpacted land cover within 1 mile was supported by the best available science and incorporated it into our SSA report.

*Comment 141:* One commenter stated the unexplained use of the EOR instead of the EOR+10 affects the amount of habitat that could be listed as potentially available for the species by the SSA analysis.

*Our response:* The EOR+10 for the lesser prairie-chicken originated in WAFWA's Lesser Prairie-Chicken Range-wide Conservation Plan in 2013 (see Covered Area, Van Pelt et al. 2013, p. 26). This was implemented by WAFWA because the exact occupancy of the lesser prairie-chicken is not known. The EOR encompasses approximately 21.8 million acres. The addition of the 10-mile buffer increases the area by approximately 20.5 million acres. Since 2012, WAFWA has been implementing rangewide aerial surveys, in addition to other surveys by participants in the RWP, agency biologists, and conservation partners. The most recent analysis indicates that there are only 13 known leks in the 10-mile buffer area. In contrast, the EOR (without the 10-mile buffer) contains 734 leks in the same time period. The EOR is the primary occupied range of the species, as is shown by WAFWA's survey data. We can no longer support, based on the available survey and occupancy data, adding an additional 20.5 million acres to the analysis area since there is very little supporting information that the larger extent of the EOR+10 is potential usable area based on a decade of additional survey and conservation work for the species. Our model extent included greater than 98 percent of current known leks for the species. After considering the information above and consulting the State fish and wildlife agencies, we determined that we should use the

EOR as our analysis area as it much more accurately represents the area in which lesser prairie chickens are currently found.

*Comment 142:* One commenter stated the Service's use of one-word descriptors (low, continuation, high) as categorization of future conservation efforts does not meet the best scientific and commercial data available standard.

*Our response:* In the SSA report, we used categorical descriptors (low, continuation, high) for the modeled range of projected future scenarios. These one-word descriptions were simply used as shorthand to create categories for summarizing the information. The input data that were used to establish the conservation efforts were extensive and developed in close coordination with the entities implementing those conservation efforts. Additionally, the SSA report, which contains the characterization of the future conservation efforts was reviewed by independent peer reviewers as well as our State and Federal conservation partners to ensure accuracy. We provide the full explanation of what each term means (low, continuation, high) within the SSA report (Service 20222, Appendix C). We used the best available data regarding conservation efforts to inform our projections that were included in each category. For a detailed description regarding the data and processed used to project these efforts please see Appendix C of the SSA report.

*Comment 143:* Several commenters indicated the Service should have used USDA land use data called Cropland Data Layer (CDL) instead of other sources, and the Service's use of data from FSA (2012) was inappropriate to use instead of CDL.

*Our response:* We used the best available information in our analyses, including within the spatial analysis of the SSA. Multiple land use and land cover datasets were

considered for our work, including National Land Cover Database, CDL, and LandFire. While we did not use Cropland Data Layer CDL for our base land cover data, we did use CDL as processed by Lark (2020) to support projections of a range of scenarios of rates and amount of grassland conversion to cropland (see 4.3.1.1 and appendix C). We did not use CDL for the base landcover because of the known error rates associated with the unprocessed non-cropland portions of the classification (see Reitsma et al. 2016) and the CDL accuracy assessment information available from USDA (USDA 2020, entire). The date of the product is not the sole determinant of best available information.

#### Comments Related to Oil and Gas Development

*Comment 144:* Multiple commenters stated that the Service overestimated the impacts of oil and gas development because we failed to consider advancements in technology, such as directional drilling, which has resulted in reduced impacts to the lesser prairie-chicken. Specifically, some commenters stated that the Service should have used only data from the years of 2016–2019 to inform assumptions around rates of development because of technological advancements that are currently in place and that reduced surface disturbance but were not being used prior to 2016.

*Our response:* We agree that there have been technological advancements in oil and gas exploration, development, and extraction. However, we determined that projecting the future oil and gas development based only upon impacts occurring from 2016 through 2019 (as opposed to including the years from 2004 through 2019 as the Service did) would not provide a representative view of likely future development, as the number of new wells drilled annually is not tied only to technology but also to many other variables such as oil prices. During the period of 2016–2019, fewer wells were

drilled within the analysis area. However, that fact cannot be attributed only to technological advancements because the price of oil was low during that period. To this point, within our analysis area in the Sand Shinnery Oak Ecoregion in 2016, 2017, and 2018 (after technological advancements) more wells were drilled annually than in 2004 and 2005 (prior to technological advancements) indicating that a variety of factors drive the number of wells drilled each year beyond the technology being employed. While we do not agree that we should have based the projections of the number of new wells drilled each year from past development rates limited to the 2016–2019 timeframe, we did incorporate aspects of development patterns that have resulted in reduced surface disturbance when assuming how many acres per well would be impacted as discussed in appendix C of the SSA report (Service 2022).

*Comment 145:* One commenter stated that the Service overestimated the impacts from oil and gas development because of the participation from the oil and gas industry in existing conservation plans that require implementation of conservation measures to minimize impacts to the lesser prairie-chicken.

*Our response:* We did consider the fact that a portion of the wells drilled within the range of the species, are participating in existing conservation agreements and we fully considered the benefits of that participation. Existing conservation efforts primarily implement two types of measures to minimize impacts to the lesser prairie-chicken. First, they implement measures such as noise and timing stipulations meant to reduce disruption to breeding activities. These types of measures were considered in our determination. However, these types of measures, while beneficial to the species, were not shown to decrease habitat loss and fragmentation, the primary threats driving the risk

of extinction. Second, some conservation efforts avoid or minimize surface disturbance by co-locating anthropogenic features, which results in fewer acres of habitat loss. We directly incorporated those efforts to reduce surface disturbance into our projections of the future impacts of oil and gas development. Specifically, we reduced the number of new wells being drilled to account for the fact that the majority of these wells are drilled in areas that are not impacting the lesser prairie-chicken. We also factored in that when a well is drilled in an area that may impact the species there are efforts to minimize impacts by co-locating these disturbances with existing impacts, which resulted in an assumption that fewer acres of habitat will be impacted per well. These assumptions are further detailed in appendix C of the SSA report. Thus, we have fully incorporated efforts of industry to minimize impacts of development through participation in existing conservation efforts.

*Comment 146:* One commenter stated that the Service ignored the benefits of oil and gas development to the lesser prairie-chicken. Specifically, the commenter stated that oil and gas development can create an alternative financial opportunity for landowners, which could reduce the possibility that the landowner would seek other financial interests such as residential or commercial development.

*Our response:* In this final rule, we fully considered all impacts of threats to the lesser prairie-chicken. Though their impacts on habitat would be different, both oil and gas development and residential development occurring within habitat would cause negative impacts to the species and population declines, and they would both result in incidental take of the species. In regard to the commenter's point about financial opportunities, as discussed in our response to Comment 36, we cannot consider economic

impacts when determining whether to list a species. We recognize that the lesser prairie-chicken is found primarily on private lands, and that listing may result in impacts to landowners. We want to continue to encourage land management practices that support the species. Many existing conservation programs provide landowners the opportunity to receive financial assistance to implement conservation measures and provide additional revenue streams. As discussed throughout this comment section and particularly in response to Comment 21, we recognize the need to work collaboratively with private landowners to conserve and recover the lesser prairie-chicken. The recovery of endangered and threatened species to the point that they are no longer in danger of extinction now or in the future is the ultimate objective of the Act, and the Service recognizes the vital importance of voluntary, nonregulatory conservation measures that provide incentives for landowners in achieving that objective. We are committed to working with landowners to conserve this species and develop workable solutions.

*Comment 147:* One commenter stated that the Service was silent on the conservation efforts employed by BLM in concert with the oil and gas industry.

*Our response:* We fully considered the impacts of all efforts implemented by BLM, both individually and in concert with the oil and gas industry, within the SSA report and they were fully carried forward to the final listing decision. Within chapter 3 of the SSA report, we discuss the conservation efforts on lands managed by BLM, and we provide even further detail in appendix D to section D.2.2.

*Comment 148:* Multiple commenters stated that the Service overestimated the impacts of oil and gas development because we failed to account for the temporary nature of the impacts. Specifically, the commenters stated that the impacts were only temporary

because the human disturbance associated with oil and gas development largely occurs only during the drilling phase and after that there is very little human presence for the remainder of the life of the well.

*Our response:* Within chapter 3 of the SSA report we summarize the best available science regarding the impacts of oil and gas development on the lesser prairie-chicken. That science indicates that the primary concern related to oil and gas development is not human presence but instead the direct and indirect impacts that result in habitat loss and fragmentation. The studies that were conducted on lesser prairie-chicken and oil and gas development and documented avoidance were not conducted during the drilling phase but occurred after completion when there was limited human presence (Hunt and Best 2004, pp. 99–104; Pitman et al. 2005, entire; Hagen 2010, entire; Hagen et al. 2011, pp. 69–73; Plumb et al. 2019, pp. 224–227; Sullins et al. 2019, pp. 5–8; Peterson et al. 2020, entire).

#### Comments Regarding Wind Energy

*Comment 149:* Several commenters stated that the impact radius applied by the Service to commercial wind energy turbines is unreasonable, overstates impacts to the species, and is unsupported by best available and cited data. In using 1.12 mi (1.8 km), the Service did not use the impact radius recommendation of State wildlife agency biologists of 0.41 mi (667 m). Commenters asserted that the treatment of impacts from wind energy turbines was an unsubstantiated hypothesis based on impacts from other structures (e.g., oil and gas), and the species does not show the degree of avoidance applied in the proposed rule and SSA report. In contrast, several other commenters indicated support for applying a 1.12-mi (1.8-km) impact radii to commercial wind

energy turbines, and suggested occupancy by the species be assumed for all areas within 2.98 mi (4.8 km) of current active leks (i.e., within the last 5 years).

*Our response:* We have reviewed all available information related to prairie grouse and wind energy development. Because there are a limited number of original research projects and associated information on the topic specific to lesser prairie-chickens (Coppes et al. 2020, entire), we have relied on information for other similar prairie grouse species. The results of these studies indicate a range of effects to different aspects of the species (Marques et al. 2021, p. 469). These results range from demonstrating no statistically significant response related to survival to significant indirect effects extending 5 miles (8.05 km), as discussed in the SSA report and this final rule. The findings of relevant studies are not always directly comparable due to different research designs and reported metrics. As discussed in our response to Comment 30, we have made this determination on the basis of the best scientific and commercial data, and in accordance with our information quality standards. As discussed in our response to Comment 137, construction of anthropogenic features results in avoidance of otherwise suitable habitat during all or a portion of the species' life cycle. While some limited use may occur, these areas can no longer support the needs for the species and thus are not considered habitat.

*Comment 150:* One commenter indicated the Service did not hold all information evaluating grouse and wind energy to the same standards and incorrectly dismissed one paper, while not doing the same thing with other topics and associated citations (e.g., population reconstruction).

*Our response:* This rule and our SSA report extensively discuss the available information on the topic of the likely impacts of wind energy. All information was evaluated and considered within the context of the cited publication and the Service's ability to evaluate the quality and rigor of the provided data and the corresponding assertions against all available information on the topic. In regard to the paper to which the comment refers (LeBeau et al. 2020), we did not dismiss the paper but presented the results that there is no evidence of: (1) lesser prairie-chicken displacement during multiple seasons and at multiple scales; (2) negative effects on nest survival; and (3) barrier effects to local-scale movements. Survival of lesser prairie-chicken was reported at higher rates closer to the wind turbines. We then discussed the limitations associated with the study, including that significant fragmentation already existed on the landscape prior to wind turbine construction, the study was of short duration (3 years), and there were no pre-construction lesser prairie-chicken data for comparison (Service 2022, p. 32). This example is one of many treatments of similar papers in chapter 3.3.1.3, where we outline results from available scientific information and limitations associated with each study. Overall, this rule and our SSA report acknowledge the limited amount of information directly addressing prairie grouse and wind energy development, and we reviewed all available material in the manner laid out in comment 30.

*Comment 151:* One commenter stated support for the application of an impact radius for wind turbines and asserted that this impact should be considered in context of lesser prairie-chicken leks, while asking for prohibition of future developments within 2.98 mi (4.8 km) of current leks.

*Our response:* To meet the complete habitat needs of the full life cycle of the species, habitat that provides for breeding, feeding, sheltering, and connectivity for movement between these areas is necessary. Areas within 2.98 mi (4.8 km) of leks have been shown to provide the majority of use by the species, but individuals also move between leks across areas of habitat and non-habitat outside of 2.98 mi (4.8 km) from leks (e.g., Peterson et al. 2020, entire). The potential impacts of development in these movement areas requires understanding the site's context and juxtaposition relative to known leks, and other potentially suitable habitat with no documented leks. The prohibitions under the Act will prohibit any take of the lesser prairie-chicken by wind energy development. Regardless, we cannot assume that any wind energy development within 2.98 mi (4.8 km) of current leks would necessarily result in take. We will need to evaluate the site-specific information of the landscape and evaluate the effects of all activities associated with the development for each project to determine if take would occur for a potential wind development activity.

#### Comments Regarding Overhead Power Lines

*Comment 152:* Two commenters identified the Service's statements in the preamble to the proposed rule, "no data were available to quantify the potential independent impacts of distribution lines on habitat loss and fragmentation" and "distribution lines are another important source of habitat loss and fragmentation," as contradictory and a reason to remove distribution lines as a cause of habitat loss and fragmentation from the assessment of the status of the species.

*Our response:* Distribution lines have been identified as impacting lesser prairie-chickens and their habitat (resulting in habitat loss and fragmentation) in the scientific

literature (see Service 2022, pp. 36–38 for a review of the subject). However, we were unable to incorporate an analysis of this threat within the SSA geospatial model because representative datasets for distribution level power lines do not exist rangewide or are not available to us.

*Comment 153:* Several commenters stated that the variation in size, classes, and types of power line structures should be assessed differently than the two classes, distribution and transmission, used by the Service and assigned different impact radii.

*Our response:* The available literature on power lines and prairie grouse and the wide variety in size and structure types used in different classes of power lines on the landscape does not provide sufficient data to create different classes of impact radii. The commenters did not provide new scientific information on power line structures or impact radii for us to consider. In the future, if additional new information becomes available with sufficient distinction in the classes of power lines, we could reevaluate our current impact radii recommendations if appropriate.

#### Comments on the Significant Portion of the Range Analysis

*Comment 154:* One commenter stated that the Service should have concluded that the Sand Sagebrush Ecoregion is a significant portion of the range because, without that portion, the rest of the DPS would lose redundancy and representation and would be endangered.

*Our response:* In *Desert Survivors v. U.S. Department of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018) and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017), the courts invalidated the definition of significant that the commenter uses here; that is, making a conclusion about the overall

status of the remainder of the range without the portion in question. Therefore, the commenter's suggested method of analyzing the significance of the Sand Sagebrush Ecoregion is not allowed by the courts.

*Comment 155:* One commenter stated that, in our analysis of significant portion of the range of the Northern DPS, we wrote that the Sand Sagebrush Ecoregion "may meet the definition of endangered" and did not come to a conclusion as to whether or not it actually does. The commenter also argued that the Service should have concluded that the Sand Sagebrush Ecoregion met the definition of endangered as a significant portion of the Northern DPS's range. They stated that the ecoregion has a higher concentration of threat from drought, severe storms, incompatible grazing, and effects associated with small population size. They concluded that the Service should conclude that region is endangered, and thus list the entire Northern DPS as endangered.

*Our response:* Based on this and other public comments, we have expanded our discussion in *Status of the Northern DPS of the Lesser Prairie-Chicken Throughout a Significant Portion of Its Range* to analyze the significance of the Sand Sagebrush Ecoregion. Based on our expanded analysis, we affirm that we did not identify any threats that were concentrated in the Sand Sagebrush Ecoregion that were not at similar levels in the remainder of the range at a biologically meaningful scale, and also that the Sand Sagebrush Ecoregion is not significant to the remainder of the range. We conclude that no portion of the species' range provides a basis for determining that the Northern DPS is in danger of extinction in a significant portion of its range, and we determine that the DPS is likely to become in danger of extinction within the foreseeable future throughout all of its range.

## Comments on the Distinct Population Segment Analysis

*Comment 156:* Multiple commenters stated that, if the same fact pattern was followed for discreteness and significance as for listing of the lesser prairie-chicken, more species would be listed as DPSs. They presented an example of a common species with unique alleles in one population to support their argument.

*Our response:* As discussed in our response to Comment 30, each listing decision we make must be in accordance with the factors in section 4(a)(1) of the Act, but is also informed by the species' life history and response of the species to the identified threats. Additionally, each DPS analysis must be made based on the elements set out in our 1996 DPS policy. In this instance, as discussed under Distinct Population Segment Evaluation above, we found that both parts of the range are discrete due to being markedly separated from each other based on geographical distance. We also found that they are significant due to differing markedly from each other in their genetic characteristics, and because the loss of either would result in a significant gap in the range. We then determined that the Northern DPS meets the definition of a threatened species, and that the Southern DPS meets the definition of an endangered species. Accordingly, we are finalizing the listing of both DPSs.

*Comment 157:* Multiple commenters asked why the Service was just now separating the range into DPSs, when previously it had never done so, particularly not in the 2014 rule. One stated that the Service had never before indicated that the species could be divided into DPSs. Another commenter said that there had always been historical population separation and differences in environment. Another noted that when we received comments in 2012 indicating we should divide the range into DPSs, we

rejected that option. They also noted that the 90-day finding did not discuss the DPSs, and only indicated the rangewide entity as the subject of the petition finding.

*Our response:* In making a 90-day finding, we consider only the information in the petition and information that is readily available, and we evaluate whether that information constitutes substantial information such that a reasonable person conducting an impartial scientific review would conclude that the petitioned action may be warranted. In a 12-month finding, we must complete a thorough status review of the species and evaluate the best scientific and commercial data available to determine whether a petitioned action is warranted. We were petitioned to evaluate whether any DPSs might also warrant listing; we conducted that evaluation and found that the Northern DPS of the lesser prairie-chicken meets the definition of a threatened species and the Southern DPS of the lesser prairie-chicken meets the definition of an endangered species. We have the discretion to propose listing of species and DPS configurations that we find to be the most appropriate application of the Act. These determinations were based on our review of the best available information, updated survey results, and additional genetics information since the 2014 final listing rule.

*Comment 158:* One commenter asked why the SSA report did not discuss the DPS finding.

*Our response:* The objective of the SSA is to evaluate the viability of the lesser prairie-chicken based on the best scientific and commercial information available. In conducting this analysis, we took into consideration the likely changes that are happening in the environment—past, current, and future—to help us understand what factors drive the viability of the species. Through the SSA report, we described what the species needs

to support viable populations, its current condition in terms of those needs, and its forecasted future condition under plausible future scenarios. The SSA does not make any analysis or conclusions with regard to policy decisions, such as DPS findings. Instead, the SSA report provides the biological information that our decisionmakers can then use to inform those policy decisions. Thus, all of the policy decisions and the rationale for those decisions are contained within the *Federal Register* documents and are not included within the SSA report.

*Comment 159:* One commenter stated that the Service had not provided enough documentation (additional technical support or record materials) regarding the decision to designate DPSs. The commenter also said they had provided materials (genetic data and legal analyses) regarding the potential for DPS designations in response to the Services 2016 90-day petition finding and they say the Service did not respond to this in our proposed listing rule. The commenter concluded it was inappropriate for the Service to designate DPSs without more documentation. Finally, they stated that the Service did not ask for information related to potential DPSs after our 2016 90-day finding, and that we should have.

*Our response:* We fully considered all material submitted by commenters from 2014 to the present. In our 90-day finding, we requested information on a number of topics related to the ecology of the species and the threats impacting it. In our DPS finding, we presented only information relevant to the finding itself; that is, we did not analyze legal arguments, as those are outside the scope of the three criteria for determining if a part of a species meets the definition of a Distinct Population Segment.

*Comment 160:* Several commenters stated that the Service had not properly determined that the two DPSs were discrete. Other commenters asked how a bird species could ever be considered discrete, given their ability to fly, and the recorded movement of lesser prairie-chickens flying long distances. They cited a single report of a bird nesting 35 miles away from a lek, and a study by Berigan (2019) showing long-distance movement of translocated birds. Another noted that Earl et al. (2016) had recorded movements up to 44 mi (71 km). Those commenters concluded that it strains credulity that birds could not and have not crossed the distance between the DPSs. Another commenter asked us to state the information we considered to conclude that there had been no movement; another stated that we had not proven there was no barrier to movement between ecoregions. Another said that we had ignored evidence of gene flow as demonstrated in Oyler-McCance et al. (2016) and others.

*Our response:* Our DPS policy states that a population may be considered discrete if it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. The policy additionally notes that we do not consider it appropriate to require absolute reproductive isolation as a prerequisite to recognizing a distinct population segment. As the policy states, this would be an impracticably stringent standard, and one that would not be satisfied even by some recognized species that are known to sustain a low frequency of interbreeding with related species.

We acknowledge that movement between ecoregions is possible, and that gene flow does occur between some ecoregions. However, that movement is not frequent or common. For example, though one study did record movements up to 41 mi (71 km), the

average net displacement was 9.9 mi (16 km), and more study is needed to understand what landscape features might act as barriers to movement (Earl et al. 2016, p. 10). Additionally, the most recent genetic study found no movement between the ecoregions in the Northern DPS and the Shinnery Oak Ecoregion that makes up the Southern DPS (Oyler-McCance et al. 2016, p. 653). Therefore, based on the best available information, we affirm that the Northern DPS and the Southern DPS are markedly separated from each other, and are therefore discrete under the DPS policy.

*Comment 161:* One commenter noted that the National Marine Fisheries Service defines significant gap in the range as the loss of a populations between two other populations. The commenter pointed to a 90-day finding for the Iliamna Lake harbor seal (*Phoca vitulina richardii*) that concluded that the petition did not present substantial information that a DPS finding may be warranted because it was not an interstitial population of harbor seals whose loss would isolate another population from the main group. The commenter concluded that, using that logic, the loss of the Shinnery Oak Ecoregion that makes up the Southern DPS would be a range contraction, not a gap in the range.

Another commenter disputed the importance of the statement that the loss of one half of the population would result in a loss in a gap in the range because they believe that could apply to any species. The commenter quoted a response to a public comment in the 1996 DPS policy that used an example of an interstitial population and the importance of gene flow, and concluded from that response that the gap in the range was meant to apply to interstitial populations only. Additionally, one commenter interpreted the DPS policy to state that a population could not be both entirely separate from the remainder of

the range and significant to the rangewide entity because there would be no significant gap in its range.

*Our response:* In regard to the Iliamna Lake harbor seal, the petition finding states that the harbor seal taxon is broadly distributed, ranging from Alaska to the Baja Peninsula, and that the estimated number of seals in Iliamna Lake accounts for roughly 0.1 percent of the total population (Boveng et al. 2016, p. 40; 81 FR 81074, November 17, 2016). The petition finding further quotes Boveng et al. (2016, p. 40): “Because Iliamna Lake is not a part of the continuous coastal range of the marine population of harbor seals, the loss of the Iliamna Lake segment could not produce a gap in that range, and therefore would not reduce or preclude dispersal between segments of the marine population.” Thus, the finding regarding the Iliamna Lake harbor seal is not relevant to this DPS finding, as the loss of a small percentage of the harbor seal population also does not amount to a range contraction.

Furthermore, the DPS policy can apply to populations at the edge of a species' range. For example, the northern bog turtle and the western yellow-billed cuckoo were listed as DPSs that were not interstitial populations. Courts have affirmed that it is appropriate for DPS findings to apply to populations on the edge of a species' range, as long as it is a geographic area that amounts to a substantial reduction of a taxon's range (*National Association of Homebuilders v. Norton*, 340 F.3d 835, 852 (9th Cir. 2003)). Given that the Shinnery Oak Ecoregion makes up 25 percent of the species' range, we consider that its loss would result in a significant gap in the range of the lesser prairie-chicken.

*Comment 162:* Several commenters stated that the Service had not appropriately used the DPS authority as designated by Congress and the 1996 policy, and stated that the Service had manipulated the policy in order to find that listing the lesser prairie-chicken was warranted. Another commenter stated that using a single study to support a DPS determination was contrary to the instruction to use the DPS policy sparingly.

*Our response:* Our 1996 DPS policy stated that the application of the policy framework would lead to consistent and sparing exercise of the authority to address DPSs, in accord with congressional instruction. Further, because we are to use the best available information to make all findings, including the finding on the marked genetic differences between the Shinnery Oak Ecoregion and other three ecoregions, at times we may have only one study to inform our decision. In this instance, we used the best available scientific information regarding genetic differences. Specifically, for our DPS determinations within this rule we cite the genetic information provided by Oyler-McCance et al (2016), which represents the most up to date and complete information on the genetics of the lesser prairie-chicken. While we believe this study represents the best available science, we also considered all other available genetic information for the lesser prairie-chicken (Service 2022, pp. 14–15).

*Comment 163:* Several commenters argued that the Service has not shown that genetic differences between lesser prairie-chicken DPSs equal differences in physical or behavioral characteristics, or that they result in any adaptive capacity for the birds; one commenter stated that a lesser prairie-chicken in one ecoregion was indistinguishable from a lesser prairie-chicken in another part of the range, and that a lesser prairie-chicken

could survive equally well in any ecoregion. These commenters concluded that the Service had not proven the genetic differences were significant.

*Our response:* The DPS policy states that, for any population segment found to be discrete, we consider available scientific evidence of the discrete population segment's importance to the taxon to which it belongs. This consideration may include, but is not limited to, evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. The policy does not require that those genetic characteristics must result in physical or biological differences or any other adaptive capacity. The stated purpose of the DPS policy is to support the Act's goals of conserving genetic resources and maintaining natural systems and biodiversity over a representative portion of their historical occurrence. Our DPS findings for the lesser prairie-chicken are in line with that stated purpose.

*Comment 164:* Multiple commenters submitted questions about the 2016 Oyler-McCance et al. study on lesser prairie-chicken genetics, which we reference in our DPS determination. Supposed flaws stated by the commenters included that the study: was not intended for use in a DPS analysis; was not meant to be a landscape genetic analysis, had not taken samples from lesser prairie-chickens in Eddy, Chaves, or Lea Counties in New Mexico, had not accounted for long-range dispersals, and was meant only to inform efforts to increase connectivity. One commenter said that one genetic study (Pruett et al. 2011) had shown that genetic variation in the lesser prairie-chicken was mostly explained by geography. Some commenters stated that the study does not prove more genetic variation besides that typically found in metapopulations, and that we had ignored evidence of gene flow and that we did not have information on the timing of when the

populations diverged. One commenter noted that the study stated that more data were needed to understand the genetic structure of the lesser prairie-chicken. Commenters noted that any wide-ranging species with isolated populations would have "marked genetic differences."

*Our response:* As discussed in our response to Comment 30, we must use the best available scientific and commercial data to make our findings. Additionally, the DPS policy does not require that a finding be based on a landscape genetic analysis or on time since separation, only that significance can include evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics. The Pruett et al. (2011) study did note that lesser prairie-chicken in Oklahoma and New Mexico were genetically differentiated but did not make any conclusions about geography being the cause of the distinctiveness. The 2016 Oyler-McCance et al. study represents the most up-to-date and complete information on the genetics of the lesser prairie-chicken, and found that there was genetic structuring within ecoregions, and that there was limited gene flow between them (Oyler-McCance et al. 2016, p. 657). The study also found that the Shinnery Oak Ecoregion was a genetically distinct population with "large and significant  $F_{ST}$  values" (Oyler-McCance et al. 2016, p. 653) ( $F_{ST}$  values are the proportion of total genetic variance in a population relative to the total genetic variance). Overall, in considering whether a population meets the discreteness criteria in the DPS policy, we consider solely whether it is markedly separate from other populations of the same species, not whether it is genetically distinct in comparison to other species' populations.

*Comment 165:* Two commenters considered the location of the bounding line between DPSs to be arbitrary. One stated that the location of the line cutting through Texas would make statewide management and private landowner conservation efforts difficult. Another stated that there is not even scientific consensus as to the number of ecoregions supporting the lesser prairie-chicken, or on their boundaries; that commenter concluded that we should not use ecoregions for DPSs because of that uncertainty. Another commenter said that the ecoregions were designed for conservation and management purposes and should not be used for DPS determinations.

*Our response:* The ecoregions are used regularly by State management agencies and scientists for management, and we are not aware of any of any alternative ecoregion boundaries being used by experts or management agencies. The designations of these ecoregions were made for the purposes of lesser prairie-chicken management based upon the scientific information. Our placement of the line between the Northern DPS and Southern DPS of the lesser prairie-chicken was not an arbitrary decision. Using the analysis area identified in the SSA report, which represents the best estimate of the species range, we placed the line between the Northern DPS and the Southern DPS at approximately the geographic mid-way point between the southernmost part of the Northern DPS and northeastern most part of the Southern DPS. Within the State of Texas, the areas occupied by the lesser prairie-chicken are already being managed as two different ecoregions as outlined by the Western Association of Fish and Wildlife Agencies. While evaluating the lesser prairie-chicken under our DPS policy, we did not rely solely on the ecoregion boundaries to determine that there were two DPSs. Overall,

we used the best available science regarding the lesser prairie-chicken ecoregions and lesser prairie-chicken populations in identifying the boundary between the two DPSs.

*Comment 166:* Two commenters believed the Service conflated the discussions of significance and discreteness by using the same genetics study for both determinations. One stated we had not fully explained how the genetic evidence translated to them both being significant due to evidence that the population segments differed markedly due to genetic characteristics. They concluded that there was no evidence to prove any genetic differences translated to adaptive capacity.

*Our response:* We use the best available scientific data for all analysis under the Act, even if that requires use of the same study for multiple determinations related to a species. There is no requirement that separate genetic data be used for discreteness and significance criteria in the DPS policy. As discussed in our response to Comment 164, Oyler-McCance et al. (2016, p. 653) found significant  $F_{ST}$  values between the Shinnery Oak Ecoregion and the Northern DPS. This and other genetic evidence demonstrate that the population segments do indeed differ markedly due to genetic characteristics and that they are markedly separate based on genetics; that is, that genetic evidence provides support that the DPSs are both discrete and significant.

*Comment 167:* Several commenters stated that the methodology used in Oyler-McCance et al. (2016) was not appropriate for determining marked separation. One commenter noted that microsatellite loci have a low likelihood of uncovering recent genetic structure, and that microsatellites often show high variation, particularly in populations that are close to each other. They also said that the loci in the study had not been selected randomly. They concluded that although the study says that the populations

are genetically distinct, this does not necessarily translate to them differing markedly due to genetic characteristics in accordance with the DPS policy.

*Our response:* Microsatellites are commonly used by researchers to examine genetic characteristics of species and populations; in fact, the detection of variation is often suitable for detecting population structure. It is also common in genetic studies for loci not to be selected at random. Additional genetic information would be useful; however, as discussed in our response to Comment 118, we must use the best available science, and we cannot wait for additional studies to be completed. We have evaluated this study and all of the other best available information on genetic data to support our conclusion that the Southern DPS has marked genetic separation from the Northern DPS.

*Comment 168:* Three commenters stated that the genetic diversity found in Oyler-McCance et al. (2016) is too small, and that the methods are otherwise inappropriate. They say the study found that only 3.4 of total genetic variance is explained by geographic area. The commenters considered that too small of a difference. One of the commenters added that the information could also not be used to support discreteness, as they said that the DPS policy interprets discreteness to mean genetic variation that is identifiable to a certain geographic area. One commenter provided a study that they said showed that the methods used in Oyler-McCance et al. (2016) are too sensitive or too good at finding diversity. The commenter said these differences were contrary to Congress's instruction to use the policy sparingly. The commenters concluded that there was not sufficient evidence that the genetic characteristics were important to the taxon or that the Southern DPS met the criteria for significance.

*Our response:* It appears that the commenters have misunderstood the  $F_{ST}$  value mentioned in Oyler-McCance et al. (2016).  $F_{ST}$  values are not percentages and do not simply explain genetic variance by geographic area. Instead they are the proportion of total genetic variance in a population relative to the total genetic variance. High  $F_{ST}$  values demonstrate a significant degree of differentiation among populations. It is also important to note that the  $F_{ST}$  value is only one of several analyses presented in Oyler-McCance et al. (2016), and that all of the analyses support the Shinnery Oak Ecoregion as being genetically distinct from the remainder of the lesser prairie-chicken range and that genetic evidence provides support that the DPSs are both discrete and significant. Additionally, as discussed in our response to Comment 164, we look solely at whether the population is markedly separate from other populations of the same species, not whether it is genetically distinct in comparison to other species.

*Comment 169:* One commenter argued that the Sand Sagebrush Ecoregion was discrete from the remainder of the Northern DPS. They stated that the ecoregion is discrete because the Oyler-McCance study shows that the Sand Sagebrush population is distinct from other populations, and because the movement of the birds between the Sand Sagebrush and the Short-Grass/CRP Ecoregions appears to go in only one direction; that is, birds move only out of the Sand Sagebrush Ecoregion. The commenter added that lesser prairie-chickens rarely move far in their lifetime and often stay near their leks and that habitat fragmentation is increasing the isolation of the lesser prairie-chicken in the Sand Sagebrush Ecoregion. Based on those lines of evidence, they concluded that we should consider the Sand Sagebrush Ecoregion to be discrete from other populations of the lesser prairie-chicken.

The commenter further argued that the Sand Sagebrush Ecoregion met the definition of significant under the DPS policy, and that it met the definition of endangered. They concluded that we should list the Sand Sagebrush Ecoregion as a DPS separate from the remainder of the Northern DPS.

*Our response:* Our 1996 DPS policy states that a population segment of a vertebrate species may be considered discrete if it satisfies either one of the following conditions: (1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation, or (2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act. There are no international boundaries separating any of the ecoregions, so we then consider if the Sand Sagebrush Ecoregion meets the first criterion.

According to the most recent genetic data, studies of neutral markers indicate that, although lesser prairie-chicken from the Sand Sagebrush Ecoregion form a distinct genetic cluster from other ecoregions, they have also likely contributed some individuals to the Short-Grass/CRP Ecoregion through dispersal, and some low levels of ongoing gene flow occurs from the Sand Sagebrush Ecoregion into the Short-Grass/CRP Ecoregion (Oyler-McCance et al. 2016, p. 653). This finding demonstrates that the Sand Sagebrush Ecoregion is not discrete from the Short-Grass/CRP Ecoregion. Therefore, we conclude that the Sand Sagebrush Ecoregion is not discrete as it is not markedly

separated due to physical or genetic factors from other lesser prairie-chicken populations as a consequence of physical, physiological, ecological, or behavioral factors.

In regard to the commenter's point about the significance of the Sand Sagebrush Ecoregion, our DPS policy states that we consider significance of a population segment only if it is considered discrete. Because we do not have evidence that the Sand Sagebrush Ecoregion is discrete from the remainder of the Northern DPS, we do not consider if it meets the definition of significance under the policy.

*Comment 170:* One commenter expressed confusion on how the separation of the species into two DPSs would help improve connectivity between the two areas and added that separating them taxonomically would not improve connectivity either. That commenter and another noted that many conservation efforts had gone toward increasing connectivity between those areas, and that designating separated DPSs would be a barrier toward encouraging connectivity in the future. The commenter concluded that the Service should not divide the lesser prairie-chicken into two taxa.

*Our response:* Regarding existing effects to connectivity, please see the response to Comment 95. The creation of DPSs is solely a policy consideration, not a biological division. Designating DPSs does not alter or modify existing species taxonomy. Rather, it identifies one or more segments of a population that are discrete from and significant to the taxon as a whole, and that may or may not require protection under the Act. Thus, designation of the species as two DPSs would also not hinder future conservation efforts that could be aimed at encouraging connectivity.

*Comment 171:* One commenter claimed that the Service was designating DPSs solely because it had detected genetic diversity in the species, which they said was

contrary to the stated purpose of the DPS policy to "concentrate conservation efforts undertaken under the Act on avoiding important losses of genetic diversity."

*Our response:* We affirm that our designation of the two DPSs is in alignment with the goals of the DPS policy and the Act to conserving genetic resources and maintaining natural systems and biodiversity over a representative portion of their historic occurrence, and with the Congressional intent to use the policy sparingly. Additionally, we are listing the Northern DPS because it meets the definition of a threatened species and the Southern DPS because it meets the definition of an endangered species.

#### Comments on the 4(d) Rule

*Comment 172:* Multiple commenters stated that the 4(d) rule should include provisions allowing incidental take of lesser prairie-chickens as a result of development and operation of oil and gas production, renewable energy facilities, and transmission lines. They argued that, without those provisions, those industries would have no incentive to participate in conservation of the species.

*Our response:* We do not find that provisions under a 4(d) rule for these sectors would be necessary and advisable for the conservation of the lesser prairie-chicken. These activities have been identified as sources contributing to the primary threat of habitat loss and fragmentation to the lesser prairie-chicken currently and into the future (see the SSA report for further details), and continued unmitigated impacts are likely to result in an additional decline in the status of the species. As a result, these sectors are better addressed through other compliance mechanisms under the Act, such as sections 7 and 10 as appropriate.

*Comment 173:* Multiple commenters asserted that a provision should be developed in the 4(d) rule that would serve to exempt or “grandfather” projects that are pending or otherwise in progress.

*Our response:* While we recognize that the period following the listing of a species can be challenging with regard to incidental take coverage, we do not find that such a provision would meet the definition of a 4(d) rule that is necessary and advisable for the conservation of the lesser prairie-chicken. The Service is committed to reviewing section 10 permit applications as quickly as possible in conjunction with project proponents.

*Comment 174:* Two commenters asserted that 5 years was too short for the agricultural provision, and that agricultural practices change more frequently than that. They concluded that the timeframe was too burdensome for farmers, particularly as some lands may not be maintained for more than 5 years for a variety of reasons, including drought or market factors. One commenter asked that we increase the timeframe to 10 years.

*Our response:* While developing the exception for routine agricultural practices on existing cultivated lands, we recognized the need to define "existed cultivated lands." The intent is to be clear that areas currently in cropland do not possess the vegetative structure and composition necessary to support most life history functions for the lesser prairie-chicken, and, while there may be some very limited use for activities such as opportunistic feeding and lekking, prohibiting take on these areas is not necessary for the conservation of the species. We first looked to the definition of cropland as defined in the CFR but then realized that just because an area was cultivated in the past does not mean

that it currently is not lesser prairie-chicken habitat. Thus, we then added a second requirement, that not only does the area meet the definition of cropland but also that it has been tilled within the previous 5 years. For cropland that has gone fallow, we would not expect those areas to reach a successional state that would support the lesser prairie-chicken prior to 5 years. We do not find that a longer period of time, such as 10 years, would be necessary and advisable for the conservation of the lesser prairie-chicken because, after 5 years, fallow lands may have reached a successional state that could support lesser prairie-chickens.

*Comment 175:* Multiple commenters requested that activities such as new construction in areas that are already impacted, be excluded from take prohibitions. Other commenters requested that general operations and maintenance as well as emergency operations occurring on existing infrastructure be excluded from take prohibitions.

*Our response:* We do not find that provisions under a 4(d) rule for activities in areas that are already impacted (this includes the direct and indirect impacts) are necessary and advisable for the species. These activities are taking place in areas that are not suitable habitat for lesser prairie-chicken because the species avoids existing development. As a result, it is unlikely that take of the species would be occurring from these activities. Therefore, no exception from the prohibitions is needed.

*Comment 176:* Multiple commenters requested that the existing CCAAs be included in the 4(d) rule.

*Our response:* A provision under a 4(d) rule for an existing CCAA is not necessary as any take associated with activities covered within those agreements would be covered by the associated section 10(a)(1)(A) permit.

*Comment 177:* Several commenters stated that any projects or project proponents following voluntary conservation measures be covered by the 4(d) rule. Several commenters asked that projects contributing to certain conservation banks and other conservation actions be included in the 4(d) rule. One commenter stated that mitigation measures and proactive conservation be used in place of a 4(d) rule.

*Our response:* The fact that a project proponent has voluntarily implemented conservation measures or has contributed to a conservation bank is not an indication the voluntary measures implemented will provide benefits that are commensurate with realized impacts to the species. We cannot conclude that project proponents implementing an unknown amount of future impacts and applying undefined conservation measures would be adequate to conserve the lesser prairie-chicken without a structured mechanism in place to allow for an accurate assessment of those impacts and a structured way to determine how to adequately offset those impacts. Thus, we do not find that blanket provisions for these actions under a 4(d) rule are necessary and advisable for the conservation of the species.

*Comment 178:* Multiple commenters stated that, if surveys do not detect lesser prairie-chicken in an area, then that project should be excepted from take under section 4(d) of the Act.

*Our response:* Due to the cryptic nature of the lesser prairie-chicken, existing survey efforts have relatively poor detection probabilities and thus negative survey results for the species may not necessarily indicate the absence of the species. We do not advise that project proponents make evaluations of the effects of a project on the lesser prairie-chicken based on survey results. For project proponents needing assistance in evaluating

the impacts of their projects, please contact your local Service Field Office. Because of these issues, we do not find that blanket provisions for a project area with a negative survey result under a 4(d) rule are necessary and advisable for the conservation of the species.

*Comment 179:* Several commenters stated that renewable energy projects should be excepted from take in the 4(d) rule because renewable energy reduces climate change, a major threat to the lesser prairie-chicken, or because renewable energy has lower impacts on the lesser prairie-chicken than other threats. One commenter stated that renewable energy also provides grassland preservation. They concluded that renewable energy was thus necessary and advisable to the conservation of the species.

*Our response:* We do not find that provisions under a 4(d) rule for these sectors would be necessary and advisable for the conservation of the lesser prairie-chicken. These activities have been identified as sources contributing to the primary threat of habitat loss and fragmentation to the lesser prairie-chicken currently and into the future (see the SSA report for further details), and continued unmitigated impacts are likely to result in an additional decline in the status of the species. As a result, these sectors are better addressed through other ESA compliance mechanisms such as sections 7 and 10, as appropriate.

*Comment 180:* One commenter asked the Service to clarify the regulatory 4(d) text to include the statement from the preamble that the provision does not include take coverage for any new conversion of grasslands into agriculture. The commenter stated that including that text would improve clarity and avoid confusion.

*Our response:* We reviewed the 4(d) and regulatory text to ensure clarity around this point and we do not find that adding language to the regulatory text would provide any additional clarity. Along with this final listing determination, we developed answers to frequently asked questions that address conversion of grasslands into agriculture; this document is available on our website at <https://www.fws.gov/lpc> and posted to <https://www.regulations.gov>. This document reemphasizes the fact that the provision of the section 4(d) rule for the Northern DPS does not except from take any new conversion of grassland to cropland.

*Comment 181:* One commenter stated that the 4(d) rule impermissibly amends the definition of cropland in 7 CFR 718.2 by adding the 5-year requirement. The commenter stated that a rulemaking must take place to amend the definition of cropland.

*Our response:* We are not amending the definition of cropland in 7 CFR 718.2. The 4(d) rule simply outlines that, to qualify for the exception for routine agricultural practices on existing cultivated lands, the land must not only meet the definition of cropland as defined in 7 CFR 718.2, but the land must also have been tilled within the previous 5 years.

*Comment 182:* One commenter asked that the 4(d) rule clarify if addition of windmills to the landscape would be excepted from take prohibitions, given that removal of windmills is covered.

*Our response:* We do not find that a blanket provision allowing an exception of take resulting from the construction of windmills under the 4(d) rule is necessary and advisable for the conservation of the lesser prairie-chicken. Construction of vertical features has been identified as a threat for the lesser prairie-chicken as outlined in the

SSA report as they can serve as potential predator perches. Additionally, we note that the removal of windmills is not an excepted activity but rather we determined that no exception in the Northern DPS 4(d) rule is needed because the removal of a windmill would not result in take of the species.

*Comment 183:* One commenter requested that the Service provide a 4(d) exception for renewable energy facilities that implement the Land-Based Wind Energy Guidelines developed by the Service in 2012.

*Our response:* The Land-Based Wind Energy Guidelines were not developed to fully mitigate the impacts of wind energy development on the lesser prairie-chicken. Implementation of these guidelines may assist developers to minimize impacts to wildlife while siting projects, but implementation of the guidelines does not indicate that the developer has fully evaluated the extent of their impacts on the lesser prairie-chicken or mitigated for those impacts (habitat loss and fragmentation). The LWEG does not provide species-specific assessment of effects from wind energy developments and therefore does not provide sufficient information to inform adequacy of mitigation for the lesser prairie-chicken. Thus, we do not find that a blanket provision allowing renewable energy facilities that implement the Land-Based Wind Energy Guidelines under the 4(d) rule is necessary and advisable for the conservation of the lesser prairie-chicken.

*Comment 184:* One commenter asserted that the proposed 4(d) regulations meant that the Northern DPS and Southern DPS would have the same protections and prohibitions, and that this was inappropriate.

*Our response:* The two DPSs do not have the same prohibitions. The **Available Conservation Measures** section below lays out examples of activities that may

potentially result in violations of section 9 that are covered under our section 4(d) rule, such as removal of native shrub or herbaceous vegetation. As outlined under our section 4(d) rule, we have crafted three exceptions from the general take prohibitions that were adopted for the Northern DPS. More details on exceptions from prohibitions only applicable to the Northern DPS are laid out in our Provisions of the 4(d) Rule section, below.

### **Determination of Lesser Prairie-Chicken Status**

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an endangered species or a threatened species. The Act defines an "endangered species" as a species in danger of extinction throughout all or a significant portion of its range, and a "threatened species" as a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether a species meets the definition of endangered species or threatened species because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence.

#### *Status of the Southern DPS of the Lesser Prairie-Chicken Throughout All of Its Range*

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the Southern DPS of the lesser prairie-chicken and its habitat. We analyzed effects associated with habitat degradation,

loss, and fragmentation, including conversion of grassland to cropland (Factor A), petroleum production (Factor A), wind energy development and transmission (Factor A), woody vegetation encroachment (Factor A), and roads and electrical distribution lines (Factor A); other factors, such as livestock grazing (Factor A), shrub control and eradication (Factor A), collision mortality from fences (Factor E), predation (Factor C), influence of anthropogenic noise (Factor E), and fire (Factor A); and extreme weather events (Factor E). We also analyzed the effects of existing regulatory mechanisms (Factor D) and ongoing conservation measures. In the SSA report, we also considered three additional threats: hunting and other recreational, educational, and scientific use (Factor B); parasites and diseases (Factor C); and insecticides (Factor E). We consider all of these impacts now in analyzing the status of the Southern DPS.

Over the past several decades, habitat loss, fragmentation, and degradation have resulted in the loss of large areas of the habitat that supports the lesser prairie-chicken in the Southern DPS. Suitable habitat has been lost as grasslands are converted to cropland, and as petroleum and natural gas production and wind energy development have resulted in further loss of habitat. The lesser prairie-chicken is particularly vulnerable to changes on the landscape, as it requires large blocks of suitable habitat to complete its life-history needs. This includes its lek breeding system, which requires males and females to be able to hear and see each other over relatively wide distances, the need for large patches of habitat that include several types of microhabitats, and the behavioral avoidance of vertical structures. In the case of petroleum and wind energy production, the extent of the impact from the threat is not just the original site, but also all roads, power lines, and

other infrastructure associated with the sites, and noise associated with those areas that may interfere with communication between male and female birds.

In the Southern DPS, woody vegetation encroachment by honey mesquite has played a significant role in limiting available space for the lesser prairie-chicken and is one of the primary threats to the species in this DPS. Fire, incompatible grazing management, and drought associated with climate change also continue to degrade habitat. The size of fires, especially in areas dominated by woody vegetation, is increasing. When managed compatibly, fire and grazing can improve habitat quality. However, fire management efforts are currently occurring on only a limited portion of the lesser prairie-chicken range.

The Southern DPS is particularly vulnerable to effects associated with climate change and drought, as it is already warmer and drier than it was historically. That warmer and drier trend is expected to continue (Grisham et al. 2013, entire; Grisham et al. 2016c, p. 742). Given the needs of lesser prairie-chicken for cool microclimates to find appropriate nest sites and rear broods, droughts like those that have recently occurred on the landscape could further impact already declining population growth rates in this DPS.

Conservation measures and regulatory mechanisms are acting to reduce the magnitude of threats impacting the lesser prairie-chicken and its habitat. However, our analysis demonstrates that the restoration efforts have not been enough to offset the impacts of habitat loss and fragmentation and conservation efforts focused on localized management to affect habitat quality, are not addressing the overarching limiting factor of habitat loss and fragmentation, and are not addressing the long-term population needs

for the lesser prairie-chicken. Thus, these measures are only minimally ameliorating the threats acting throughout the DPS.

After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we conclude that the Southern DPS is continuing to experience ongoing habitat loss and fragmentation, and additional threats from influence of anthropogenic noise and extreme weather events, particularly droughts. We have estimated that currently, only 27 percent of this ecoregion is potentially usable habitat for the lesser prairie-chicken. Based on mean population estimates, the Southern DPS has very low resiliency to stochastic events. It may have as few as 5,000 birds remaining. The population counts have dropped to fewer than 1,000 birds in 2015 and 2022 following drought conditions. Under current climactic conditions, another wide-scale severe drought could occur in this ecoregion at any time, and the species may not be able to recover. Overall, the lesser prairie-chickens in the Southern DPS are likely to continue to experience declines in resiliency, redundancy, and genetic representation. Thus, after assessing the best available information, we determine that the Southern DPS of the lesser prairie-chicken is in danger of extinction throughout all of its range. We find that a threatened species status is not appropriate for the Southern DPS because the magnitude and imminence of the threats acting on the DPS now result in the species meeting the definition of an endangered species.

*Status of the Southern DPS of the Lesser Prairie-Chicken Throughout a Significant Portion of Its Range*

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all

or a significant portion of its range. We have determined that the Southern DPS of the lesser prairie-chicken is in danger of extinction throughout all of its range and accordingly did not undertake an analysis of any significant portions of its range. Because the Southern DPS of the lesser prairie-chicken warrants listing as endangered throughout all of its range, our determination does not conflict with the decision in *Center for Biological Diversity v. Everson*, 2020 WL 437289 (D.D.C. Jan. 28, 2020), because that decision related to significant portion of the range analyses for species that warrant listing as threatened, not endangered, throughout all of their range.

*Determination of Status of the Southern DPS of the Lesser Prairie-Chicken*

Our review of the best available scientific and commercial information indicates that the Southern DPS of the lesser prairie-chicken meets the definition of an endangered species. Therefore, we are listing the Southern DPS of the lesser prairie-chicken as an endangered species in accordance with sections 3(6) and 4(a)(1) of the Act.

*Status of the Northern DPS of the Lesser Prairie-Chicken Throughout All of Its Range*

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats to the Northern DPS of the lesser prairie-chicken and its habitat. We analyzed effects associated with habitat degradation, loss, and fragmentation, including conversion of grassland to cropland (Factor A), petroleum production (Factor A), wind energy development and transmission (Factor A), woody vegetation encroachment (Factor A), and roads and electrical distribution lines (Factor A); other factors, such as livestock grazing (Factor A), shrub control and eradication (Factor A), collision mortality from fences (Factor E), predation (Factor C), influence of anthropogenic noise (Factor E), and fire (Factor A); and extreme weather

events (Factor E). We also analyzed existing regulatory mechanisms (Factor D) and ongoing conservation measures. In the SSA report, we also considered three additional threats: hunting and other recreational, educational, and scientific use (Factor B); parasites and diseases (Factor C); and insecticides (Factor E). As with the Southern DPS, we consider all of these impacts now in analyzing the status of the Northern DPS.

As is the case in the Southern DPS, habitat degradation, loss, and fragmentation is the primary threat to the lesser prairie-chicken in this DPS, with other threats such as fire, incompatible livestock grazing, and extreme weather events further decreasing population resiliency and species redundancy. The largest impacts in this DPS are cropland conversion and woody vegetation encroachment. The Sand Sagebrush Ecoregion is also experiencing habitat degradation due to incompatible grazing management. The Short-Grass/CRP region has the highest number of birds, with a 5-year estimate of approximately 23,000 birds. Other portions of the range have lower population resiliency. In particular, the Sand Sagebrush Ecoregion has approximately 1,000 birds remaining (table 2).

Resiliency of populations throughout the Northern DPS has decreased from historical levels, although the DPS still has redundancy across the three ecoregions and genetic and environmental representation. However, our future scenario analysis demonstrates that the current threats acting on the landscape are expected either to continue at the same levels or increase in severity in the foreseeable future. Habitat loss is projected to outpace conservation efforts to restore habitat. Although we do not expect rates of habitat conversion to cropland to be equivalent to historical rates, we expect any additional conversion that does occur will have a disproportionately large effect on

resiliency and redundancy due to the limited amount of remaining large intact grasslands. Conversion of habitat due to oil, gas, and wind energy will continue to occur, although the rates of development are uncertain. Woody vegetation encroachment is also expected to continue, particularly in the Mixed-Grass Ecoregion. Increased drought and severe weather events associated with climate change are expected to decrease population resiliency and redundancy into the foreseeable future, and as habitat availability continues to decline, and available habitat blocks decrease in size, populations may decline to below quasi-extinction levels. Our future scenarios project that over the next 25 years usable habitat will decrease from between 3 to 25 percent within the Northern DPS (5–24 percent in the Short-Grass/CRP Ecoregion, 2–37 percent in the Mixed-Grass Ecoregion, and 3–14 percent in the Sand Sagebrush Ecoregion) due to projected impacts from conversion to cropland, energy development, and woody vegetation encroachment.

Conservation measures and regulatory mechanisms are acting to reduce the magnitude of threats impacting the lesser prairie-chicken and its habitat. However, our analysis demonstrates that future restoration efforts will not be enough to offset the impacts of habitat loss and fragmentation, and conservation efforts focused on localized management to affect habitat quality are not addressing the overarching limiting factor of habitat loss and fragmentation, and are not addressing the long-term population needs for the lesser prairie-chicken. Thus, these measures are having only minimal impacts on threats acting throughout the DPS.

After evaluating threats to the species and assessing the cumulative effect of the threats under the section 4(a)(1) factors, we find that the lesser prairie-chicken maintains populations in all three ecoregions in the Northern DPS, and has genetic and ecological

representation in those ecoregions, as well as population redundancy across the entirety of the DPS. Thus, lesser prairie-chickens in the Northern DPS are not currently in danger of extinction, and thus the Northern DPS does not meet the definition of endangered. However, our future projections indicate that habitat will become increasingly fragmented and less able to support lesser prairie-chickens. Thus, after assessing the best available information, we conclude that the Northern DPS of the lesser prairie-chicken is not currently in danger of extinction but is likely to become in danger of extinction within the foreseeable future throughout all of its range.

*Status of the Northern DPS of the Lesser Prairie-Chicken Throughout a Significant Portion of Its Range*

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so in the foreseeable future throughout all or a significant portion of its range. The court in *Center for Biological Diversity v. Everson*, 2020 WL 437289 (D.D.C. Jan. 28, 2020) (*Center for Biological Diversity*), vacated the aspect of the Final Policy on Interpretation of the Phrase “Significant Portion of Its Range” in the Endangered Species Act’s Definitions of “Endangered Species” and “Threatened Species” (Final Policy) (79 FR 37578; July 1, 2014) that provided that the Service does not undertake an analysis of significant portions of a species’ range if the species warrants listing as threatened throughout all of its range. Therefore, we proceed to evaluating whether the species is endangered in a significant portion of its range—that is, whether there is any portion of the species’ range for which both (1) the portion is significant; and (2) the species is in danger of extinction in that portion. Depending on the case, it might be more efficient for us to address the “significance” question or the

“status” question first. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species’ range.

Following the court’s holding in *Center for Biological Diversity*, we now consider whether there are any significant portions of the species’ range where the species is in danger of extinction now (i.e., endangered). In undertaking this analysis for the Northern DPS of the lesser prairie-chicken, we choose to address the status question first—we consider information pertaining to the geographic distribution of (a) individuals of the species, (b) the threats that the species faces, and (c) the resiliency condition of populations. We evaluated all parts of the Northern DPS, including the Sand Sagebrush Ecoregion, the Mixed-Grass Ecoregion, and the Short-Grass/CRP Ecoregion. We identified one portion, the Sand Sagebrush Ecoregion, that may meet the definition of endangered, as population estimates have shown the greatest declines in that portion of the range.

For the Northern DPS, we considered whether the threats or their effects on the species are greater in any biologically meaningful portion of the species’ range than in other portions such that the species is in danger of extinction now or likely to become so in the foreseeable future in that portion. In this final rule, we examined threats associated with habitat degradation, loss, and fragmentation, including conversion of grassland to cropland; petroleum production; wind energy development and transmission; woody vegetation encroachment; and roads and electrical distribution lines. We also examined threats associated with other factors, such as livestock grazing; shrub control and

eradication; collision mortality from fences; predation; influence of anthropogenic noise; fire; and extreme weather events. We also considered cumulative effects associated with all those threats. However, we did not identify any threats that were concentrated in the Sand Sagebrush Ecoregion that were not at similar levels in the remainder of the range of the Northern DPS at a biologically meaningful scale.

As explained in the response to public comments, we considered for this final rule if the Sand Sagebrush Ecoregion is significant in relation to the remainder of the range as an alternative approach to the significant portion of the range analysis. Because *Desert Survivors v. U.S. Department of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018) and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017) have invalidated the definition of “significant” set forth in the Final Policy, we determine significance on a case-by-case basis using a reasonable interpretation of significance and providing a rational basis for our determination. For the purposes of this rule, we considered whether the Sand Sagebrush Ecoregion constitutes habitat of high quality relative to the remaining portions of the Northern DPS’ range and whether the Sand Sagebrush Ecoregion constitutes high or unique value habitat for the Northern DPS. One way in which we may consider significance is if the identified portion constitutes high or unique value habitat for the species; for example, a portion that provides habitat used by the species to support a life history stage. The Sand Sagebrush Ecoregion does not constitute a portion of the range where limiting life history stages, such as breeding or nesting, are concentrated, as the lesser prairie-chicken is currently carrying out all important life history stages in each portion of the Northern DPS. The lesser prairie-chicken reproduces and nests throughout the Northern DPS, regardless of ecoregion. We

also considered if the Sand Sagebrush Ecoregion is a high-quality area that is also the only area that has remained intact where other areas in the range have been impacted by particular threats. Although the Sand Sagebrush Ecoregion is important habitat for the lesser prairie-chicken, it has been degraded due to incompatible grazing, historical conversion of grassland to cropland, woody vegetation encroachment, and roads and electrical distribution lines. When we consider the current condition of the habitat in the Sand Sagebrush Ecoregion relative to the Short-Grass/CRP Ecoregion and Mixed Grass Ecoregion, we find that the habitat in all three ecoregions has been degraded. Thus, after reviewing the Sand Sagebrush Ecoregion portion relative to the range of the Northern DPS, we conclude that the Sand Sagebrush Ecoregion is not significant.

Therefore, no portion of the species' range provides a basis for determining that the species is in danger of extinction in a significant portion of its range, and we determine that the species is likely to become in danger of extinction within the foreseeable future throughout all of its range. This does not conflict with the courts' holdings in *Desert Survivors v. U.S. Department of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018) and *Center for Biological Diversity v. Jewell*, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017) because, in reaching this conclusion, we did not apply the aspects of the Final Policy's definition of "significant" that those court decisions held were invalid.

#### *Determination of Status of the Northern DPS of the Lesser Prairie-Chicken*

Our review of the best scientific and commercial data available indicates that the Northern DPS of the lesser prairie-chicken meets the definition of a threatened species.

Therefore, we are listing the Northern DPS of the lesser prairie-chicken as a threatened species in accordance with sections 3(20) and 4(a)(1) of the Act.

### **Critical Habitat**

Section 3(5)(A) of the Act defines critical habitat as: (i) The specific areas within the geographical area occupied by the species, at the time it is listed on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed upon a determination by the Secretary that such areas are essential for the conservation of the species.

Section 4(a)(3) of the Act and implementing regulations (50 CFR 424.12) require that we designate critical habitat at the time a species is determined to be an endangered or threatened species, to the maximum extent prudent and determinable. In the proposed listing rule (86 FR 29432, June 1, 2021), we determined that designation of critical habitat was prudent but not determinable because specific information needed to analyze the impacts of designation was lacking. We are still in the process of obtaining this information. As a result, we reaffirm our finding that critical habitat is not determinable for the lesser prairie-chicken at this time.

### **Available Conservation Measures**

Conservation measures provided to species listed as endangered or threatened species under the Act include recognition as a listed species, planning and implementation of recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and

conservation by Federal, State, Tribal, and local agencies, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies, including the Service, and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

The recovery planning process begins with development of a recovery outline made available to the public soon after a final listing determination. The recovery outline guides the immediate implementation of urgent recovery actions while a recovery plan is being developed. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) may be established to develop and implement recovery plans. The recovery planning process involves the identification of actions that are necessary to halt and reverse the species' decline by addressing the threats to its survival and recovery. The recovery plan identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened ("downlisting") or removal from protected status ("delisting"), and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies

to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Revisions of the plan may be done to address continuing or new threats to the species, as new substantive information becomes available. The recovery outline, draft recovery plan, final recovery plan, and any revisions will be available on our website as they are completed (<http://www.fws.gov/lpc>), or from our Southwest Regional Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g., restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands.

Following publication of this final rule, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of Colorado, Kansas, New Mexico, Oklahoma, and Texas will be eligible for Federal funds to implement management actions that promote the protection or recovery of the lesser prairie-chicken. Information on our grant programs that are available to aid species recovery can be found at: <https://www.fws.gov/service/financial-assistance>.

Please let us know if you are interested in participating in recovery efforts for the lesser prairie-chicken. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is listed as an endangered or threatened species and with respect to its critical habitat. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of any endangered or threatened species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into consultation with the Service.

Some examples of Federal agency actions within the species' habitat that may require consultation, as described in the preceding paragraph include: landscape-altering activities on Federal lands; provision of Federal funds to State and private entities through Service programs, such as the PFW Program, the State Wildlife Grant Program, and the Wildlife Restoration Program; construction and operation of communication, radio, and similar towers by the Federal Communications Commission or Federal Aviation Administration; issuance of section 404 Clean Water Act permits by the U.S. Army Corps of Engineers; construction and management of petroleum pipeline by the Federal Energy Regulatory Commission; construction and maintenance of roads or highways by the Federal Highway Administration; implementation of certain USDA

agricultural assistance programs; Federal grant, loan, and insurance programs; or Federal habitat restoration programs such as the Environmental Quality Incentive Program and CRP; and development of Federal minerals, such as oil and gas.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to endangered wildlife. The prohibitions of section 9(a)(1) of the Act, codified at 50 CFR 17.21, make it illegal for any person subject to the jurisdiction of the United States to take (which includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect; or to attempt any of these) endangered wildlife within the United States or on the high seas. In addition, it is unlawful to import; export; deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of commercial activity; or sell or offer for sale in interstate or foreign commerce any species listed as an endangered species. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to employees of the Service, the National Marine Fisheries Service, other Federal land management agencies, and State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving endangered wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22. With regard to endangered wildlife, a permit may be issued for the following purposes: for scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities. The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

It is our policy, as published in the *Federal Register* on July 1, 1994 (59 FR 34272), to identify to the maximum extent practicable at the time a species is listed those activities that would or would not constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of a final listing on proposed and ongoing activities within the range of a listed species. For the Northern DPS of the lesser prairie-chicken, which we are listing as threatened, the discussion below in section II regarding protective regulations under section 4(d) of the Act complies with our policy.

We now discuss specific activities related to the Southern DPS, which we are listing as endangered. Based on the best available information, the following actions are unlikely to result in a violation of section 9, if these activities are carried out in accordance with existing regulations and permit requirements; this list is not comprehensive. As identified in the SSA report, restoration actions are essential for conservation of the lesser prairie-chicken. Restoration actions will not constitute a violation of section 9 as those actions are implemented on lands that are not currently lesser prairie-chicken habitat. These restoration actions include:

- (1) Planting previously tilled or no till croplands to grasses;
- (2) Removal of nonnative or invasive trees and shrubs, not including shinnery oak or sand sagebrush; and
- (3) Removal of existing infrastructure including oil and gas infrastructure, electrical transmission and distribution lines, windmills, existing fences, and other anthropogenic features impacting the landscape.

Based on the best available information, the following activities may potentially result in a violation of section 9 of the Act in the Southern DPS of the lesser prairie-

chicken if they are not authorized in accordance with applicable law; this list is not comprehensive:

(1) Unauthorized collecting, handling, possessing, selling, delivering, carrying, or transporting of the species, including import or export across State lines and international boundaries, except for properly documented antique specimens of these taxa at least 100 years old, as defined by section 10(h)(1) of the Act.

(2) Actions that would result in the unauthorized destruction or alteration of the species' habitat. Such activities could include, but are not limited to, the removal of native shrub or herbaceous vegetation by any means for any infrastructure construction project or the direct conversion of native shrub or herbaceous vegetation to another land use.

(3) Actions that would result in sustained alteration of preferred vegetative characteristics of lesser prairie-chicken habitat, particularly those actions that would cause a reduction or loss in the native invertebrate community within those habitats or alterations to vegetative composition and structure. Such activities could include, but are not limited to, incompatible livestock grazing, the application of herbicides or insecticides, and seeding of nonnative plant species that would compete with native vegetation for water, nutrients, and space.

(4) Actions that would result in lesser prairie-chicken avoidance of an area during one or more seasonal periods. Such activities could include, but are not limited to, the construction of vertical structures such as power lines, communication towers, buildings, infrastructure to support energy development, roads, and other anthropogenic features; motorized and nonmotorized recreational use; and activities such as well drilling,

operation, and maintenance, which would entail significant human presence, noise, and infrastructure.

(5) Actions, intentional or otherwise, that would result in the destruction of eggs or active nests or cause mortality or injury to chicks, juveniles, or adult lesser prairie-chickens.

Questions regarding whether specific activities would constitute a violation of section 9 of the Act in regard to the Southern DPS of the lesser prairie-chicken should be directed to the Southwest Regional Office (see **FOR FURTHER INFORMATION CONTACT**).

## **II. Final Rule Issued Under Section 4(d) of the Act**

### **Background**

Section 4(d) of the Act contains two sentences. The first sentence states that the Secretary shall issue such regulations as she deems necessary and advisable to provide for the conservation of species listed as threatened species. The U.S. Supreme Court has noted that statutory language similar to the language in section 4(d) of the Act authorizing the Secretary to take action that she “deems necessary and advisable” affords a large degree of deference to the agency (see *Webster v. Doe*, 486 U.S. 592, 600 (1988)). Conservation is defined in the Act to mean the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Additionally, the second sentence of section 4(d) of the Act states that the Secretary may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife, or section 9(a)(2), in the case of plants. Thus, the combination

of the two sentences of section 4(d) provides the Secretary with wide latitude of discretion to select and promulgate appropriate regulations tailored to the specific conservation needs of the threatened species. The second sentence grants particularly broad discretion to the Service when adopting one or more of the prohibitions under section 9.

The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species. For example, courts have upheld, as a valid exercise of agency authority, rules developed under section 4(d) that included limited prohibitions against takings (see *Alsea Valley Alliance v. Lautenbacher*, 2007 WL 2344927 (D. Or. 2007); *Washington Environmental Council v. National Marine Fisheries Service*, 2002 WL 511479 (W.D. Wash. 2002)). Courts have also upheld 4(d) rules that do not address all of the threats a species faces (see *State of Louisiana v. Verity*, 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history when the Act was initially enacted, "once an animal is on the threatened list, the Secretary has an almost infinite number of options available to [her] with regard to the permitted activities for those species. [She] may, for example, permit taking, but not importation of such species, or [she] may choose to forbid both taking and importation but allow the transportation of such species" (H.R. Rep. No. 412, 93rd Cong., 1st Sess. 1973).

The provisions of this 4(d) rule will promote conservation of the Northern DPS of the lesser prairie-chicken by encouraging essential conservation efforts and management that enhance habitat quantity and quality for the lesser prairie-chicken. The provisions of

this rule are one of many tools that we will use to promote the conservation of the Northern DPS of the lesser prairie-chicken.

As mentioned previously in **Available Conservation Measures**, section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they fund, authorize, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species.

If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into consultation with us. Examples of Federal actions that are subject to the section 7 consultation process are actions on State, Tribal, local, or private lands that require a Federal permit (such as a permit from the U.S. Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C. 1251 et seq.) or a permit from the Service under section 10 of the Act) or that involve some other Federal action (such as funding from the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency). Federal actions not affecting listed species or critical habitat—and actions on State, Tribal, local, or private lands that are not federally funded, authorized, or carried out by a Federal agency—do not require section 7 consultation.

These requirements are the same for a threatened species with a species-specific 4(d) rule. For example, a Federal agency's determination that an action is "not likely to adversely affect" a threatened species will require the Service's written concurrence. Similarly, a Federal agency's determination that an action is "likely to adversely affect" a

threatened species will require formal consultation and the formulation of a biological opinion.

#### **Provisions of the 4(d) Rule**

Exercising this authority under section 4(d), we have developed a final rule that is designed to address the specific threats and conservation needs of the Northern DPS of the lesser prairie-chicken. As discussed above under **Summary of Biological Status and Threats**, threats including habitat loss, fragmentation, and degradation are affecting the status of the Northern DPS of the lesser prairie-chicken. A range of activities have the potential to affect the Northern DPS of the lesser prairie-chicken, including actions that would result in the unauthorized destruction or alteration of the species' habitat. Such activities could include, but are not limited to: the removal of native shrub or herbaceous vegetation by any means for any infrastructure construction project or direct conversion of native shrub or herbaceous vegetation to another land use; actions that would result in the long-term alteration of preferred vegetative characteristics of lesser prairie-chicken habitat, particularly those actions that would cause a reduction or loss in the native invertebrate community within those habitats.

Activities that may result in long-term alteration of lesser prairie-chicken habitat could include, but are not limited to, incompatible livestock grazing; the application of herbicides or insecticides; seeding of nonnative plant species that would compete with native vegetation for water, nutrients, and space; and actions that would result in lesser prairie-chicken avoidance of an area during one or more seasonal periods. Activities that may result in lesser prairie-chicken avoidance of an area include, but are not limited to, the construction of vertical structures such as power lines; communication towers;

buildings; infrastructure to support energy development, roads, and other anthropogenic features; motorized and nonmotorized recreational use; and activities such as well drilling, operation, and maintenance, which would entail significant human presence, noise, and infrastructure; and actions, intentional or otherwise, that would result in the destruction of eggs or active nests or cause mortality or injury to chicks, juveniles, or adult lesser prairie-chickens. Regulating these activities would slow the rate of habitat loss, fragmentation, and degradation and decrease synergistic, negative effects from other threats.

Section 4(d) requires the Secretary to issue such regulations as she deems necessary and advisable to provide for the conservation of each threatened species and authorizes the Secretary to include among those protective regulations any of the prohibitions that section 9(a)(2) of the Act prescribes for endangered species. We find that the protections, prohibitions, and exceptions in this final rule as a whole satisfy the requirement in section 4(d) of the Act to issue regulations deemed necessary and advisable to provide for the conservation of the Northern DPS of the lesser prairie-chicken.

The protective regulations we are finalizing for the Northern DPS of the lesser prairie-chicken incorporate prohibitions from section 9(a)(1) to address the threats to the species. Section 9(a)(1) prohibits the following activities for endangered wildlife: importing or exporting; take; possession and other acts with unlawfully taken specimens; delivering, receiving, transporting, or shipping in interstate or foreign commerce in the course of commercial activity; or selling or offering for sale in interstate or foreign commerce. This protective regulation includes all of these prohibitions for the Northern

DPS of the lesser prairie-chicken because the DPS is at risk of extinction in the foreseeable future and putting these prohibitions in place will help to prevent further declines, preserve the species' remaining populations, slow its rate of decline, and decrease synergistic, negative effects from other ongoing or future threats.

Under the Act, "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Some of these provisions have been further defined in regulations at 50 CFR 17.3. Take can result knowingly or otherwise, by direct and indirect impacts, intentionally or incidentally. Regulating take would help preserve the species' remaining populations, slow their rate of decline, and decrease synergistic, negative effects from other ongoing or future threats. Therefore, we prohibit take of the Northern DPS of the lesser prairie-chicken, except for take resulting from those actions and activities specifically excepted by the 4(d) rule.

It is appropriate to extend the standard section 9 prohibitions for endangered species to the Northern DPS of the lesser prairie-chicken in order to conserve the species, with several exceptions, which we found are necessary and advisable to provide for the conservation of the DPS. While developing this 4(d) rule, the Service considered exceptions to the standard section 9 prohibitions for endangered species that would facilitate essential conservation actions needed for the Northern DPS. We consider essential conservation actions to include restoration actions, use of prescribed fire, and compatible grazing management as the primary essential conservation actions needed to conserve the lesser prairie-chicken.

For the purposes of this rule and our SSA analysis, we consider restoration actions to be actions that convert areas that are currently not habitat for lesser prairie-chickens to

areas that are habitat for lesser prairie-chicken. These actions are essential for the conservation of the species as this is the only way to reverse past and current trends of habitat loss and fragmentation. For the lesser prairie-chicken, the primary restoration actions consist of woody vegetation removal in and adjacent to grasslands (this does not include the removal of sand shinnery oak (specifically, *Quercus havardii* species) or sand sagebrush (specifically, *Artemisia filifolia* species)). Other restoration actions include removal of existing anthropogenic features (such as existing energy infrastructure, roads, fences, windmills, and other anthropogenic features), and converting cropland to grassland. We have determined that an exception under this 4(d) rule is not needed for these restoration actions as they occur on lands already impacted or altered in ways such that they no longer represent lesser prairie-chicken habitat and thus there is no potential for a section 9 violation.

We also considered the value provided by the implementation of prescribed fire on the landscape. Prior to extensive Euro-American settlement, frequent fires helped confine trees (and other woody vegetation) like eastern red cedar to river and stream drainages and rocky outcroppings. However, settlement of the Southern Great Plains altered the historical ecological context and disturbance regimes. The frequency and intensity of these disturbances directly influenced the ecological processes, biological diversity, and patchiness typical of Great Plains grassland ecosystems, which evolved with frequent fire that helped to maintain prairie habitat for lesser prairie-chicken (Collins 1992, pp. 2003–2005; Fuhlendorf and Smeins 1999, pp. 732, 737).

Following Euro-American settlement, fire suppression allowed trees, such as eastern red cedar, to begin invading or encroaching upon neighboring grasslands.

Implementation of prescribed fire is often the best method to control or preclude tree invasion of grasslands. However, to some landowners and land managers, burning of grassland can be perceived as unnecessary for meeting their management goals, costly and burdensome to enact, undesirable for optimizing production for cattle, and likely to create wind erosion or “blowouts” in sandy soils. Consequently, wildfire suppression is common, and relatively little prescribed burning occurs on private land. Often, prescribed fire is employed only after significant tree invasion has already occurred and landowners consider forage production for cattle to have diminished. Preclusion of woody vegetation encroachment on grasslands of the southern Great Plains using fire requires implementing fire at a frequency that mimics historical fire frequencies of 2–14 years (Guyette et al. 2012, p. 330) and thus further limits the number of landowners implementing fire in a manner that would truly preclude future encroachment. We have determined that while there is a potential for short-term adverse impacts to lesser prairie-chicken, we want to encourage the use of prescribed fire on the landscape; thus, we provide an exception for take resulting from this action in the 4(d) rule.

Finally, we considered the need for grazing activities that result in the vegetation structure and composition needed to support the lesser prairie-chicken. The habitat needs for the lesser prairie-chicken vary across the range, and grazing can affect these habitats in different ways. It is important that grazing be managed at a given site to account for a variety of factors specific to the local ecological site including past management, soils, precipitation, and other factors. This management will ensure that the resulting vegetative composition and structure will support the lesser prairie-chicken. Grazing management that alters the vegetation community to a point where the composition and structure are

no longer suitable for lesser prairie-chicken can contribute to habitat loss and fragmentation within the landscape, even though these areas may remain as prairie or grassland. Livestock grazing, however, is not inherently detrimental to the lesser prairie-chicken, provided that grazing management results in a plant community with species and structural diversity suitable for the lesser prairie-chicken. When livestock grazing is managed compatibly, it can be an invaluable tool necessary for managing healthy grasslands benefiting the lesser prairie-chicken.

While developing this 4(d) rule, we found that determining how to manage grazing in a manner compatible with the Northern DPS of the lesser prairie-chicken is highly site-specific based on conditions at the local level; thus, broad and prescriptive determinations within this 4(d) rule would not be beneficial to the species or local land managers. To ensure grazing management is compatible with lesser prairie-chicken conservation, land managers should follow a site-specific grazing management plan that was developed to account for a variety of factors specific to the local ecological site, including past management, soils, precipitation, and other factors. Although we have determined that there is a potential for adverse impacts associated with grazing, we recognize the value that livestock grazing provides when managed compatibly and we want to encourage compatible grazing management. Thus, our 4(d) rule provides an exception for take associated with grazing management when land managers are following a site-specific grazing plan developed by a “Service-approved party.” For the purposes of this rule, to be considered as a “Service-approved party,” the individual or entity must possess adequate training or experience, typically 5 years or more, in the fields of wildlife management, biology, or range ecology. A “Service-approved party”

must also have demonstrated the ability to develop a grazing management plan that incorporates all the site-specific conditions discussed above. Finally, a “Service-approved party” must have demonstrated the ability to work with landowners to develop site-specific plans which ensure grazing activities result in the vegetative characteristics compatible with the habitat needs for the lesser prairie-chicken or similar species. Prior to the effective date of this rule, the Service will post a list of approved parties to our regional lesser prairie-chicken webpage (<https://www.fws.gov/lpc>). This list will be updated as appropriate as additional parties request approval. We may also update these initial requirements for a “Service-approved party” and will provide any updated qualifications on our regional lesser prairie-chicken webpage (<https://www.fws.gov/lpc>).

Overall, the 4(d) rule will also provide for the conservation of the species by allowing exceptions that incentivize conservation actions or that, while they may have some minimal level of take of the Northern DPS of the lesser prairie-chicken, are not expected to rise to the level that would have a negative impact (i.e., would have only de minimis impacts) on the species’ conservation. The exceptions to these prohibitions include the following three items, which along with the prohibitions, are set forth in the rule portion of this document:

- (1) Continuation of routine agricultural practices on existing cultivated lands.

This 4(d) rule provides that take of the lesser prairie-chicken will not be prohibited provided the take is incidental to activities that are conducted during the continuation of routine agricultural practices, as specified below, on cultivated lands that are in row crop, seed-drilled untilled crop, hay, or forage production. These lands must meet the definition of cropland as defined in 7 CFR 718.2, and, in addition, must have

been cultivated, meaning tilled, planted, or harvested, within the 5 years preceding the proposed routine agricultural practice that may otherwise result in take. Thus, this provision does not include take coverage for any new conversion of grasslands into agriculture.

Lesser prairie-chickens may travel from native rangeland and CRP lands, which provide cover types that support lesser prairie-chicken nesting and brood-rearing, to forage within cultivated fields supporting small grains, alfalfa, and hay production. Lesser prairie-chickens also may maintain lek sites within these cultivated areas, and they may be present during farming operations. Thus, existing cultivated lands, although not a native habitat type, may provide food resources for lesser prairie-chickens.

Routine agricultural activities covered by this provision include:

(a) Plowing, drilling, disking, mowing, or other mechanical manipulation and management of lands.

(b) Routine activities in direct support of cultivated agriculture, including replacement, upgrades, maintenance, and operation of existing infrastructure such as buildings, irrigation conveyance structures, fences, and roads.

(c) Use of chemicals in direct support of cultivated agriculture when done in accordance with label recommendations.

We do not view regulating incidental take resulting from these activities as necessary and advisable for the conservation of the lesser prairie-chicken as, while there may be limited opportunistic use by the species for opportunistic foraging and lekking sites, these lands do not support the vegetative composition and structure necessary to support the full suite of life history functions of the species. None of the provisions in 50

CFR 17.21 would apply to take incidental to activities associated with the continuation of routine agricultural practices, as specified above, on existing cultivated lands that are in row crop, seed-drilled untilled crop, hay, or forage production. These lands must meet the definition of cropland as defined in 7 CFR 718.2, and, in addition, must have been cultivated, meaning tilled, planted, or harvested, within the previous 5 years.

(2) Implementation of prescribed fire for the purposes of grassland management.

This 4(d) rule provides that take of the Northern DPS of the lesser prairie-chicken will not be prohibited provided the take is incidental to activities that are conducted during the implementation of prescribed fire, as specified below, for the purpose of grassland and shrubland management.

As discussed above, fire plays an essential role in maintaining healthy grasslands and shrublands, preventing woody vegetation encroachment, and encouraging the structural and species diversity of the plant community required by the lesser prairie-chicken. The intensity, scale, and frequency of fire regimes in the southern Great Plains has been drastically altered due to human suppression of wildfire resulting in widespread degradation and loss of grasslands. While fire plays an important role, potential exists for some short-term negative impacts to the lesser prairie-chicken while implementing prescribed fire. The potential impacts depend upon what time of the year the fire occurs, extent of habitat burned, and burn severity and include, but are not limited to, disturbance of individuals, destruction of nests, and impacts to available cover for nesting and concealment from predators.

Prescribed fire activities covered by this provision include:

(a) Construction and maintenance of fuel breaks.

- (b) Planning needed for application of prescribed fire.
- (c) Implementation of the fire and all associated actions.
- (d) Any necessary monitoring and followup actions.

Implementation of prescribed fire is essential to managing for healthy grasslands and shrublands, but currently use of prescribed fire is minimal or restricted to frequent use in small local areas within the range of the lesser prairie-chicken. While prescribed fire has the potential for some limited negative short-term effects on the lesser prairie-chicken, we have concluded that the long-term benefits of implementing prescribed fire drastically outweigh the short-term negative effects. None of the provisions in 50 CFR 17.21 apply to the implementation of prescribed fire as discussed above.

(3) Implementation of prescribed grazing following a site-specific grazing management plan developed by a Service-approved party.

This 4(d) rule provides that take of the Northern DPS of the lesser prairie-chicken will not be prohibited provided the take is incidental to grazing management that is conducted by a land manager who is implementing a grazing management plan developed by a qualified party that has been approved by the Service for the specific purposes of this 4(d) rule. These grazing management plans must be reviewed and adjusted to account for the current ecological conditions by the author at a minimum every 5 years, must prescribe actions based upon site-specific conditions including but not limited to soils, precipitation, and past management, and must contain drought management measures. This provision applies only to site-specific grazing management plans developed by a qualified party that has been approved by the Service for the specific purposes of this 4(d) rule.

This provision applies to potential impacts resulting from the following:

(a) Physical impact of cattle to vegetative composition and structure;

(b) Trampling of lesser prairie-chicken nests;

(c) Construction and maintenance of required infrastructure for grazing management, including but not limited to fences and water sources; and

(d) Other routine activities required to implement managed grazing, including but not limited to feeding, monitoring, and moving of livestock.

We find this exception is necessary and advisable for the conservation of the species because compatible grazing is essential to managing for healthy grasslands and shrublands, which provide habitat for the lesser prairie-chicken. While compatible grazing management has the potential for some limited negative short-term effects on the lesser prairie-chicken, we have concluded that the long-term benefits of implementing compatible grazing management that follows a site-specific prescribed grazing plan developed by a qualified party that has been approved by the Service for the specific purposes of this 4(d) rule drastically outweigh the short-term negative effects. Furthermore, as discussed in the background section of this 4(d) rule, compatibly managed grazing is a necessary component for the management and maintenance of healthy grassland for the lesser prairie-chicken. None of the provisions in 50 CFR 17.21 apply to grazing management that is conducted by a land manager who is implementing a site-specific grazing management plan developed by a qualified party who has been approved by the U.S. Fish and Wildlife Service for the specific purposes of this 4(d) rule as discussed above.

Despite these prohibitions regarding threatened species, we may under certain circumstances issue permits to carry out one or more otherwise-prohibited activities, including those described above. The regulations that govern permits for threatened wildlife state that the Director may issue a permit authorizing any activity otherwise prohibited with regard to threatened species. These include permits issued for the following purposes: for scientific purposes, to enhance propagation or survival, for economic hardship, for zoological exhibition, for educational purposes, for incidental taking, or for special purposes consistent with the purposes of the Act (50 CFR 17.32). The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

We recognize the special and unique relationship with our State natural resource agency partners in contributing to conservation of listed species. State agencies often possess scientific data and valuable expertise on the status and distribution of endangered, threatened, and candidate species of wildlife and plants. State agencies, because of their authorities and their close working relationships with local governments and landowners, are in a unique position to assist us in implementing all aspects of the Act. In this regard, section 6 of the Act provides that we shall cooperate to the maximum extent practicable with the States in carrying out programs authorized by the Act. Therefore, any qualified employee or agent of a State conservation agency that is a party to a cooperative agreement with us in accordance with section 6(c) of the Act, who is designated by his or her agency for such purposes, would be able to conduct activities designed to conserve the Northern DPS of the lesser prairie-chicken that may result in otherwise prohibited take without additional authorization.

Nothing in this 4(d) rule changes in any way the recovery planning provisions of section 4(f) of the Act, the consultation requirements under section 7 of the Act, or our ability to enter into partnerships for the management and protection of the Northern DPS of the lesser prairie-chicken. However, interagency cooperation may be further streamlined through planned programmatic consultations between us and other Federal agencies, where appropriate.

### **Required Determinations**

#### *National Environmental Policy Act (42 U.S.C. 4321 et seq.)*

It is our position that, outside the jurisdiction of the U.S. Court of Appeals for the Tenth Circuit, we do not need to prepare environmental analyses pursuant to the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.) in connection with regulations adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the *Federal Register* on October 25, 1983 (48 FR 49244). This position was upheld by the U.S. Court of Appeals for the Ninth Circuit (*Douglas County v. Babbitt*, 48 F.3d 1495 (9th Cir. 1995), cert. denied 516 U.S. 1042 (1996)).

#### *Government-to-Government Relationship with Tribes*

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the

Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. We also provided these Tribes the opportunity to review a draft of the SSA report, to provide input prior to making our proposed determination on the status of the lesser prairie-chicken, and during the open comment period, but did not receive any responses.

### **References Cited**

A complete list of references cited in this rulemaking is available on the internet at <https://www.regulations.gov> and upon request from the Southwest Regional Office (see **FOR FURTHER INFORMATION CONTACT**).

### **Authors**

The primary authors of this final rule are the staff members of the U.S. Fish and Wildlife Service's Species Assessment Team and the Southwest Regional Office.

### **List of Subjects in 50 CFR Part 17**

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

### **Regulation Promulgation**

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

### **PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS**

1. The authority citation for part 17 continues to read as follows:

AUTHORITY: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

2. In § 17.11 amend the table in paragraph (h) by adding an entry for “Prairie-chicken, lesser [Northern DPS]” and an entry for “Prairie-chicken, lesser [Southern DPS]” to the List of Endangered and Threatened Wildlife in alphabetical order under BIRDS to read as set forth below:

**§ 17.11 Endangered and threatened wildlife.**

\* \* \* \* \*

(h) \* \* \*

| Common name                            | Scientific name                   | Where listed   | Status | Listing citations and applicable rules   |
|--|-----------------------------------|--|--------|--|
| * * * * *                              | * * *                             | BIRDS  |        |  |
| * * * * *                              | * * *                             |  |        |  |
| Prairie-chicken, lesser [Northern DPS] | <i>Tympanuchus pallidicinctus</i> | U.S.A. (All lesser prairie-chickens north of a line starting at 37.9868 N, 105.0133 W, and ending at 31.7351 N, 98.3773 W, NAD83; see map at § 17.41(k)) | T      | 87 FR [Insert <u>Federal Register page where the document begins</u> ], [Insert date of publication in the <u>Federal Register</u> ]; 50 CFR 17.41(k). <sup>4d</sup> |
| Prairie-chicken, lesser [Southern DPS] | <i>Tympanuchus pallidicinctus</i> | U.S.A. (All lesser prairie-chickens south of a line starting at 37.9868 N, 105.0133 W, and ending at 31.7351 N, 98.3773 W, NAD83; see map at § 17.41(k)) | E      | 87 FR [Insert <u>Federal Register page where the document begins</u> ], [Insert date of publication in the <u>Federal Register</u> ].                                |
| * * * * *                              | * * *                             |  |        |  |

3. Amend § 17.41 by adding paragraph (k) to read as follows:

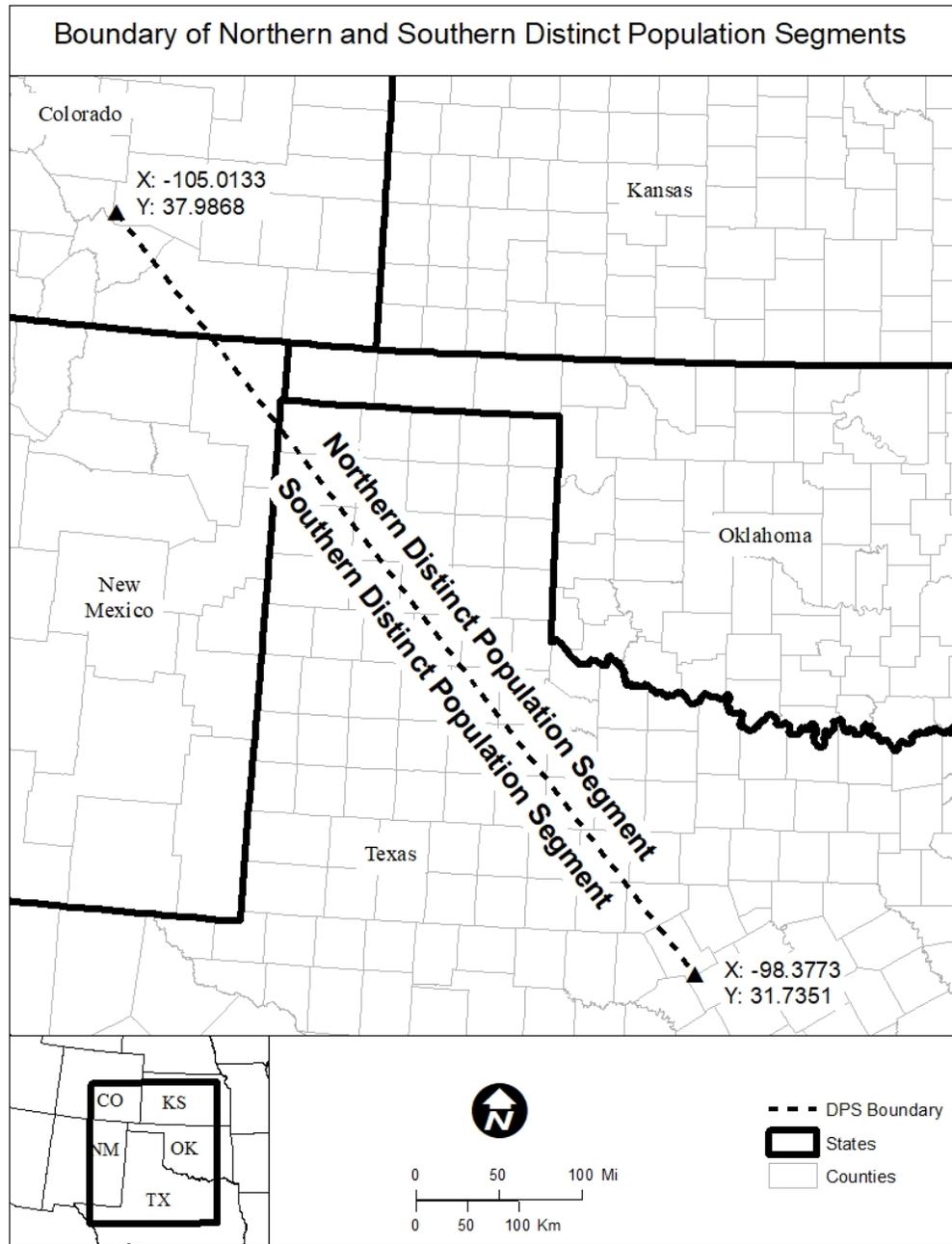
**§ 17.41 Special rules—birds.**

\* \* \* \* \*

(g) through (j) [Reserved]

(k) Lesser prairie-chicken (*Tympanuchus pallidicinctus*), Northern Distinct Population Segment (DPS). The Northern DPS of the lesser prairie-chicken pertains to lesser prairie-chickens found northeast of a line starting in Colorado at 37.9868 N, 105.0133 W, going through northeastern New Mexico, and ending in Texas at 31.7351 N, 98.3773 W, NAD83, as shown in the map:

Figure 1 to paragraph (k)



(1) *Prohibitions.* The following prohibitions that apply to endangered wildlife also apply to the Northern DPS of the lesser prairie-chicken. Except as provided under paragraph (k)(2) of this section and §§ 17.4 and 17.5, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or cause to be committed, any of the following acts in regard to this species:

- (i) Import or export, as set forth at § 17.21(b) for endangered wildlife.
- (ii) Take, as set forth at § 17.21(c)(1) for endangered wildlife.
- (iii) Possession and other acts with unlawfully taken specimens, as set forth at § 17.21(d)(1) for endangered wildlife.
- (iv) Interstate or foreign commerce in the course of a commercial activity, as set forth at § 17.21(e) for endangered wildlife.
- (v) Sale or offer for sale, as set forth at § 17.21(f) for endangered wildlife.
- (2) *Exceptions from prohibitions.* In regard to this species, you may:
  - (i) Conduct activities as authorized by a permit under §17.32.
  - (ii) Take, as set forth at § 17.21(c)(2) through (c)(4) for endangered wildlife.
  - (iii) Take as set forth at § 17.31(b).
  - (iv) Possess and engage in other acts with unlawfully taken wildlife, as set forth at § 17.21(d)(2) for endangered wildlife.
  - (v) Take incidental to an otherwise lawful activity caused by:
    - (A) Continuation of routine agricultural practices on existing cultivated lands, including:
      - (1) Plowing, drilling, disking, mowing, or other mechanical manipulation and management of lands;
      - (2) Routine activities in direct support of cultivated agriculture, including replacement, upgrades, maintenance, and operation of existing infrastructure such as buildings, irrigation conveyance structures, fences, and roads; and
      - (3) Use of chemicals in direct support of cultivated agriculture when done in accordance with label recommendations.

(B) Implementation of prescribed fire for the purposes of grassland management, including:

- (1) Construction and maintenance of fuel breaks;
- (2) Planning needed for application of prescribed fire;
- (3) Implementation of the fire and all associated actions; and
- (4) Any necessary monitoring and followup actions.

(C) Implementation of prescribed grazing following a site-specific grazing management plan developed by a Service-approved party, including:

- (1) Physical impact of cattle to vegetative composition and structure;
- (2) Trampling of lesser prairie-chicken nests;
- (3) Construction and maintenance of required infrastructure for grazing management, including but not limited to fences and water sources; and
- (4) Other routine activities required to implement managed grazing, including but not limited to feeding, monitoring, and moving of livestock.

**Stephen Guertin,**  
*Acting Director,*  
*U.S. Fish and Wildlife Service.*