EXAMINING THE ENDANGERED SPECIES ACT

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY POLICY,
HEALTH CARE AND ENTITLEMENTS

OF THE

COMMITTEE ON OVERSIGHT
AND GOVERNMENT REFORM

HOUSE OF REPRESENTATIVES

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EXAMINING THE ENDANGERED SPECIES ACT

Thursday, February 27, 2014

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY POLICY, HEALTH CARE, AND ENTITLEMENTS,
COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM,
Washington, D.C.

The subcommittee met, pursuant to call, at 2:47 p.m., in Room 2154, Rayburn House Office Building, Hon. James Lankford [chairman of the subcommittee] presiding.

Present: Representatives Lankford, Chaffetz, Walberg, Woodall, and Speier.

Also Present: Representative Lummis.

Staff Present: Joseph A. Brazauskas, Counsel; Sharon Casey, Senior Assistant Clerk; Ryan M. Hambleton, Senior Professional Staff Member; Matt Mulder, Counsel; Jessica Seale, Digital Director; Jaron Bourke, Minority Director of Administration; Courtney Cochran, Minority Press Secretary; and Juan McCullum, Minority Clerk.

Mr. LANKFORD. Ladies and gentlemen, we are going to go ahead and start. I know Jackie is on her way here. We have three Members here, so technically we can begin. And I am going to do an opening statement, so let me go ahead and get started.

The committee will come to order.

I would like to begin this hearing by stating the Oversight Committee mission statement.

We exist to secure two fundamental principles. First, Americans have the right to know the money Washington takes from them is well-spent. And, second, Americans deserve an efficient, effective government that works for them. Our duty in the Oversight and Government Reform Committee is to protect these rights.

Our solemn responsibility is to hold the government accountable to taxpayers, because taxpayers have the right to know what they will get from their government. We will work tirelessly in partnership with citizen watchdogs to deliver the facts to the American people and bring genuine reform to the Federal bureaucracy.

This is the mission of the Oversight and Government Reform Committee.

I will walk through a quick opening statement, and then I will yield the floor to our ranking member to do the same.

We are here today to discuss the Endangered Species Act, which is now in its 40th year. Happy birthday.

The ESA was enacted to conserve habitats and species that are considered endangered or threatened. President Nixon signed it

into law with the support of 99 percent of Congress. At the time, there were high expectations for the Endangered Species Act, President Nixon saying this new law will protect an irreplaceable part of our national heritage and threatened wildlife.

However, over the years, some flaws of the Endangered Species Act have surfaced. There is a significant concern that some are using the act to advance other policy goals, such as stopping development, instead of for its intended purpose of protecting threatened animal and plant species.

Concerns also abound over whether or not the law gives the implementing agencies enough time to properly process the candidates for species listing. In one instance, Fish and Wildlife Service was asked in a petition to examine 374 separate aquatic species, all from 1 petition, in the statutory 90-day timeframe. As a result, the Agency admitted that it was only able to conduct cursory reviews of the information in their files and the literature cited in the petition.

This put the Agencies in a very difficult position: Process the enormous work brought in by a petition within 90 days or face a lawsuit for missing the deadline from the same groups bringing the petition in the first place.

The mass amount of petitions lead to a transition toward sue-and-settle agreements. Whether by choice or not, the Federal Government faces lawsuits that are very often settled to the financial benefit of environmental groups and their lawyers. In many of these cases, States and other affected stakeholders are not even aware of the negotiations or what is being discussed until they are resolved.

Also, there have been instances where much of the basis of these settlements remains sealed. Thus, communities and stakeholders affected by these listings don't have a full view of what all occurred. In general, the lack of transparency of the data used to justify a species' listing remains a major problem. In some cases, data gathered at taxpayer expense has not been publicly released.

Transparency is essential to public faith in government. The less information the public has to understand the Endangered Species Act and how it is carried out, the less support the act will have, and it will be even more difficult to process in the future.

The general success rate of the ESA has also come under criticism, as well: only a 2-percent recovery rate of the approximately 2,100 species listed on the endangered/threatened list since 1973. As I discussed previously, we have seen how we get species on the list. However, the above statistic begs the question, how do species graduate off the list? Is 2 percent enough for success?

Like all Federal agencies in this time of belt-tightening, Fish and Wildlife Service and NOAA Fisheries have finite resources. They are spending all their time and resources getting species on the list. It is unclear if they are able to spend the time necessary and the finances necessary to get species off the list, which was the reason this law was passed in the first place 40 years ago.

Some claim that success can be measured by adding species to the list, as their prospects will benefit once they get there. I hope that is the case. However, the goal of the law enacted 40 years ago

was to rehabilitate species and to move them off the list, not perpetual staying on it.

If Americans are going to have faith in the Endangered Species Act, they need to see how it works and that it works at all. Constantly heaping more species on the listings while barely moving any off of it will undermine that faith and raise questions about the act's effectiveness.

We also have to deal with the issues of: How do we determine if the act is being effective? And when things are moved off, are they moved off because of habitat or because of population numbers? Are those goals set in advance? And do the different communities even know how to have those goals achieved at all?

The ESA is jointly administered by Fish and Wildlife Service, the Department of the Interior, the National Marine Fisheries Service, and the National Oceanic and Atmospheric Administration at the Department of Commerce. I am pleased that we have representatives of both agencies here today as witnesses, and I thank them for coming and look forward to hearing their answers to the subcommittee questions and to the conversation we will have today.

And I recognize our ranking member, Mrs. Speier, for her opening statement.

Ms. SPEIER. Mr. Chairman, thank you for holding this very important hearing.

And thank you to the witnesses who are here to testify.

You know, 40 years ago, the Endangered Species Act was passed with overwhelming bipartisan support from Congress. As President Nixon signed it into law, he said, "Nothing is more priceless and more worthy of preservation than the rich array of animal life with which our country has been blessed."

The Endangered Species Act, or ESA, has preserved our country's rich natural heritage, preventing the extinction of 99 percent of the plants and animals it protects. Without this landmark legislation, scientists estimate that as many as 227 U.S. species would have disappeared. My own State of California would be much poorer without our brown pelicans, our sea otters, and our bighorn sheep, all of which were saved by the ESA.

Too often in Congress, the ESA is invoked as some kind of legislative boogeyman. My colleagues on the other side of the aisle have on occasion been known to imply we would all be better off if we didn't have to protect this insignificant bird or that ugly flower.

During the debate over the recovery package in 2009, the salt marsh harvest mouse, anendangered species found around San Francisco Bay, was blamed for an entirely fictitious spending boondoggle. Now, I do not want to find a salt marsh harvest mouse inhabiting my kitchen, but when they are living where they belong, these lesser-known species act as sentinels for the health of our ecosystems. When these species decline, they act as an early-warning system for problems that will harm us, as well.

Species like the salt marsh harvest mouse or the endangered San Francisco garter snake that also lives in my district simply need healthy wetlands. This is a win-win since the people of the Bay Area also need healthy wetlands to filter out pollution, buffer homes and businesses from storm surge and floods, and support thousands of fishing, tourism, and recreational jobs around the bay.

This holds for other threatened ecosystems, too, from the heights of the Sierra Nevada to the Great Plains shortgrass prairie.

The ESA is also protecting future technological and biomedical advances. Bacteria found in a hot spring in Yellowstone National Park led to the discovery of an enzyme that underpins all basic genetic research and forensic techniques. Protein from a jellyfish supports advances in almost every aspect of biomedical science.

To be clear, the bacteria and jellyfish that I mentioned are not listed under the ESA. But we do not know where the next discovery might come from. An endangered species could lead to the next medical breakthrough. By preventing extinction, the ESA preserves a natural medicine chest for the coming generations.

Frequently, the ESA is blamed for tying up the courts in wasteful litigation. My colleagues on the other side of the aisle claim that the Department of Justice litigates an average of at least three cases a week dealing just with citizen suits under the ESA. However, Department of Justice data shows that civil litigation filed by industry and nonprofit organizations is far less than that rate. A hundred and nineteen lawsuits were filed in 2009, 111 in 2010, 57 in 2012, and only 23 through April 2012.

Let's stick to the facts. The implementation of the ESA has not been perfect. ESA programs have been chronically underfunded. The fiscal year 2013 appropriation approved by Congress for endangered-species work at the Fish and Wildlife Service was $45.7 million less than the administration's 2013 request. This has led to a substantial backlog of candidate species which continues to decline, making recovery more difficult and expensive.

Species also can't recover if there is no place for them to live. Since the passage of the ESA in 1973, 25 million acres of land have been converted from undeveloped to developed and 22 million acres have been converted from forested to nonforested, areas roughly the size of Virginia and South Carolina respectively. But the answer to the limited resources is cooperation and coordination, not rolling back protections for vulnerable species.

You know, when I was on the Board of Supervisors in San Mateo County way back in the 1980s, I helped to develop what was then called the Habitat Conservation Plan. It was the very first in this Nation, and it was an experiment, in part. But we had endangered butterflies: the Mission Blue, the San Bruno Elfin, and the Callippe Silverspot. They were inhabiting an area where a developer wanted to build homes. So we came up with a habitat conservation plan, created an opportunity for all of those endangered species to live and to thrive, and were able to build homes as well.

So we worked with the developer and with the environmental community to achieve both housing and habitat conservation. These are the kinds of win-win situations that the ESA can help facilitate when we commit to protecting species instead of arguing about whether species should be protected.

Thank you, Mr. Chairman, and I yield back the balance of my time.

Mr. LANKFORD. I would love to discuss at a future date how local leadership could make decisions about how to protect species, as well. So we will continue that maybe throughout the course of the day, as well.

Members will have 7 days to submit opening statements for the record.

Mr. LANKFORD. We will now recognize our first and only panel of the day today.

Mr. Sam Rauch is the—it is "Rauch," right? Okay, I said it wrong the first time—Rauch is the Deputy Assistant Administrator for Regulatory Programs at the National Oceanic and Atmospheric Administration's National Marine Fisheries Service in the Department of Commerce. It is a very long business card, by the way.

Mr. Michael Bean is the Counselor to the Assistant Secretary for Fish and Wildlife and Parks at the Department of the Interior.

Gentlemen, thank you both for being here. Look forward to our conversation.

And pursuant to committee rules, all witnesses are sworn in before they testify. So if you would please stand, raise your right hand, please.

Do you solemnly swear or affirm that the testimony you are about to give will be the truth, the whole truth, and nothing but the truth, so help you God?

Thank you. You may be seated.

Let the record reflect the witnesses have answered in the affirmative.

In order to allow time for discussion, I would like you to limit your initial testimony to 5 minutes. You have a clock in front of you there. Your entire written statement—thank you so much for submitting that—will be a part of the permanent record. And then we will go into a dialogue from that point.

Mr. Rauch?

WITNESS STATEMENTS

STATEMENT OF SAMUEL RAUCH

Mr. RAUCH. Good afternoon, Mr. Chairman and members of the committee. Thank you for the opportunity to testify before you today.

My name is Sam Rauch, and I am the Deputy Assistant Administrator for Regulatory Programs for the National Oceanic and Atmospheric Administration's National Marine Fisheries Service. We co-administer the ESA with the Fish and Wildlife Service.

The purpose of the Endangered Species Act is to conserve threatened and endangered species and their ecosystems. Congress passed this law on December 28th, 1973, recognizing that the natural heritage of the United States was of aesthetic, ecological, educational, recreational, and scientific value to our Nation and its people. It was understood that, without protection, many of our Nation's living resources would become extinct.

The Endangered Species Act has been successful in preventing species extinction. Less than 1 percent of the species listed under the law have gone extinct, and over 30 species have recovered.

The National Marine Fisheries Services has recently delisted the eastern population of Steller sea lion. This is the first delisting that has occurred because of recovery for the National Marine Fisheries Service since 1994 when we delisted the now-thriving eastern population of Pacific gray whales.

Actions taken under the Endangered Species Act have also stabilized and improved the downward population trend of many marine species. For example, in 2013, we saw record returns of nearly 820,000 adult fall Chinook salmon passing the Bonneville Dam on their way up the Columbia River to spawn. This is the most fall Chinook salmon to pass the dam in a single year since the dam was completed in 1938, more than twice the 10-year average.

Recovery of threatened and endangered species is a complex and challenging process. We engage in a range of activities under the Endangered Species Act that include listing species and designating critical habitat, consulting on Federal actions that may affect enlisted species or its designated habitat, and authorizing research to learn more about protected species.

We also partner with a variety of stakeholders, including private citizens; Federal, State, and local agencies; tribes; interested organizations and industry, that have been critical to implementing recovery actions and achieving species recovery goals.

For example, several NMFS programs provide support to our partners to assist with achieving recovery goals. From 2000 to 2012, the Pacific Coastal Salmon Recovery Fund provided $1.02 billion in funding to support partnerships in the recovery of listed salmon and steelhead. From 2003 to 2013, the species recovery grants to States awarded $37 million to support State recovery and research projects for our listed species. And from 2001 to 2013, the Prescott Program awarded over $44.8 million in funding through 483 grants to Stranding Network members to respond to and care for stranded marine mammals.

The National Fisheries Service is dedicated to the stewardship of living marine resources through science-based conservation and management. The Endangered Species Act is a mechanism that helps guide our conservation efforts and reminds us that our children deserve the opportunity to enjoy the same natural world we experience.

Thank you again for the opportunity to discuss implementation of the Endangered Species Act, and I am available to answer any questions you may have.

Mr. LANKFORD. Thank you, Mr. Rauch.

[Prepared statement of Mr. Rauch follows:]

WRITTEN TESTIMONY OF
SAM RAUCH
DEPUTY ASSISTANT ADMINISTRATOR FOR REGULATORY PROGRAMS
FOR THE NATIONAL MARINE FISHERIES SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

HEARING ON
IMPLEMENTATION OF THE *ENDANGERED SPECIES ACT*

BEFORE THE
COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM
SUBCOMMITTEE ON ENERGY, HEALTH CARE, AND ENTITLEMENTS
U.S. HOUSE OF REPRESENTATIVES

FEBRUARY 27, 2014

Introduction

Good morning, Mr. Chairman and Members of the Committee. Thank you for the opportunity to testify before you today. My name is Sam Rauch and I am the Deputy Assistant Administrator for Regulatory Programs for the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) in the Department of Commerce. NMFS is dedicated to the stewardship of living marine resources through science-based conservation and management.

This year we celebrate the 40th Anniversary of the *Endangered Species Act* (*ESA*). The purpose of the *ESA* is to conserve threatened and endangered species and their ecosystems. Congress passed the *ESA* on December 28, 1973, recognizing that the natural heritage of the United States was of "esthetic, ecological, educational, recreational, and scientific value to our Nation and its people." It was understood that, without protection, many of our nation's living resources would become extinct. There are more than 2,140 species listed under the *ESA*. A species is considered endangered if it is in danger of extinction throughout all or a significant portion of its range. A species is considered threatened if it is likely to become endangered in the foreseeable future. The U.S. Fish and Wildlife Service (USFWS) within the Department of the Interior and NMFS share responsibility for implementing the *ESA*. NMFS is responsible for 93 marine species, from whales to sea turtles and salmon to Johnson's sea grass.

NMFS Implementation of the *ESA*

NMFS conserves and recovers marine resources by doing the following: listing species under the *ESA* and designating critical habitat (section 4); developing and implementing recovery plans for listed species (section 4); developing cooperative agreements with and providing grants to States for species conservation (section 6); consulting on any Federal agency actions where the agency determines that the action may affect a listed species or its designated critical habitat and to minimize the impacts of incidental take (section 7); partnering with other nations to ensure that

international trade does not threaten species (section 8); enforcing against violations of the *ESA* (sections 9 and 11); cooperating with non-federal partners to develop conservation plans for the long-term conservation of species (section 10); and authorizing research to learn more about protected species (section 10).

How Species are Listed or Delisted

Any individual or organization may petition NMFS or USFWS to "list" a species under the *ESA*. If a petition is received, NMFS or USFWS must determine within 90 days if the petition presents enough information indicating that the listing of the species may be warranted. If the agency finds that the listing of the species may be warranted, it will begin a status review of the species. The agency must, within one year of receiving the petition, decide whether to propose the species for listing under the *ESA*. NMFS may, on its own accord, also initiate a status review to determine whether to list a species. In that instance, the statutory time frames described above do not apply. The same process applies for delisting species.

NMFS or the USFWS, for their respective species, determine if a species should be listed as endangered or threatened because of any of the following five factors: 1) present or threatened destruction, modification, or curtailment of its habitat or range; 2) overutilization for commercial, recreational, scientific, or educational purposes; 3) disease or predation; 4) inadequacy of existing regulatory mechanisms; and 5) other natural or manmade factors affecting its continued existence. The *ESA* requires that listing and delisting decisions be based solely on the best scientific and commercial data available. The Act prohibits the consideration of economic impacts in making species listing decisions. The *ESA* also requires designation of critical habitat necessary for the conservation of the species; this decision does consider economic impacts.

The listing of a species as endangered makes it illegal to "take" (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to do these things) that species. Similar prohibitions usually extend to threatened species. Federal agencies may be allowed limited take of species through interagency consultations with NMFS or USFWS. Non-federal individuals, agencies, or organizations may have limited take through special permits with conservation plans. Effects to the listed species must be minimized and in some cases conservation efforts are required to offset the take. NMFS' Office of Law Enforcement works with the U.S. Coast Guard and other partners to enforce and prosecute *ESA* violations.

Interagency Consultation and Cooperation

All Federal agencies are directed, under section 7 of the *ESA* to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Federal agencies must also consult with NMFS on activities that may affect a listed species or its designated critical habitat. These interagency consultations are designed to assist Federal agencies in fulfilling their duty to ensure Federal actions do not jeopardize the continued existence of a listed species or destroy or adversely modify designated critical habitat. Biological opinions document NMFS' opinion as to whether the Federal action is likely to jeopardize the continued existence of listed species or adversely modify their designated critical habitat. Where appropriate, biological opinions provide an exemption for the "take" of listed species while specifying the extent of take allowed, the Reasonable and Prudent Measures necessary to minimize impacts from the Federal action, and the Terms and Conditions with which the action agency must comply. Should an

action be determined to jeopardize a species or adversely modify critical habitat, NMFS will suggest Reasonable and Prudent Alternatives, which are alternative methods of project implementation that would avoid the likelihood of jeopardy to the species or adverse modification of critical habitat. Nationally, NMFS conducts approximately 1,200 *ESA* consultations per year.

Species Recovery

Recovery of threatened and endangered species is a complex and challenging process, but one which also offers long-term benefits to the health of our environment and our communities. Actions to achieve a species' recovery may require restoring or preserving habitat, minimizing or offsetting effects of actions that harm species, enhancing population numbers, or a combination of all of these actions. Many of these actions also help to provide communities with healthier ecosystems, cleaner water, and greater opportunities for recreation, both now and in future generations.

Partnerships with a variety of stakeholders, including private citizens, federal, state and local agencies, tribes, interested organizations, and industry, are critical to implementing recovery actions and achieving species recovery goals. Several NMFS programs, including the Species Recovery Grants to States and Tribes and the Pacific Coastal Salmon Recovery Fund, and the Prescott Marine Mammal Rescue Assistance Grant Program provide support to our partners to assist with achieving recovery goals. From 2000-2012 the Pacific Coastal Salmon Recovery Fund has provided $1.03 billion in funding to support partnerships in the recovery of listed salmon and steelhead. From 2003-2013 the Species Recovery Grants to States has awarded $37 million to support state recovery and research projects for other listed species. From 2001-2013 the Prescott Program awarded over $44.8 million in funding through 483 grants to Stranding Network members to respond and care for stranded marine mammals.

***Endangered Species Act* Successes**

The *ESA* has been successful in preventing species extinction—less than 1 percent of the species listed have gone extinct. Despite the fact that species reductions occurred over often very long time periods, in its 40 year existence, the *ESA* has helped recover over 30 species. NMFS has recently delisted the Eastern population of Steller sea lion, our first delisting since 1994 when NMFS delisted the now thriving eastern population of Pacific gray whales. Between October 1, 2010, and September 30, 2012, of the 70 domestic endangered or threatened marine species listed under the *ESA*, 27 (39 percent) were stabilized or improving, 16 (23 percent) were known to be declining, 6 (8 percent) were mixed, with their status varying by population location, and 21 (30 percent) were unknown, because we lacked sufficient data to make a determination.

In addition to Pacific gray whales and Eastern Steller sea lions, *ESA* recovery actions have stabilized or improved the downward population trend of many marine species. For example, listed humpback populations are currently growing by 3-7 percent annually. In 2013, we saw record returns of nearly 820,000 adult fall Chinook salmon passing the Bonneville Dam on their way up the Columbia River to spawn. This is the most fall Chinook salmon to pass the dam in a single year since the dam was completed in 1938, and more than twice the 10-year average of approximately 390,000. A substantial number of Hawaiian monk seals are alive today because of

direct interventions by the NMFS Recovery Program. Because of these efforts directed at monk seals, the population is 30 percent larger than if we had not acted, offering hope for future recovery and assurance our actions are making a difference.

Conclusion

Extinctions are currently occurring at a rate that is unprecedented in human history. Each plant, animal, and their physical environment is part of a much more complex web of life. Because of this, the extinction of a single species can cause a series of negative events to occur that affect many other species. Endangered species also serve as "sentinel" species to indicate larger ecological problems that could affect the functioning of the ecosystem and likely humans as well. As importantly, species diversity is part of the natural legacy we leave for future generations. The wide variety of species on land and in our ocean has provided inspiration, beauty, solace, food, livelihood and economic benefit, medicines and other products for previous generations. The *ESA* is a mechanism to help guide conservation efforts, and to remind us that our children deserve the opportunity to enjoy the same natural world we experience.

Thank you again for the opportunity to discuss implementation of the *Endangered Species Act*. I am available to answer any questions you may have.

Mr. LANKFORD. Mr. Bean?

STATEMENT OF MICHAEL BEAN

Mr. BEAN. Thank you, Mr. Chairman, Ranking Member Speier, members of the committee. It is a pleasure to appear before you. My name is Michael Bean. I am Counselor for Fish and Wildlife and Parks at the Interior Department.

Rather than read my statement, sir, I would like to simply summarize what I think are some of the key points for you.

Congress set an ambitious goal when it passed the Endangered Species Act, and that was simply to halt the slide toward extinction and to provide a more secure future for the wildlife and plant life that comprise our Nation's natural heritage. And, to perhaps a surprising degree, it is working.

A recent example that I included in my testimony concerns the Oregon chub, a fish, one of four species that the Fish and Wildlife Service in this month has proposed to delist from the endangered species list. I want to note three aspects of that particular fish and its recovery that I think are noteworthy.

First, that the listing and recovery of that fish generated little controversy. There were no major headlines, there were no major conflicts. Like most endangered species, the work that was done to recover it was done in a way that was both successful and generated few conflicts.

Secondly, the recovery of that species benefited greatly from the help of private landowners who took advantage of new, administratively created mechanisms to work with the Fish and Wildlife Service to cooperate in conserving that fish. Those agreements, called safe harbor agreements, are the same sorts of agreements that ranchers in Texas have used to help reintroduce the Aplomado falcon to that State after an absence from the U.S. of more than 50 years. Those same safe harbor agreements are akin to the ones that over 300 forestland owners in the Southeast, including some 28 forestland owners in Georgia, Mr. Woodall's State, who are in effect laying out the welcome mat on their property for an endangered species, the red-cockaded woodpecker. And as a result of their efforts, that species is growing in numbers on private land for the first time in a very long time.

The third thing I want to note about the Oregon chub recovery is that it took over 2 decades to happen. And that is actually rather speedy, because, unfortunately, for many endangered species, by the time we start efforts to conserve them, they are so reduced in numbers that the prospects of recovering them will inevitably take a very long time.

I will give you a few examples: the whooping crane. This country has, since the mid-1940s when the numbers of that bird were fewer than 20, been engaged in a steadfast effort to recover it. And that has been successful, although it has taken some 70 years. We now have a wild population of roughly 400 or so whooping cranes in 3 populations, 2 of which were created through conservation actions.

The California condor, in Ms. Speier's home State and is now also in Utah and Arizona due to a translocation effort, is a species that, like the black-footed ferret, was once extinct in the wild. That is to say, all the wild specimens were gone. The only specimens of

those two species that survived were in captivity. And those two species became the subject of successful reintroduction—captive rearing and reintroduction programs. They are both now reintroduced in the wild. They are both reproducing in the wild. They both have a better shot at recovery than ever in their history.

These and other examples of clear progress being made show that recovery is possible, even for species that only a few decades ago seemed to face inevitable extinction.

A few lessons that I draw from these experiences are: First, don't wait until species are in extremis. Get started early. That is when you have the best chance and you have the most options to succeed.

And, secondly, take advantage of what I argue will be the inherent flexibility of the Endangered Species Act to craft innovative solutions, like the safe harbor agreements I have described; like the candidate conservation agreements that have made possible the decision not to list the dune sagebrush lizards in Texas; like the experimental population provisions of Section 10(j) of the act that have helped restore both the whooping crane and the California condor; and like the flexibility provided through Section 4(d) of the Endangered Species Act to tailor requirements to the needs of threatened species.

If we can learn from these lessons and if we can heed Congress' own admonition when it passed this law to temper our economic growth and development with adequate concern and conservation, then we can continue to make progress in reversing the slide toward extinction and getting on the road to recovery.

Thank you, sir.

Mr. LANKFORD. Thank you.

[Prepared statement of Mr. Bean follows:]

TESTIMONY OF MICHAEL J. BEAN
COUNSELOR TO THE ASSISTANT SECRETARY FOR FISH AND WILDLIFE AND PARKS
DEPARTMENT OF THE INTERIOR
BEFORE THE
HOUSE COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM
SUBCOMMITTEE ON ENERGY POLICY, HEALTH CARE, AND ENTITLEMENTS
"EXAMINING THE ENDANGERED SPECIES ACT"

February 27, 2014

Chairman Lankford, Ranking Member Speier, and Members of the Subcommittee, I am Michael J. Bean, Counselor to the Assistant Secretary for Fish and Wildlife and Parks at the Department of the Interior. It is my pleasure to testify before you today regarding the implementation of the Endangered Species Act (ESA).

The Department is committed to making the ESA work for the American people to accomplish its purpose of conserving threatened and endangered species and protecting the ecosystems upon which they depend. This job has never been easy, and it grows more difficult and complex every day. In passing the ESA, Congress recognized we face an extinction crisis. Since that time, the pace and extent of environmental change threatening the continued existence of more and more of our Nation's biological wealth, have made it imperative to have an effective, collaborative approach to conserving imperiled species.

The Listing Process

Listing under the ESA becomes necessary when a species declines, or threats to it increase, to the point where it is in danger of extinction throughout all or a significant portion of its range (an "endangered species") or it is likely to become endangered in the foreseeable future (a "threatened species"). The Fish and Wildlife Service lists a species if, after reviewing the species' status using the best scientific and commercial data available, it determines that the species is endangered or threatened because of any one or a combination of the following factors:

- the present or threatened destruction, modification, or curtailment of its habitat or range;
- overutilization for commercial, recreational, scientific, or educational purposes;
- disease or predation;
- the inadequacy of existing regulatory mechanisms; and
- other natural or manmade factors affecting its continued existence.

There are two processes the Service follows to identify species eligible for listing. The first is the candidate assessment process, which is initiated by the Service. The second is a petition process, which is available to the public.

The second process for identifying species that may warrant listing is the petition process. Section 4 of the ESA allows any interested person to petition the Secretary of the Interior either to add a species to, or remove a species from, the lists of threatened and endangered species.

Upon receipt of a petition, the Service must respond, within 90 days when practicable, with a finding as to whether the petition provides substantial scientific or commercial information indicating that the petitioned action may be warranted. If the Service determines that the petition did not provide such substantial information, the 90-day finding concludes the petition review process. However, if the Service determines that the petition does provide substantial information, the Service initiates a status review and issues an additional finding within 12 months of the receipt of the petition.

There are three possible outcomes of the "12-month finding": 1) listing is not warranted, and no further action is taken; 2) listing is warranted, and a listing proposal is promptly prepared; or 3) listing is warranted, but immediate action is precluded by higher priority actions. A "warranted but precluded" finding is made on the basis of the species' listing priority number and the listing workload. In such cases, preparation of a listing proposal is delayed until higher priority actions are completed, and the species is added to the list of candidate species and included in the next CNOR.

Our listing and delisting actions are rule-makings, published in proposed and final rule form in the *Federal Register*, and leading to revisions to Title 50, Part 17 of the Code of Federal Regulations. Once a proposal is published, the Service must allow for a public comment period on the proposal; provide actual notice of the proposed regulation to appropriate State, tribal, and local government agencies; publish a summary of the proposal in a newspaper of general circulation in areas where the species occurs; and hold a public hearing, if requested (see 16 U.S.C. § 1533(b)(5)). The Service's implementing regulations require that the public comment period on a listing proposal be at least 60 days long (see 50 C.F.R. § 424.16(c)(2)).

The Service always solicits independent peer review of its listing proposals, and has found such peer review to be a valuable element of the decision-making process.

ESA Consultation and Habitat Conservation Planning

Science is the foundation of our consultation and recovery activities under the ESA. One of the most important and effective tools available to recover endangered and threatened species is the consultation process prescribed by section 7 of the ESA. The Service engages in consultation with other Federal agencies to assist them in meeting their obligation to avoid taking any action

that would be likely to jeopardize the continued existence of a listed species or that would destroy or adversely modify their critical habitat.

Habitat Conservation Plans (HCPs) under section 10(a)(1)(B) of the ESA provide for partnerships with non-Federal parties to conserve the ecosystems upon which listed species depend, ultimately contributing to their recovery. HCPs are planning documents required as part of an application for an incidental take permit. HCPs provide the conservation benefits of proactive landscape planning, combining private land development planning with species ecosystem conservation planning. Working in partnership is foundational for the Endangered Species program, because the conservation of the Nation's biological heritage cannot be achieved by any single agency or organization.

Success of the Endangered Species Act

The ESA provides a critical safety net for America's native fish, wildlife, and plants. And we know it can deliver remarkable successes. Since Congress passed this landmark conservation law in 1973, the ESA has prevented the extinction of hundreds of imperiled species across the nation and has promoted the recovery of many others – like the bald eagle, the very symbol of our Nation's strength.

Earlier this month, the Service published a proposal to recognize the recovery of, and to remove from the protection of the ESA, the Oregon chub, a fish native to rivers and streams in the State of Oregon. The recovery of the Oregon chub is noteworthy because it is attributable in significant part to the cooperation of private landowners who entered into voluntary conservation agreements to manage their lands in ways that would be helpful to this rare fish. In some cases, landowners agreed to cooperate in reintroducing the fish into suitable waters on their property. The help of private landowners and the cooperation of state and federal partners were critical to the success in bringing this fish to the point at which it is no longer endangered and no longer in need of the protection of the ESA.

The recovery of the Oregon chub has taken a little more than twenty years of sustained effort. That is relatively speedy time frame within which to undo the effects of habitat loss and degradation and the other threats that are responsible for the endangerment of many species. The recovery and delisting of the bald eagle was the culmination of a 40-year conservation effort. The Aleutian Canada goose recovery took 34 years. Efforts to recover the whooping crane have been underway since the 1940's when fewer than 20 cranes remained. Those efforts have been dramatically successful, with a wild population today of several hundred birds. Likewise, the California condor and black-footed ferret, both of which were so perilously close to extinction that no individuals of either species survived in the wild, have made extraordinary progress. Today condors and ferrets have been successfully bred in captivity and reintroduced to the wild,

where they have successfully produced wild-born offspring. Despite the dramatic progress toward recovery that each of these species has made, the whooping crane, California condor and black-footed ferret are still endangered species and will likely remain so for many more years. That is the virtually inevitable consequence of waiting until a species has been greatly depleted before beginning efforts to recover it.

Cooperative Conservation Efforts

As the Oregon chub example makes clear, private landowners can hasten the recovery of endangered species through their cooperative efforts. The Oregon chub is just one of many endangered species that landowners are helping recover through voluntary agreements with the Service known as "safe harbor agreements." Safe harbor agreements with Texas ranch owners have helped restore the northern aplomado falcon to the United States, from which it had been absent for roughly a half century. In the southeastern United States, more than 400 landowners have enrolled nearly 2.5 million acres of their land in safe harbor agreements for the endangered red-cockaded woodpecker. These landowners have effectively laid out the welcome mat for this endangered bird on their land, as a result of which populations of this endangered bird are growing on many of these properties. Many others are doing similarly for other endangered species.

However, there is no reason to wait until a bird or other species is listed as an endangered species before beginning to enlist the cooperation of landowners. As the examples above make clear, a likely consequence of postponing conservation action is simply to prolong the time that a species remains on the endangered list. By beginning conservation efforts early, it may be possible to shorten the time that a species spends on the endangered species list, or even to avoid the need to place it on that list at all. The Service has fashioned tools to enlist the cooperation of private landowners and others in conservation efforts before species are listed, and landowners have been willing to use them. A case in point was the Service's decision last year with respect to the dunes sagebrush lizard in Texas and New Mexico. Although the Service had originally proposed to list the lizard as an endangered species, in the end, because of the substantial acreage encompassed by Candidate Conservation Agreements, the Service concluded that those agreements had sufficiently addressed the threats to that species so as to preclude the need to list it.

Increasing Flexibility to Reduce Regulatory Burden

Important as voluntary landowner agreements are, the law is very clear that decisions whether to list or not list species are to be based on the best available science. If the best available science shows that a species is in danger of extinction or likely to become so in the foreseeable future, the duty of the Service is clear: it must extend to that species the protection of the ESA by listing it as endangered or threatened. The law also allows anyone to petition the Service to list – or

delist or reclassify – a species, and it imposes strict deadlines for responding to petitions and for making a final listing decision once a proposed listing has been published.

At times, the volume of incoming petitions has exceeded the capacity of the Service to meet these statutory deadlines. When that happens, petitioners have often turned to the courts to secure new, judicially-enforceable deadlines for making these decisions. While the Service would prefer to be able to make its decisions within the deadlines specified by Congress, it has worked with stakeholders to take advantage of the time available to put in place conservation measures that could beneficially affect the ultimate listing decision.

A current example of that concerns the greater sage grouse, a species that occurs in eleven Western states. Under the terms of a 2011 court order, the Service must decide by September 30, 2015, whether or not to propose to list that species as a threatened or endangered species. Because of the scope of the sage grouse's habitat, all eleven states, the Bureau of Land Management, U.S. Forest Service, the Natural Resources Conservation Service and others are working closely together to do what they can to address the several threats to that species in advance of the late-2015 deadline.

Similar efforts have been underway for some time with respect to the lesser prairie chicken, a related bird that occurs in five states in the southern plains. The Service must decide later this year whether to list that species as threatened or endangered. The Service has proposed to list it as a threatened species, and if so listed, to accompany that listing with a special rule – known as a "4(d) rule" – that would give the five states the ability to manage the prairie-chicken under the terms of a range-wide conservation plan developed by the states. Although the ESA has since 1973 had two categories of listed species – threatened and endangered – in practice there has been little difference in how they are treated by the U.S. Fish and Wildlife Service. Recently, however, the Service has made more innovative use of the flexibility provided by Section 4(d) to fashion the rules applicable to individual threatened species so as to address major threats effectively without burdening activities that pose little threat.

There are still other mechanisms in the ESA to further the recovery of imperiled species by engaging the collaborative efforts of land owners and others. For example, Section 10(j) of the ESA allows experimental populations to be established in appropriate locales and has greatly benefited species such as California condors, black-footed ferrets and whooping cranes. These experimental populations are provided the full protection of the ESA in National Parks and in National Wildlife Refuges, but elsewhere they can be managed with greater flexibility.

The U.S. Fish and Wildlife Service (Service) has a record of decisions that are scientifically sound, legally correct, transparent, and capable of withstanding challenge. The Service works diligently with project proponents through the consultation provisions of the ESA to help projects achieve their goals while achieving ESA compliance and minimizing impacts to listed species. The Department strongly supports the Service's long track record of using the

flexibility of the ESA to create innovative programs and processes that make the law more predictable for private citizens and businesses and to encourage long-term cooperative conservation that helps species on their long road to recovery.

Conclusion

In closing, Mr. Chairman, America's fish, wildlife, and plant resources belong to all Americans, and ensuring the health of imperiled species is a shared responsibility for all of us. In implementing the ESA, the Service endeavors to adhere rigorously to the congressional requirement that implementation of the law be based strictly on science. At the same time, the Service has been responsive to the need to develop flexible, innovative mechanisms to engage the cooperation of private landowners and others, both to preclude the need to list species where possible, and to speed the recovery of those species that are listed. The Service remains committed to conserving America's fish and wildlife by relying upon the best available science and working in partnership to achieve recovery.

Thank you for your interest in endangered species conservation and ESA implementation, and for the opportunity to testify.

Mr. LANKFORD. I recognize myself for a line of questioning.

As I mentioned to both of you in advance, we will do the 5 minutes of questioning, and then when we get into our second round we are going to open it up for more open colloquy.

Let me just ask a couple quick questions. Species at this point, how are they identified for concern? I know that is not an official term, but how does the initial process come out in both of the agencies to say, we now recognize this species as something we need to look at closer? Can you tell me the process of how it gets into that?

Mr. BEAN. I would be happy to give an answer to that to start.

Two ways the Fish and Wildlife Service addresses species that may be in need of the act's protection. First, the Service itself sometimes generates its own priorities of species based on the information it has——

Mr. LANKFORD. So I am asking, where is that information coming from?

Mr. BEAN. Oh——

Mr. LANKFORD. So you don't have a population count of every species of plant and animal and fish in North America, I would assume, that there is not some such listing somewhere, correct?

Mr. BEAN. That is correct. Instead, what——

Mr. LANKFORD. Then there has to be some way to be able to identify a certain plant, fish, or animal to say, okay, this is something we want to look at.

Mr. BEAN. Yes. There are a variety of published and unpublished studies about the status of species. Certainly, every State has a fish and wildlife agency that tends to keep careful track of the trends of species in the State. And the Fish and Wildlife Service utilizes and accesses that information to determine whether any of those species may be declining or facing threats that warrant protection of the act. So that is a very common mechanism.

Secondly, the act provides for citizen petitions, and any person can petition the Fish and Wildlife Service to consider for listing a species. And if the petition presents substantial evidence, the Service then does a status review to determine, based upon all the evidence that is available from all sources, whether a proposal to list is appropriate.

Mr. LANKFORD. Okay. I am going to a couple quick questions, and then we will move on to Mr. Rauch on that, as well.

What percentage do you think come from State agencies that are saying that there is a concern here? And what percentage of those currently—and you can take the last couple years. And I know it is going to be an estimate. What are coming from State agencies identifying and what are coming from citizen petitions?

Mr. BEAN. We have in the last several years been heavily weighted toward citizen petitions. As you noted in your opening statement, we have received some petitions to list multiple species, and those have occupied the great majority of the attention of the Fish and Wildlife Service.

Mr. LANKFORD. So, in the past, if you go back, were the species that were citizen suits coming, they would bring one or two species at a time, and you have seen a trend difference, where now they are bringing hundreds at a time?

Mr. BEAN. We, beginning 5 or 6 years ago, began to receive multi-species petitions, which were atypical prior to that.

Mr. LANKFORD. I know Ms. Speier had mentioned that the number of lawsuits is dropping dramatically, but you are saying the number of species included in each of those lawsuits, in those petitions, seem to be much higher?

Mr. BEAN. I am not talking about lawsuits, sir. I am talking about petitions.

Mr. LANKFORD. Okay. So the actual petition to request to get into it, you are seeing this big jump of the number?

Mr. BEAN. There have been a few large petitions that have required a fair amount of attention from the Fish and Wildlife Service because of the number of species protected.

Mr. LANKFORD. Okay. So how many do you think right now of the citizen petitions that are sitting out there that citizens have brought in the last couple of years even? Are we talking 200? Are we talking 700?

Mr. BEAN. Species subject to petition?

Mr. LANKFORD. Yes.

Mr. BEAN. I don't have that number. It is probably in the hundreds, but I don't have a precise number.

Mr. LANKFORD. Okay. So we have 2,100 total that are currently threatened or endangered at this point, and we are having hundreds coming in citizen petitions at this point asking to be listed in additional?

Mr. BEAN. Yes. A petition does not mean a species will become listed.

Mr. LANKFORD. Correct. But it starts your review process.

Mr. BEAN. It starts the review process, that is true.

Mr. LANKFORD. Okay.

Mr. Rauch—thank you, by the way.

Mr. Rauch, what is the process for you all?

Mr. RAUCH. Thank you, sir.

We follow much the same process that the Fish and Wildlife Service follows by looking at different sources of information. The petition process in recent years has largely driven our listings.

But before we get to the listing process, we do maintain a species-of-concern list, which we look at—as Mr. Bean said, the time to act to protect these species, when you can do it at the least cost to the greatest effect, is before they get critically imperiled. And so the point of our species-of-concern list is it identifies issues where we can work with the States and our partners well before the Endangered Species Act kicks in to try to deal with that.

The one difference between us and the Fish and Wildlife Service is we do maintain a series of marine surveys of marine life in Federal waters, and oftentimes our own surveys can feed into some of our analysis.

Mr. LANKFORD. So it is not necessarily a State bringing species that are specific to that. It is more often your own population counts. Because that is what I am trying to determine; how do they get on this species of concern? It is something you are tracking, a certain number in a population?

Mr. RAUCH. That is something that we track. I am not aware that a State has petitioned us in recent memory.

Mr. LANKFORD. Okay.

Then the big question we will deal with as we come through this is obviously getting on and then it is a matter of getting off in the process.

And I want to yield to my ranking member, Mrs. Speier, for her questioning.

Ms. SPEIER. Thank you both for your service and for your participation here today.

I guess I would love to have an understanding of how we can measure the success of the Endangered Species Act. Some might suggest that you have to either prevent extinction or you have to delist a species to show that there has been some kind of success.

And, as you have mentioned, in many cases, they don't even get to the list until they are truly almost extinct, which makes it that much more difficult to recover. And I am thinking, in part, of the bald eagle and the American alligator and their status.

So I guess to each of you I would like to ask you, what would you count as success?

Mr. BEAN. I would be happy to begin. Thank you for the question.

Clearly, the examples that I gave earlier of the California condor, the whooping crane, the black-footed ferret, we are making extraordinary progress in giving those species a more secure future. But they are still endangered, and they will remain endangered probably for many more years. And so anyone who suggests that that is a failure, because they have not been recovered yet, is really blind to the major progress that has been accomplished. So, for me, I think an important indicia is simply: Are they more secure? Are they more abundant? Are they more widespread? Have the threats to them been reduced?

Clearly, we would like to get and hope to get and intend to get to a point where we can take these species off the list because they are no longer endangered. But, as I suggested in my testimony, that is often a very long process, and what is important is that we make progress over the course of the years, as we have done for a great many of these species.

Ms. SPEIER. Mr. Rauch?

Mr. RAUCH. For the Fisheries Service, the Marine Fisheries Service, we currently have 94 species on the list that our Fisheries Service is managing. Of those, only one of them has gone extinct over the time, and it may well have been extinct at the time of listing in 1973.

Since then, we do measure our success in terms of the number of stable or increasing populations. The species are critically imperiled, and many of them are in a steep decline at the time that they are listed. If we can stabilize them at all, that is a sign of success. And the majority of our species are either stable or increasing. We only have a few of those 94 that still are exhibiting a decline.

And so I think that is how we—that is how we measure our success at this point. I would love to measure it in terms of more recovered species, like the Steller sea lion that we just did, but, as Mr. Bean said, that is a long process.

Ms. SPEIER. So, of these citizen petitions, how much time is afforded the review of these petitions?

I think, Mr. Rauch, you indicated that most of your listings now come from citizen petitions, not from anywhere else. So is that a lion's share of the time that you spent doing your work, is reviewing these petitions?

Mr. RAUCH. No. We do spend a substantial amount of time reviewing petitions, and most of our listing work does come through the petition process. But we spent a substantial amount of resources working on recovery. I listed at the beginning some of the resources working on salmon recovery in the western United States. We have made great strides in recovering monk seals and right whales. All of that is done post-listing.

And so, I don't have a breakdown. We don't calculate our resources in terms of how much time on listings versus others. But we do spend a substantial amount of resources and time on recovery efforts.

Ms. SPEIER. Let me just spend a couple minutes on habitat conservation plans, since I cut my teeth on them decades ago. How many are there in the country now?

Mr. BEAN. I don't have a precise number, but it is well over 500.

Ms. SPEIER. Is that right.

Mr. BEAN. Yes. And they have been very widely used in California, they have been widely used by other local governments as a way of integrating concerns about endangered species with local land-use planning decisions. And they have been quite successful, particularly in California, but they are increasingly in use elsewhere, as well.

Ms. SPEIER. Now, how do they compare to the safe harbor agreements?

Mr. BEAN. Well, habitat conservation plans, as you know from your experience in San Mateo County, are designed for situations in which there is some development or other project that is planned that is going to cause some degree of harm to an endangered species. And what those plans do is to offset that harm with a mitigation program, typically by protecting certain lands from development.

Safe harbor agreements are intended for landowners who are willing to voluntarily do things that improve or create or restore habitat on their land, thus attracting endangered species to it, or hopefully attracting endangered species to it, or allowing species already there to expand. And those agreements protect those landowners from any additional regulatory burden for having laid out the welcome mat on their land for endangered species.

So that is the key difference.

Ms. SPEIER. Thank you.

My time has expired.

Mr. LANKFORD. Thank you.

I recognize the gentleman from Utah, the home of the Utah prairie dog, Mr. Chaffetz.

Mr. CHAFFETZ. I thank the chairman. We will have to get you such a shirt. You will enjoy it.

Mr. Bean, you are obviously a very accomplished individual. Where did you grow up?

Mr. BEAN. I grew up in a small town in Iowa.

Mr. CHAFFETZ. Oh, very good. And at some point, I am sure, you will look towards retirement, way, way in the future. Where would—do you have any idea where you might retire?

Mr. BEAN. I haven't the foggiest.

Mr. CHAFFETZ. My guess is it is probably not in Utah, right?

Mr. BEAN. Utah is a great place. I would consider it.

Mr. CHAFFETZ. Oh, well, thank you.

I guess one of the things we are concerned about is Utahans feel like they have lived there—they have lived there for generations, they will live there in the future. They want what is best for the land, and wildlife is part of that.

Why is it that there is so much resistance to taking State data and information under consideration when you are making these types of decisions?

Mr. BEAN. Respectfully, sir, I don't think there is much resistance to taking State data. I think the Fish and Wildlife Service routinely uses information from the States in making its decisions.

Mr. CHAFFETZ. We don't feel like that in Utah, quite frankly.

Let me ask you this. The 2010 decision by Fish and Wildlife Service that the greater sage grouse warrants an ESA listing was based, as I understand it, on a 2009 taxpayer-funded Fish and Wildlife Service study. The study was cited 62 times in the listing decision, yet the data used in the study has still not been made publicly available. Do I have that right?

Mr. BEAN. I don't know whether you have it right or not. I do know as a general matter that some of the underlying data for studies that the Fish and Wildlife Service relies upon is not publicly available.

Mr. CHAFFETZ. Why not?

Mr. BEAN. Because the—as I understand it, because the researchers who collected that data have it as a proprietary source of data.

Mr. CHAFFETZ. Isn't that patently unfair? You are making a decision that affects people's lives and dramatically affects their way of living, and yet they can't see it?

Mr. BEAN. Well, sir, the decision made in 2010 was not a decision to list the species. It had no effect upon anyone's life. There will be a decision forthcoming about whether to list——

Mr. CHAFFETZ. It is going to be part of the decision-making process, is it not?

Mr. BEAN. Well, there will be a decision made in 2015 on the sage grouse——

Mr. CHAFFETZ. And they are going to rely upon some of that data, right?

Mr. BEAN. Well, I don't know.

Mr. CHAFFETZ. But why can't we look at it? I mean, taxpayers paid for it.

Mr. BEAN. It is not as though the Fish and Wildlife Service is withholding it. The Fish and Wildlife Service doesn't have it to give, as I understand.

Mr. CHAFFETZ. Who paid for it?

Mr. BEAN. I don't honestly don't know.

Mr. CHAFFETZ. The taxpayers. Taxpayers paid for it. Why can't we see the information? It is not about some North Korean nuclear

bomb that the military is—we are talking about data that should be made publicly available.

Mr. BEAN. Sir, I can tell you that I am currently aware that the Fish and Wildlife Service is working quite closely with the State of Utah. Mr. John Harja, representing Governor Herbert, is involved on a regular basis in dialogue with respect to Utah's efforts to protect the sage grouse. And any information from Utah or other sources relevant to whether that species should be listed will be fully taken into account by the Service, I can assure you of that.

Mr. CHAFFETZ. It seems to be a one-way street. And it shouldn't be. We have spent time with Mr. Harja. He is a very good, talented individual. I don't feel like there is a good, two-way communication.

This is a taxpayer-funded study with data and information that we should be able to review and challenge. That is part of the open and transparent process where we are ultimately going to make some sort of decision.

I am running short of time here. I really don't understand the philosophy behind this. I don't think it is fundamentally fair. I think you are hiding something. And I think it should be made publicly available.

And if you would please get back to this committee and try to articulate why you are hiding this information, we can't see it, I would greatly appreciate it, because I really don't understand it.

The other part I want to ask about is, for instance, with the prairie dogs, how you count them on public lands but not on private lands, but then if they are deemed to get on the list, then you have to manage them also on the private lands. Explain that philosophy to me.

Mr. BEAN. I think the Fish and Wildlife Service recovery plan for the prairie dog relied primarily upon recovering the species on public lands. And that was done, I believe, in part, in recognition of the fact that, for the most part, private landowners regard the Utah prairie dog as not a desirable thing to have on their lands, and therefore the prospects for recovery really depend upon securing its survival on public lands.

Mr. CHAFFETZ. But when you are assessing—when you are assessing how endangered they might be, you don't take into account what is on the private property.

Mr. BEAN. Respectfully, sir, I do not think that is correct. I think the Fish and Wildlife Service takes into account all the prairie dogs in assessing whether or not they belong on the list.

Mr. CHAFFETZ. All right. Well, that is a question that I would like to further explore with you.

My time is expiring here, but I can tell you in general that the good people of Utah, they care deeply about their land. They pass this on from generation to generation. It is highly offensive when we have people who come in and make fundamental decisions about the longevity of the State and don't properly, I think, can take into account the State plans. The State data is not necessarily used with the consistency we would like it to. And it seems to be a one-way street, because when we ask for data from the Federal Government in how they are making these decisions before they are finally made—because once they are finally made, it is very difficult—we can't get our hands on that information.

And that is the frustration. And it should be an open and collaborative process. I believe the States are in a much better position to draw up the plans, come to these conclusions, and gather this information.

But, Mr. Chairman, I appreciate the time. I am well over. Yield back.

Mr. LANKFORD. Thank you.

Mr. Woodall?

Mr. WOODALL. Thank you, Mr. Chairman.

I appreciate you all being here.

I would encourage you to come look at the great State of Georgia when you are thinking about retirement, Mr. Bean. We have everything from close proximity to the oceans to close proximity to the mountains and wonderful folks and flora and fauna in between.

I have great frustration about these ESA debates that we have, because I look around my community and I can't find anybody who loves native species more than we do. It is the hunters and the fishermen, it is the hikers and the bikers who are invested. I share Mr. Chaffetz's observation that I can't believe there is anybody in the Nation that cares more about preserving the God-given benefits of Utah more than the folks who live in Utah.

Why do you think here 40 years after a bipartisan effort, not just bipartisan agreement but really a bipartisan effort, to get the ESA passed into law, why are we arguing about it instead of celebrating it?

Mr. Rauch, do you have a—is it obvious to you, from where you sit?

Mr. RAUCH. I don't have an opinion on why we continue——

Mr. LANKFORD. The light should come on there when you hit the "talk" button.

Mr. RAUCH. Oh, sorry. Thank you.

I don't have an opinion about why we continue to argue about it. I do think that both services have done in recent years a—have undertaken a significant effort to look for flexibilities in the current law, to forge partnerships. I think we both agree that if you are going to recover the species, it cannot be solely on the part of the Federal Government acting as a regulatory entity but as a conservation partner. And I know that both services have tried in many instances to do that. And where we have been able to do that successfully, I think it has worked.

Mr. WOODALL. Well, I think about how suspicion gets created. And it is very tough to get anything done around here without trust, and you need that basis of trust.

I am an attorney by training, but I look at the lawsuits in this area, where attorneys are suing the Federal Government. I mean, you are talking about having a partnership with private-sector entities. I mean, I am just asking us to have a partnership with one another as a Federal Government.

If this is the law of the land, if we are not only personally invested as public servants in making this happen but personally invested as citizens in making this happen, is having the process driven by attorneys rather than by individuals, Mr. Bean, a part of what undermines public confidence in whether our goal is to pre-

serve species or whether our goal is to manipulate a process to achieve yet a different goal?

Mr. BEAN. Mr. Woodall, I think that the most successful efforts at conservation are ones that are carried out in cooperation with the local landowners. And in your State of Georgia, as I indicated, many of the landowners in the Red Hills area in the southwest part the State are voluntarily participating in a Fish and Wildlife Service agreement, known as a safe harbor agreement, to improve the habitat on that land for red-cockaded woodpeckers and other wildlife. Because, as you know, they care a great deal about their land and about the wildlife on it. And that has been a remarkably successful effort. It has been replicated next-door in South Carolina and in Florida.

So I think that is the best way to do things. And where the Fish and Wildlife Service has been able to sit down successfully with landowners and strike these agreements, great progress is being made. And we are committed to doing more of that, just as we have been committed to doing much of it in the past.

Mr. WOODALL. Well, but if you and I are invested in getting this done, if at a government level we are invested in getting this done, and if, as I would ask that we stipulate is true, if public trust is being undermined by not just the amount of litigation on the issue but the size and scope and direction of the litigation on this issue, what would be the harm in eliminating attorney-fees recovery, say, here?

Because, again, we are invested as individuals, we are invested as public servants. What if we took that small step to say, you know what, let's find the right answers, but let's not finance attorneys who might be doing the wrong thing under the guise of helping to protect native species that we care so much about?

Any harm in removing those attorney-fees awards today, Mr. Rauch?

Mr. RAUCH. I can't speak to that. The Justice Department would be better.

I think that——

Mr. WOODALL. Well, let me just—I mean, you have these issues come across your desk. If what you are saying is that your job would be much harder to do without private litigators, you would know the answer to that. But if private litigators are not value-adds here, then it seems, you know, we have limited resources, limited opportunities, it is—I know of no one better than you to make the determination of whether or not this is mission-critical or whether or not this is a case of misapplied resources.

Mr. RAUCH. I know that the Fish and Wildlife Service has significantly more Endangered Species Act litigation than we do. We do have some. We believe that it is—we do devote resources to it, but it is not constraining our overall effort towards recovery.

And I am from Georgia, by the way. I was born and raised there.

Mr. WOODALL. And will we get you back?

Mr. RAUCH. In the—probably so.

Mr. WOODALL. I am glad to hear it.

Mr. RAUCH. But it was the Ninth District. Sorry.

Mr. WOODALL. We move the lines around frequently. You and I may be teammates yet again down the road.

Mr. Bean?

Mr. BEAN. Congressman Woodall, I am a bit worried I am looking older than I am because you are all talking about my retirement here already.

With respect to the litigation, the Fish and Wildlife Service is an equal-opportunity defendant. We get sued not just by environmental groups, but in the last year or 2 we have been sued by the National Association of Homebuilders, by Weyerhaeuser Corporation, American Forest Resources Council, which is a timber industry group, and numerous others.

We don't like be sued by anybody, but I will say this: The fact that people are looking over our shoulder, our left shoulder and our right shoulder, does make us pay careful attention to dotting our i's and crossing our t's and getting it right as best we can.

So there is a salutary benefit, as much as I hate to admit it, to being sued sometimes, because that forces you to pay careful attention to what you are doing. So I think that is something that should not be lost sight of.

Mr. LANKFORD. Ms. Lummis?

Mrs. LUMMIS. Mr. Bean, have you ever been the one who was looking over the agency's left shoulder?

Mr. BEAN. I have certainly been one who has closely followed the agency's implementation of the Endangered Species Act, yes.

Mrs. LUMMIS. Were you the director of wildlife conversation at the Environmental Defense Fund from 1977 to 2008?

Mr. BEAN. Yes, I was.

Mrs. LUMMIS. During those years, was the Environmental Defense Fund party to at least 138 lawsuits, most of them against the Federal Government and some involving the Endangered Species Act?

Mr. BEAN. To my recollection, during the time I was there, there were two or three lawsuits involving the Endangered Species Act.

Mrs. LUMMIS. Has the Environmental Defense Fund been involved in any litigation that was ESA-related since then, since you joined the administration?

Mr. BEAN. Not to my knowledge.

Mrs. LUMMIS. Has it been party to almost 90 lawsuits against the Federal Government?

Mr. BEAN. Since I left, I have no idea what has happened since I have left.

Mrs. LUMMIS. Do you know what year the gray wolf met Federal recovery goals in Wyoming?

Mr. BEAN. I don't know the precise year, but it was some years ago, yes.

Mrs. LUMMIS. It was 2002. So here we are, 11 years, numerous lawsuits later. The Fish and Wildlife Service proposed national delisting in June 2013, correct?

Mr. BEAN. I believe that is correct, yes.

Mrs. LUMMIS. Now, the extended public comment period, now twice, ends on March 27th of 2014; is that correct?

Mr. BEAN. Again, I don't know for sure. That sounds like it is in the ballpark, however.

Mrs. LUMMIS. Do you have a deadline for final decision on delisting the gray wolf?

Mr. BEAN. The statute requires the Fish and Wildlife Service to make a final decision within 1 year after publishing a proposed rule.

Mrs. LUMMIS. With the gray wolf having first been introduced under Section 10(j) of the Endangered Species Act, which is the nonessential experimental populations, having met its first recovery goal in 2002, here it is 2014 and it is still not delisted, does that seem like a reasonable amount of time?

Mr. BEAN. Just for correction, it has been delisted not only in Wyoming but throughout the North Rockies.

Mrs. LUMMIS. But not a national delisting.

Mr. BEAN. That is correct.

Mrs. LUMMIS. Is Wyoming's management plan still being litigated?

Mr. BEAN. I believe there is a lawsuit pending against the decision to delist. I don't think there is a challenge, that I am aware of at least, to the Wyoming management plan.

Mrs. LUMMIS. Were you aware that Secretary Salazar promised Wyoming a delisting decision of the grizzly bear by 2014?

Mr. BEAN. I am not aware of what Secretary Salazar may have said about——

Mrs. LUMMIS. Are you aware that in December of 2013 a panel of State and Federal wildlife officials recommended delisting?

Mr. BEAN. What was the date again?

Mrs. LUMMIS. December 2013.

Mr. BEAN. Yes.

Mrs. LUMMIS. When can we expect a proposal to delist?

Mr. BEAN. I don't know precisely when, but I suspect you will see a proposal to delist reasonably soon.

Mrs. LUMMIS. Do you think that a 1 percent delisting rate is indicative of a successful program?

Mr. BEAN. I don't think it is an appropriate measure of the success or failure of the program.

Mrs. LUMMIS. The Endangered Species Act passed over 40 years ago, and the last time it was amended, even tweaked, was in 1988. I have never heard a Republican or a Democrat suggest that the Endangered Species Act should be repealed. But I have heard people suggest in testimony before the Natural Resources Committee and before a committee which Doc Hastings, who is chairman of the Natural Resources Committee, and I co-chair, that it should be amended and tweaked.

And let me give you some ideas about some of the areas that we heard about from people testifying. We heard that local, State, and tribal governments should be involved in species management listing decisions. Do you agree with that?

Mr. BEAN. They should be, and they are.

Mrs. LUMMIS. We heard that they aren't at least adequately involved at the front end and that they were not party to the multi-species listing petitions and the resultant settlement agreements that set the priorities and the time periods for delisting the hundreds of species that were included in the multi-species listing petitions.

Is that true? Were they involved or not? Were they part of the discussions in the settlement agreements?

Mr. BEAN. Only the parties to the litigation were involved in those settlement agreements.

Mrs. LUMMIS. And why was that, since the law says that they should be involved?

Mr. BEAN. Well, every opportunity that the law provides for States and tribes and citizens, for that matter, to have a say in whether or not species should be listed or not listed will be, in fact, carried out. Because what the settlement agreement simply did was to set a schedule——

Mrs. LUMMIS. But the schedules were set without involving State, local, and tribal governments. So they were excluded from settlements that the Fish and Wildlife Service made with agencies that were suing them or nonprofit entities that were suing——

Mr. BEAN. They were not involved in setting the schedule, that is correct. They will have every right to be involved and will be involved in any proposals that may come pursuant to that schedule.

Mrs. LUMMIS. Thanks, Mr. Chairman, for running a generous clock.

Mr. LANKFORD. Thank you.

Second round, I had informed everyone that we will just open this up for more of a colloquy setting. And so it is entirely appropriate to be able to interject, during this round, any line of questioning with anyone that is running a line of questions, so let's feel free. Let's get answers and be able to walk through the dialogue.

Let me kick it off. There is a question on the data. And Mr. Chaffetz brought this up, as well. How common is it that data is withheld for the research at the beginning part of that?

So I understand this is not the listing, but this is part of—the beginning part of actual research—the emphasis to be able to look at these species.

Mr. BEAN. Honestly, sir, I don't know how common it is. It is my understanding that the Service typically relies upon published studies——

Mr. LANKFORD. Right.

Mr. BEAN. —that are done by researchers who have collected data. And those researchers have invested their time, effort, energy, and so forth in collecting that data and want the ability to publish additional studies with that data. And, therefore, it is not made available by them either to us or to other parties.

So I think that situation is reasonably common, just as businesses, when they enter into agreements with the Fish and Wildlife Service, often seek to protect some of their data as proprietary.

Mr. LANKFORD. All right, but here is the concern. You take a—we have discussed before, you and I, the lesser prairie chicken. The lesser prairie chicken—five States are dealing with significant financial changes. It has not been listed, as you have mentioned before. It is not listed as threatened, it is not listed as endangered. Just being studied, just being evaluated. Oklahoma alone has spent millions of dollars trying to adjust around it, just with the threat hovering.

Now, you deal with the sage grouse in Utah. I know you can say it has not been listed, but there is data that exists somewhere that no one can look at that a State and private landowners are going

to spend millions of dollars trying to be able to protect a species on there, but no one also has access to the data.

Do you see what the problem may be? So I am spending millions of dollars fighting against data that I have no idea what it is, how accurate it is, how well-researched it was, if it was even peer-reviewed. I don't know what I am fighting against. So I am now suddenly fighting a ghost, and my own Federal Government is bringing the cost on me.

Mr. BEAN. Well, sir, my understanding is that the Fish and Wildlife Service, before it makes any decision on the sage grouse or, for that matter, the lesser prairie chicken, will rely upon all the information from all the sources, the States and others.

And the studies I think that Mr. Chaffetz is referring to were peer-reviewed studies——

Mr. LANKFORD. So they were available to other people, just not to the State?

Mr. BEAN. Well, peer reviewers don't necessarily review underlying data. They review, as I understand it——

Mr. LANKFORD. Well, that would be—just to dialogue, how do you peer-review something without actually looking at the underlying data? Because you then have to rely on their opinion of the data rather than the data.

Mr. BEAN. I think, sir, as I understand this, the typical peer-review situation—peer-review process, rather, involves reviewers analyzing the methodologies and the conclusions based upon the summaries of the data but not the raw data themselves.

Mr. LANKFORD. See, I am familiar with peer reviews. It typically goes back to evaluate—they are checking their math, not just their grammar. They are actually looking back into the documents, as well, to say, is this conclusion correct based on the data itself.

And so, if you have a reviewer that is reviewing based on their—they are really doing a grammar check at that point, not a mathematical check. And that becomes a big issue. Again, you have people spending millions of dollars, and it is one person that has drawn conclusions that I won't let you see where I got those conclusions from.

Mr. BEAN. Well, if I have misstated the situation, I will happily correct the record later, but I have described to you what my understanding is.

Mr. LANKFORD. I understand. Is there a way that we can actually get some transparency, though, into the operation so that people can see it?

Because you can understand the situation, if someone were to come and say, I believe that Fish and Wildlife Service or NOAA should look at this particular species, that there is a major problem here and I think you should do a review, which is very costly to the American taxpayer and very time-consuming to Fish and Wildlife and NOAA, you should do this review, they are going to bring a citizen suit on it, but they are going to tell you, "I think there is a major problem, but, by the way, I am not going to give you our data, you can't look at it, you are just going to have to trust me on this one that there is a major problem," you then have to kick in and engage. All the people have to then mitigate something that may or may not even be a problem.

Mr. BEAN. Well, I can assure you, it really doesn't work like that. The Service does not simply act upon somebody coming to it and saying, "Here is what I think; I am not showing you any data." Rather, the Service responds to situations in which there are published, peer-reviewed studies, there are maybe data from the States. I mentioned that the States themselves are frequently a source of information from——

Mr. LANKFORD. Right, but the majority are citizen suits still, not from the States.

Mr. BEAN. They may be citizen petitions——

Mr. LANKFORD. All right, petitions.

Mr. BEAN. —but even those rely upon State-generated data frequently. Because, keep in mind, virtually every State has its own endangered species laws——

Mr. LANKFORD. Sure.

Mr. BEAN. —and so every State has data, has information about the status of species in that State. Frequently, that information is woven into the petitions——

Mr. LANKFORD. Could that data originate from someone doing a graduate study in their master's or doctoral work and that becomes the study that is then proposed?

Mr. BEAN. It could be.

Mr. LANKFORD. So the publishing is not necessarily publishing in a research journal; it could be just publishing their dissertation?

Mr. BEAN. I think, again, it could be.

Mr. LANKFORD. Okay.

So, again, we are back to the same issue. A graduate student—and I have nothing against graduate students—could do a study which could be even fairly recent into the studies of different animals and different biology and such. The best that they know and understand as a graduate student, there is a limitation on this, they write a paper, they publish it. And then suddenly a State goes into millions of dollars of expenses and a tremendous amount of effort.

It goes back to this conversation that we have as a Nation, balancing the issue of data and this term that I have heard before, "best professional judgment." How do we balance those two?

Because the statute seems to lean towards this requirement that we get data. And, you know, we talked about from NOAA that they are actually going out and scanning it; they know they have a baseline. With Fish and Wildlife, there is just no way to be able to get a baseline of every single species of plant, animal, and fish. We just don't have any way to possibly do that.

So how do you balance between data and best professional judgment when there is no baseline number to come from, when you can actually have someone that is a graduate student someplace say, "I only see 20 of them in this area," and then extrapolate from that, "I assume there used to be millions of them in this area," when we really don't know at that point?

Mr. BEAN. Well, to address your hypothetical, hypothetically, that could happen. In actuality, I am not aware of any examples like that. So I——

Mr. LANKFORD. You know the first study from the lesser prairie chicken, where it came to attention from? Was it from a published or was it from a doctoral thesis?

Mr. BEAN. The first study, I don't know.

Mr. LANKFORD. Or the first attention that came to Fish and Wildlife on the lesser prairie children.

Mr. BEAN. I don't know.

Mr. LANKFORD. I believe it was from a doctoral dissertation that came.

Mr. BEAN. Okay.

Mr. LANKFORD. It is this route. This is a route that is occurring. And our State has spent millions of dollars and other States have spent millions of dollars, and it is not listed. So it is a matter of, how do we manage this at this point? How do we manage the difference between data—and I want to pass this—I want others to be able to engage in this conversation.

How do you manage from day to day the difference between having hard data, the science of it, and best professional judgment, where you may have some species that there are very few people that actually study that particular species, so the best available judgment may be three people that are scientists that study this particular species?

Mr. BEAN. Well, the Fish and Wildlife Service seldom has perfect data or all the data that it needs to make a decision, so it has to rely upon professional judgment in interpreting data often. The Service does not use judgment to create data, but it uses judgment to interpret and understand the data that it has.

Mr. LANKFORD. No, I am not accusing you of creating that. It just goes back to, if you have very limited data and you have very limited number of people that study that particular species, now you have a situation where someone is going into the—trying to determine and then trying to figure out how to mitigate all the issues around it, when we really don't have data and we have very few people that have looked at it. You are managing hundreds of things that are coming on with the citizen petitions; you don't have time to manage this either. But we are quickly moving an issue that was designed to be able to protect species, but we don't have time to study it, we don't have enough people to look at it, and we don't have enough data to evaluate it. It puts us all in a very difficult position, both the species and the people that live around it.

You and I have talked about the American burying beetle, and we can discuss about that more. We can't really study the American burying beetle much; they live underground. But there is a tremendous amount that happens in construction that is now slowed—pipeline construction, bridge construction, wind power construction, utility construction that now can't build in certain times of the year because we think maybe, possibly, but we don't have data, that the American burying beetle may be in that area.

Mr. BEAN. The Fish and Wildlife Service has a pretty good sense of the areas that may be occupied by the beetle, for example, and it has some techniques to determine presence. You are right, the beetle lives underground much of its life, but it spends some of its life above ground and is routinely attracted to lights. So there are ways to determine whether it is present in an area or not.

Mr. LANKFORD. Right.

Mr. BEAN. The Service, to the extent of its ability, bases its decisions upon the best available information that it has. And it puts a heavy emphasis upon peer-reviewed and high-quality data and analysis, and primarily published data. That isn't always available, but the standard that Congress has given the Service to guide its decisions is that of best available scientific information.

Ms. SPEIER. Can——

Mr. LANKFORD. Go ahead, Jackie.

Ms. SPEIER. Can we talk a little bit—well, first of all, let me point out that we just had a discussion about the gray wolf in Wyoming. It is presently delisted——

Mr. BEAN. That is correct.

Ms. SPEIER. —which means the population can be exterminated.

Mr. BEAN. Well, what it means is that the population is managed by the State of Wyoming. The State of Wyoming does not intend to exterminate the wolf. They do intend to manage it——

Ms. SPEIER. "Exterminate" was not the right word. They can be shot.

Mr. BEAN. They can shoot—they can hunt it, yes.

Ms. SPEIER. So I have been told that, since delisting, the gray wolf population has declined by some 16 percent in Wyoming, 4 percent in Montana, and 11 percent in Idaho. Now, I don't know what that percent means. Is that a percent that should be of concern to us, or is that healthy?

My understanding, also, is that there are fewer than 1,600 of these animals in those 3 States. So I realize they are predatory animals and that, you know, if they are killing your herd or your cattle that that is problematic. But I also would like to have a better understanding of, now that it has been delisted—Ms. Lummis is concerned about the length of time it is taking, but it is already delisted, the numbers have been declining.

Is this anything that we should be concerned about?

Mr. BEAN. Representative Speier, since the wolf was delisted not only in Wyoming but Idaho and Montana, all of those three States—each of those three States has managed the wolf and has allowed hunting and has reduced somewhat the populations, although the populations are still well above a level that the Fish and Wildlife Service regards as safe, in the sense that the Service doesn't need to reconsider putting it back on the endangered species list. They are well above that number.

Ms. SPEIER. Okay.

So let's move on to the lawsuit issue, which, you know, by numbers that I mentioned in my opening statement would suggest there is—the numbers have declined dramatically. But even if you do file a lawsuit, it does not mean that if you win the lawsuit that the Fish and Wildlife Service will delist or list the creature. Is that correct?

Mr. BEAN. I think you are referring to the deadline lawsuits, of which there have been many filed against the Fish and Wildlife Service for its failure to meet the statutory deadlines for responding to petitions. The statute has some explicit statutory deadlines for responding to a petition. And because of the volume of petitions, the Service has sometimes missed those deadlines, and then the

petitioner has sued the Fish and Wildlife Service for the purpose of getting a court-ordered deadline.

So you are right that those lawsuits do not result in decisions to list species. They result in decisions to either propose or not propose the listing of the species by a certain date.

Ms. SPEIER. And, finally—and, Mr. Chairman, I am going to have to leave to go to another meeting, so I thank you for indulging my questions here.

If everyone is supportive of retaining the Endangered Species Act, which is what I was hearing from some of my colleagues, and there are opportunities to allow for development and protection of the endangered species, habitat conservation plans being a great way of doing so and I guess been used very successfully, what things should you have, what tools should you have to create greater flexibility so that we can protect endangered species, development can happen, hunting can happen, and we can all sing Kumbayah?

Mr. BEAN. Well, thank you for the question.

And I certainly agree with the premise that habitat conservation plans have been a very effective way of reconciling development interests with conservation interests.

I think, frankly, more understanding of the potential application of that tool to solve various problems and more understanding of the availability of tools like safe harbor agreements that Georgia landowners are using, California landowners are using, and others, will be helpful in bringing to the attention of the public, particularly the landowning public, the whole panoply of tools that are potentially available to help them live compatibly and successfully with endangered species on or near their land.

Ms. SPEIER. Well, I guess I am asking if you want any additional tools. Would it be helpful to give you any additional tools of flexibility beyond those that exist?

Mr. BEAN. I think the Fish and Wildlife Service is currently exploring some administrative initiatives much like safe harbor agreements and candidate conservation agreements which were administratively developed.

It is exploring the use of mitigation banking in a more aggressive manner to allow some landowners to basically invest in conservation on their land as a way of offsetting the impacts of development on others' lands. That is an idea that has been used widely in California, as well. It is something the Fish and Wildlife Service is currently exploring ways to improve or expand the availability of that. So that would be one example.

Ms. SPEIER. And you could do that without legislation?

Mr. BEAN. Yes, I believe we could.

Ms. SPEIER. Okay. Thank you.

Mr. LANKFORD. Can I ask a quick follow-up? I don't want to interrupt. I know others want to be able to—when will we be able to see those proposed ideas? Will that come out through the rulemaking process, or will that just appear?

Mr. BEAN. No, it will come out as a proposal in the Federal Register. There will be opportunity for any interested person to weigh in it.

Mr. LANKFORD. Okay. Can you give me a timeframe on that? Are we talking 2014? 2015? 2016?

Mr. BEAN. We are definitely—well, I very strongly belive it will be 2014, and probably early 2014.

Mr. LANKFORD. Okay. Thank you.

Other Members who want to contribute?

Mrs. LUMMIS. Mr. Chairman?

What percentage of species for which listing petitions have been filed have been listed?

Mr. BEAN. I don't know the precise percentage.

Mrs. LUMMIS. More than not?

Mr. BEAN. Of those for which decisions have been made, yes, more than not, a majority. Well, actually, I am not certain. I will have to——

Mrs. LUMMIS. The information I have is that it is about 85 percent.

Mr. BEAN. Of all petitions since the act was passed? I don't really know.

Mrs. LUMMIS. The mitigation banking that you mentioned, that is something we are using in Wyoming that the private sector is using pretty substantially. Is Federal land going to be allowed to participate in mitigation banks?

Because you know about our irrational, I would call it, landownership patterns in Wyoming, where you have private land commingled with Federal land, with State land. And so it does make some sense if you have a landscape-sized mitigation project——

Mr. BEAN. Uh-huh.

Mrs. LUMMIS. —that where there is BLM land, for example, interspersed with private land, that the BLM land should be considered part of the mitigation bank.

Mr. BEAN. Ms. Lummis, I met with some of your Wyoming constituents just this week to discuss mitigation banking, and they are developing a proposal, as I understand it, that would include both private and BLM and maybe State lands. And I think the Fish and Wildlife Service will, when it is presented with that proposal, assuming it is, be sort of welcoming of that idea. Until we see the details, we can't say for sure whether it will be approved or not, but it certainly, on the face of it, seems like a good idea.

Mrs. LUMMIS. Well, since we do know that on a landscape scale we can probably achieve better results for protection of habitat, which equals protection of species a lot of the time, it seems to make a lot of sense to me that the Federal Government would cooperate with private landowners who wish to provide mitigation banking lands at a landscape scale. It seems to be working pretty well.

Our science, our ability to understand science has improved, in your opinion, since the Endangered Species Act passed, correct?

Mr. BEAN. I suppose so, yes.

Mrs. LUMMIS. You suppose so? Do you not really believe that?

Mr. BEAN. I am not sure how you would measure it, but I suppose it would be, yes.

Mrs. LUMMIS. Okay. Well, let me ask it this way: Do you think science has been static since 1973?

Mr. BEAN. Of course not.

Mrs. LUMMIS. Do you think that people's environmental ethic has been static since 1973?

Mr. BEAN. Probably not.

Mrs. LUMMIS. Do you think that people in general are more attuned to their stewardship responsibilities to the environment than they were in 1973?

Mr. BEAN. Probably so.

Mrs. LUMMIS. I think so, too. In fact, I think it has become embedded, it is cultural now, much more so than it was when the Endangered Species Act was passed. I think that the culture has grown in its sensitivity and its stewardship obligations to species, to clean water, clean air, clean land. And I think that is why things like our compliance with the Kyoto protocols for clean air have been met. And we are the only country that met those Kyoto protocols, even though we didn't sign on to the Kyoto protocols.

Americans have a marvelous stewardship and an environmental sensitivity that is cultural; it is embedded. And, to that extent, litigation, in my opinion, that puts briefcases in courtrooms but not species on conserved habitat isn't the answer in the 21st century. To me, the answer in the 21st century is boots-on-the-ground conservation by people who are culturally attuned to preserve species, be they tribal members or State government employees or private landowners working together to conserve species.

So to take an act that passed in 1973 and was last amended in 1988, where the people, the culture has gone far beyond the ethos of the act, and expect that act and its litigation-driven model to be the way we should administer the law in the 21st century is a lot like driving an Edsel in 2014 and thinking that it ought to perform like a 2014 car. The performance of automobiles is better. The performance of the American people with regard to science and culture and the ethics of species conservation have improved.

So I would really like to see the Endangered Species Act updated to acquaint it with and harmonize it with the culture and the ethos and the ethics and the stewardship that the American people are quite capable of providing. It doesn't need to be done in the courtroom anymore. Those funds that are so difficult to come by can be spent on habitat conservation and boots-on-the-ground species recovery without lawyers in the courtroom earning the money and taking that precious financial resource that is so hard to come by away from the very species that the Endangered Species Act was designed to protect.

Mr. Chairman, thank you. I yield back.

Mr. WOODALL. Mr. Chairman, if I could follow up on that? I want to ask, because listening to both Ms. Lummis and the chairman, it felt oddly adversarial to me. I am thinking, for Pete's sakes, the chairman's talking about millions of dollars that are being spent that are not directed at something that we have come together on and tried to unify our might to solve but directed towards ambiguities.

Ms. Lummis doesn't just live this every day back home but, you know, isn't talking through her hat when she talks about a conservation ethos. And, obviously, things have changed over the last 40 years. Obviously, what President Nixon envisioned is not where we are today. Are we close, are we further? We could have that

conversation, but, obviously, we are not exactly where folks thought we would be 40 years later.

Why does it feel adversarial? Why isn't it a big Kumbayah session to say, let's make some changes and let's refocus our resources on those most critical missions?

I can't think of the last time I was involved in an ESA problem-solving session that was on its way to fruition. I can think of many ESA arguments that I have been involved in. Tell me why that is. Why aren't we moving closer to a common goal today?

Mr. BEAN. Well, sir, I will be happy to offer my own experience in answer to your question.

My own experience is I have worked with landowners in your State; I mentioned the forest landowners in the Red Hills area. I have worked with forest landowners in North Carolina in the Sandhills area. I have worked in ranchland in Texas. In particular, I mentioned to Mr. Lankford yesterday a gentleman named Bob Long, who was chairman of the Republican Party of Bastrop County, Texas—local bank president, fundamentalist minister, extreme conservative, but somebody who was willing to manage his land to help recover an endangered amphibian called the Houston toad.

And what I learned from that work with him and those other landowners is that a lot of this acrimony or contention that has been talked about today in this room doesn't really exist at that level. People are willing to roll up their sleeves and work together with the Fish and Wildlife Service, with the organization for which I work which Mrs. Lummis mentioned. And one doesn't get that sense often out on the ground talking to people where these efforts are ongoing.

So I can only answer based on my experience, but my experience is that when you offer landowners an opportunity to work constructively with the Fish and Wildlife Service in a way that each understands the needs of the others and tries to accommodate them, you can have success.

Mr. WOODALL. I am afraid you are making my point exactly. That is my experience on the ground, too.

So when the chairman says he sees millions of dollars being wasted on efforts that we are not directing together, why aren't we equally incensed about that?

When Ms. Lummis says that there are dollars being errantly directed to litigation instead of mitigation, and you talk about your successful experiences one-on-one on the ground, why aren't we rushing to agree with Ms. Lummis and talk about proposed changes to the statute to foster what is the most hard-fought commodity in this Nation, not the all-precious and incredibly too limited American dollar, but the all-precious and incredibly limited trust that goes between citizens and their government?

What you say I will stipulate is true. So what next? Why isn't the next conversation, then, that collaborative sitting around the table making changes to the statute to amplify those successes and mitigate these failures?

Mr. BEAN. Well, sir, perhaps the answer is that all the examples I gave—or none of the examples I gave required amending the law. All of the examples I gave required creatively interpreting and applying the law.

And I think what this act has shown, despite the fact that it has remained unchanged by Congress since 1988, it has been changed substantially by the Fish and Wildlife Service in its implementation, in its use of new tools that didn't exist in 1973 or 1988 in order to engage landowners as partners, in order to better engage States, in order to make use of the flexible authorities I described.

The act has been, in my judgment, remarkably flexible and adaptive. I don't for a minute mean to suggest that there aren't controversies, but as I tried to make the point with respect to the Oregon chub at the outset, most of the species most of the time don't generate those controversies. Progress is being made without lots of headlines, without lots of heat, without lots of rancor.

Mr. WOODALL. If I could just take one last stab at it. You are absolutely right; the successes that you mentioned don't require changing the statute at all, but the failures that my colleagues mentioned did.

I don't know why it is that somehow we have to choose between having both the successes and the failures or having neither the success nor the failures. I don't think that is the world that we live in. I think we can have the successes, and even greater successes, and eliminate those failures.

But, again, just one last effort: Am I wrong about that? Again, you are talking about successes that don't require changes. My colleagues are talking about failures that do require changes. Why aren't we coming together around eliminating the failures and amplifying the successes?

Mr. BEAN. We may have a disagreement about the failures. In Mr. Lankford's case, I don't think the money that is being spent is being wasted. I think the money is being invested to find out what the status of the lesser prairie chicken really is. And I think that will be very helpful to us in deciding whether we need to protect it and, if so, how we need to protect it.

So I don't for a minute suggest that it isn't oftentimes difficult and sometimes expensive in order to get answers to these questions, but I think investing in finding out the answers is not necessarily a waste of resources or money or time.

Mr. WOODALL. Mr. Chairman, I thank you.

Mr. LANKFORD. No, it is most—thank you, Mr. Woodall—but it is most certainly not a waste of time to able to protect species. We wholeheartedly agree with that.

A couple of challenges just on the intensity of it. One is this sense of, as you mentioned, the creative interpretation of the law and how flexible the law is and how many times it has changed in its application over the past 40 years brings some concerns to individuals that just want consistency. They just want to know, here is the law and here is how it is applied and I know what it is. When it changes at different points, then there is great consternation. People just want to know, here is the law, here is how it is going to be applied.

That is some of the conversation up here, as well, to say—and there may be needs for fixes in the law, because it seems to change often, though it hasn't actually changed. Does that make sense?

Mr. BEAN. I understand your point. However, the examples I gave are all examples in which the law was made to be more flexi-

ble and accommodating to landowner or regulated interest concerns. So I think, as a practical matter, nobody objected to those changes, people welcomed those changes.

Mr. LANKFORD. It is the how they are coming out and how the species are being identified and put up in front of landowners.

Let me just read part of a statement here. And I know every State has its own unique species that they get a chance to have significant conversations about. Let me read you a document. It is the summary of key components—this is an official Federal document coming out—summary of key components for conservation of lesser prairie chicken. And here is just the summary of it, from the executive summary.

The primary threats dealing with the lesser prairie chicken. There are five areas here—six. Inappropriate timing and intensity of livestock grazing. In other words, grazing in the wrong place, wrong time. Conversion of native prairie for development in crop production, which I thought was interesting. In other words, we are having issues with this because we are planting crops there instead. Alteration of fire regimes. By the way, if you go into the details of the study, the study assumes that in Oklahoma there used be wildfires all the time and no one stopped them and that was good for the chicken. I would assume—I have had very well-cooked chicken over a fire before, and I don't know if that was good for it, but that is a whole different issue. Introduction and expansion of noxious weeds; fragmentation of habitat with roads, utility corridors, fences, towers, turbines, or energy development; and the planting of trees.

So when folks in Oklahoma read this, here is what they read as the next paragraph. "Features associated with human development" is the quote here. And then the quote before that is the issue being, "Returning the situation to prior European settlement status."

So I want you to understand that people get a little concerned when a document comes out and says, if we are going to protect the lesser prairie chicken, we need to return western Oklahoma to a situation that looks like prior European settlement status, and that there may be a problem with planting of trees, building roads, planting crops, or grazing cattle. Those are, kind of, things that people do.

And so you understand the situation here and why the immediate frustration comes up when you—if you were to read this and think, that is my land, there would be a concern immediately.

Mr. BEAN. Yes, indeed. I don't know what document you are referring to, but I can assure you that the Fish and Wildlife Service has no intention of trying to return to pre-European conditions in Oklahoma or elsewhere. We recognize that isn't going to happen, and that isn't going to be the strategy that the service pursues.

Mr. LANKFORD. I will bring you the document. I won't add this to the record, but I will bring you the document and be able to walk through it. But if you go through the original study that triggered this, it is loaded throughout the entire study.

There are also great statements in there about that lesser prairie chickens are concerned about anything taller than 13 feet, and so they don't want have any construction in western Oklahoma taller

than 13 feet. I am not sure how they knew that lesser prairie chickens were okay with something 12 feet but not 14 feet, but it is loaded throughout the entire study.

This becomes a big issue for individuals as we spend millions of dollars based around a study that is not based on—as it comes through this over and over again, that is not based on population count, it is based on habitat. And that is an issue I want to be able to deal with both of you on.

How do we balance this issue? When a species comes to light, there is an assumption always, we have only found so many, and so you assume there used to be more, though oftentimes there is not a count. Now, you have mentioned NOAA occasionally, you all have done population counts and you are tracking those, and in certain areas at certain times you are aware of a certain population count. Many times in Fish and Wildlife, that is just not possible with every plant species to know what was the population count 100 years ago based on what it is right now.

But some assumptions are made. So we need to protect this habitat, but then there is also—correct me if I am wrong here. Oftentimes when we have listing, we are not listing it and saying, to come off delisting, we need to go to a certain population. It seems to state that this species is listed because the habitat is diminishing. The only way to be able to delist them, it would sound like, would be for the habitat to increase.

Tell me where I am wrong on that.

Mr. BEAN. The way to delist a species once it is listed is to remove the threats. And those threats may be addressed in manners other than what you suggest.

Mr. LANKFORD. Could those threats be a road or a utility pole or a house taller than 13 feet?

Mr. BEAN. Likely not, in the sense that simply—well, in the sense that what needs to be done is to remove enough threats in enough places in order to ensure that the species has a good chance of surviving. That may mean protecting some land in perpetuity. It may mean securing cooperative agreements with willing private landowners to manage their lands in ways compatible with the needs of the species.

It certainly doesn't mean removing all trees, removing all development, and what have you. As I said a moment ago, this notion of returning to pre-European conditions is not the goal or strategy or intent of the Fish and Wildlife Service.

Mr. LANKFORD. Okay.

Mr. Rauch, you have been graciously quiet on this. We have had a lot of conversations with Mr. Bean. Let's talk a little bit about the habitat issue and numerical counts. How are you tracking that, as far as dealing with a species and getting them delisted?

Mr. RAUCH. Thank you, Mr. Chairman.

We do, when we set recovery plans, we try to set standards for recovery, and many of those do have numerical counts. We do have——

Mr. LANKFORD. Is that typical at the beginning, that everyone kind of knows, we think the population is decreasing; if we get to this number, we are going to delist?

Mr. RAUCH. No. It is typical when we do a recovery plan, which is often not when we do the listing. Sometimes it takes a while to do the recovery plan after the listing, and we do it in consult with some of our State partners. Private landowners and other kinds of people are all involved in that process.

Mr. LANKFORD. Can you just help me—"it takes a while." Is that 6 months? A year? Is that 10 years? How long is that?

Mr. RAUCH. It can vary. Sometimes it is quicker.

Mr. LANKFORD. "Quicker" meaning?

Mr. RAUCH. More than 6 months.

Mr. LANKFORD. Okay. So give me some timeframes here. A year? Ten years?

Mr. RAUCH. A year to 10 years would—somewhere in there. And it varies by species. And we have some species, particularly foreign species, since there is very little the U.S. can do about them, that we don't prioritize in our recovery plans. For the U.S., we tend to prioritize them higher.

But there is no particular deadline for doing a recovery plan. Because it is designed and we try to maximize the participation of landowners and States in that, we often can't dictate the timeframe. We come to the table when they come to the table, and we have these discussions. And sometimes that takes a while to get to a common vision of what it needs to recover the species.

But it is often—it is almost certainly longer than a year. Hopefully it is less than 10 years in most instances.

Mr. LANKFORD. Is it the same thing for Fish and Wildlife, Mr. Bean? The recovery plan may take a year to 10 years, and that is where the numerical population goal is set?

Mr. BEAN. I think the Fish and Wildlife Service informal goal is to try to have recovery plans done within 3 years of listing, which it is able to do in most instances.

Mr. LANKFORD. Population goals attached to that?

Mr. BEAN. Sometimes, but rarely, if ever, is a recovery plan goal expressed solely in terms of population. There are almost always other objectives, as well, beyond population goals.

Mr. LANKFORD. Let's go back to Mr. Chaffetz's comment earlier when we were talking about the fabulous Utah prairie dog. The last thing that I read on it, it was estimated the population is somewhere around 40,000. Is that number correct, not correct? I don't know how your——

Mr. BEAN. I——

Mr. LANKFORD. —quick facts and figures on prairie dogs here, but——

Mr. BEAN. Yes, sir. I don't know, but I believe it is much lower than that, sir.

Mr. LANKFORD. Okay. We will try to pull the number. The last thing I saw here, around 40,000 total on that. That may be the issue between public lands and private lands. Larger survey done with both at 40,000. Public lands may be lower than that. And that becomes still the study of we are trying to recovery them in public lands, where they may or may not prefer to be; they may prefer to be more in someone's flower bed than they would in public lands, where it is not necessarily a flower bed, as well, based on the preference of it.

How do they know when that animal is coming off?

Mr. BEAN. I don't know the recovery goals and the recovery plan, but there is a recovery plan for the Utah prairie dog, and it does set forth goals for delisting. And the Fish and Wildlife Service will keep track of trends with respect to both population, habitat condition, and so forth. And either when those goals are met or when the Fish and Wildlife Service has other reason to conclude that the species no longer is endangered, it would initiate a status review and a proposal to delist.

Mr. LANKFORD. Yeah, it is a challenge with a species like the prairie dog, obviously, that is a nuisance creature, quite frankly. Cute as can be on someone else's yard, but in yours it is a problem.

Mr. BEAN. Most landowners in Utah look at it that way, but not all. I worked with one named Allen Henrie, who entered into a safe harbor agreement basically to allow Utah prairie dogs to occupy some of his land. And there were other landowners, as well. So while what you say is generally true, it is not true of all of the landowners.

Mr. LANKFORD. At my house in Oklahoma, a couple years ago I distinctly remember complaining to my next-door neighbor about armadillos, which will shred your yard, and in my particular yard was absolutely shredding them overnight. And he chastised me for saying that and said, armadillos are so slow, you can just get a trash can, load them up, go get them because they are so slow, and go haul them out in the country and drop them off. And about 2 weeks later, at about 9 o'clock at night, I heard a shotgun blast next door and walked outside and found my neighbor standing over a dead armadillo who was shredding his yard.

And so, yeah, at times, there is this perception of that. I get that. But there is something unique when we are dealing with how we are trying to recover a species. And I don't want to talk about shooting armadillos, but there are some serious issues that we deal with in recovering a species, that once landowners are pushing back significantly, saying, we are being overrun, how do we manage that, whether that be a gray wolf that is taking down significant parts of a herd or whether that is a prairie dog that they are being overrun with in certain communities and can do nothing about.

I am going to run through a couple things quickly. I want to be attentive to our time, as well. I want to go through solutions. I am interested in two sets of things: One that I can bring to say, what do you think about this? One is ideas that you have.

You have already mentioned one of those, Mr. Bean, as well, of ways to be able to create an environment for more collaboration that you said is going to be an issue that will be put out in the Federal Register in the coming days.

Can we form a clear definition of the difference between "threatened" and "endangered" and how they are handled with landowners and status? Because we seem to have an emerging, from my understanding—and, really, I am no professional on it—from its history, is that "threatened" and "endangered" used to be really distinct. And now there seems to be a third category that is created with, "We are looking at listing this," and so it kicks in a whole

series of things. And then we have a threatened listing and an endangered listing.

It appears to me that "threatened" used to be this other status that was created in the past, that now we have grown into three statuses. Am I correct or not correct on that, historically?

Mr. BEAN. Well, for listed species——

Mr. LANKFORD. Can you pull the microphone a little closer, as well?

Mr. BEAN. Yeah, excuse me. For listed species, there have always been just two categories: threatened and endangered. Recently, the two services, I believe, have utilized this notion of candidate species——

Mr. LANKFORD. Right.

Mr. BEAN. —species under consideration for possible——

Mr. LANKFORD. Has "threatened" always meant the same thing, though? "Threatened" seems to be candidate level now, and candidate seems to be something new that has been added to it.

Mr. BEAN. I wouldn't characterize it that way. I would say that threatened species have always been species that aren't yet endangered but they are likely to become so in the foreseeable future. Candidate species are species for which there is concern that they may warrant listing as threatened or endangered.

It is worth pointing out there are no regulatory requirements that attach to candidate species, no Federal regulatory requirements.

Mr. LANKFORD. And that is one of my questions on it, is, where did that come from, the candidate-type listing? Is that from statute? Is that from regulation or——

Mr. BEAN. It originated as a response to the fact that the Fish and Wildlife Service responded to petitions by acknowledging that certain species that had been petitioned may warrant listing but there were higher priorities to deal with first. And so, those basically were put in queue, and those in queue were considered to be candidate species.

I think the word "candidate" now appears in the statute, but it did not originally appear in the statute.

Mr. LANKFORD. In the statute or the regulations?

Mr. BEAN. I think in the statute, if I recall correctly.

Mr. LANKFORD. Mr. Rauch, do you know in that one, or how you are handling that, where this—the candidate has risen up?

Mr. RAUCH. I cannot recall where it has risen up. But I can confirm that we do, as well as the Fish and Wildlife Service, use those species to try to engage with landowners in a nonregulatory fashion ahead of the listing so that we can avoid listing. There are a lot more options that you can do while the species is not——

Mr. LANKFORD. Uh-huh. Are we having a better recovery of species in the candidate phase or in the threatened phase?

Mr. RAUCH. I am not sure that we completely track recovery in the threatened phase, because recovery means, under the statute, recovery to the point where the ESA mandates are no longer needed. Since the candidate species did not become listed in the first place——

Mr. LANKFORD. Right.

Mr. RAUCH. —they are technically—the distinction doesn't really apply.

Mr. LANKFORD. We are back to Mr. Bean's comment earlier; it is better to catch it earlier and to be able to go after it.

Mr. RAUCH. I completely agree with that.

Mr. LANKFORD. Sure. But at that point, it is the State that is also managing it, is that correct, other than in Federal waters?

Mr. RAUCH. Yes.

Mr. LANKFORD. Okay. So we need some clarification what "candidate" means, because that is one of the areas that there is some concern nationwide in different entities, that when something suddenly becomes a candidate, no one really knows what that means fully. They just know the hammer is coming down quickly on them, and they are trying to figure out what do we do. And that is a nebulous threat, so we do need some clarification on that in the days ahead.

Making data publicly available, I know we have had some conversation about this in the research part of it. I am trying to figure out why that is still a bad idea, that we can peer-review data, and if someone is going to bring an issue and say, I have studied this, but no one else can second-guess me on it, and because this data is proprietary, there is a major problem with that, when individuals and States, counties, and tribes are going to spend millions of dollars mitigating for a risk that they can't actually verify.

Any disagreement on that? Or any solutions on how we resolve that?

Mr. BEAN. All I would say beyond what I have said already is I will be happy to explore this further within the agency to see, first of all, if my understanding is correct and, secondly, if there are reasonable solutions.

Mr. LANKFORD. Mr. Rauch, anything you can share with that?

Mr. RAUCH. I can't speak to the discussions about the sage grouse or the specific instances you are talking about. We do value public and peer-reviewed data. We recently, when we were dealing with the core listing, we put all our science out in a broad peer-reviewed document, to the extent that we had it, and made it available.

I can confirm that there are instances in which we would like to release data but we don't have it, because the researchers won't give it to us. So that appears to be what is happening to the Fish and Wildlife Service. That does happen to us on occasion; it does create issues. But we would prefer, and where we can, we try to make all of our data publicly available.

Mr. LANKFORD. I can tell you what you we do with anonymous letters, where people don't give us backup. We don't take them seriously. If I can't verify your number, if I can't verify your information, I am not going to take it seriously. Because I am not going to take "trust me" as an answer.

Even if you are you a respected researcher, every person makes mistakes and every bit of data should be peer-reviewed and should be public. And if States and individuals are going to be put into a status where they have to spend millions of dollars to mitigate for something, they should be able to back it up and to be able to disagree or disagree, and you can't do that.

That is the basic American principle of I should be able to face my accuser, and if suddenly the accuser says, no, there is a problem, but I can't tell you why, we have a problem as a Nation. That is one we have to resolve.

States getting involved and the affected parties being involved, they need, kind of, the consent decree or the research of an entity at the start rather than finding out much later. How do we get affected parties involved at the very beginning of this and accelerate that process?

And you have mentioned several times, Mr. Bean, that States are made aware of this and they are engaged. How do we get them at the very beginning engaged? Any ideas on that?

Mr. RAUCH. I will say that we are currently engaged in a joint State-Federal task force with the States to talk about their involvement. We have a series of ongoing meetings—the next one is coming up next month in Denver—where we talk with them about that exact question, about how they can be not just engaged but meaningfully engaged in this process.

There are many roles, as Mr. Bean said, for the States to become involved in the process, the substantive decision. And we do take that seriously and look to make sure that that is meaningful and that we can fully take account of the data, that they have the expertise and that they have them bring that to the decision.

Mr. LANKFORD. Right. Again, you are going back to a basic American principle: The Federal Government exists to be able to serve the people. And affected parties should be at the table and should be very aware of that. So getting them there at the very beginning makes a huge difference.

Mr. Bean, any comments on that? We will move on to other things if not.

Mr. BEAN. Just one comment. The Interior Department has provided support to the western States to develop what are known as crucial habitat assessment tools; the acronym is CHATs. These are Internet-accessible databases of the most important areas in those western States for a variety of purposes—wildlife habitats, wildlife migratory corridors, and the like.

So that investment by the Federal Government to assist the States in developing that data is proving very useful in identifying those places on the map where conflicts are likely to be most acute and, conversely, those places on the map where conflicts are likely to be least likely. So I think that is a good way to further your goal of having State and Federal cooperation.

Mr. LANKFORD. Right. And you are fully aware, once we get into the western United States, my State included, that the push is on in many areas to be able to protect where we are now. And it leaves the implication that right where we are in the level of development we are is the right level of development. And we are pushing through habitat. And it has the feeling in the western part of the United States of, "We don't want you to grow. You are going to stay right where you are."

Now, I understand the words are that we can coexist, but when the focus is on habitat erosion rather than population counts, it sends the clear signal: Not developing energy in this area, not developing wind power in this area, not developing homes or cities or

roads in this area. Sends a pretty clear signal, you have to stay at this spot. And that becomes a concern, when the focus is habitat rather than population.

A couple things. Is there a way to be able to move to an arbitration system for the citizen petitions to expedite this process, to be able to help clear the deck? If you have a high number of these that don't end up going through the rest of the process that are cleared, is there a faster route to do this and be more efficient for the services to take care of this?

Mr. BEAN. That is an idea I have not heard discussed, so I don't have—I haven't given it much thought, but I will be happy to give it some thought.

Mr. LANKFORD. Okay.

Mr. Rauch?

Mr. RAUCH. I have not thought about it either. And as I mentioned I think earlier, we do have listing petitions, not merely as many as Fish and Wildlife Service. So we believe we are able to perform our work and stay in general on schedule. We don't have the backlog that they have had.

Mr. LANKFORD. Right. Because there is nothing to stop a group coming to you with 2,000 species in a petition at this point. I mean, the continual ramp-up is larger and larger, which becomes more irrational and unachievable. There has to be a way to be able to manage and to be able to mitigate this in the days ahead.

Last piece on it I want to—I have a couple other quick notes on it. The issue of data versus best professional judgment, how do we manage between the two to be able to create the maximum amount of trust?

Because, again, if individuals and businesses and cities and States and tribes are going to spend millions of dollars in mitigation and they don't have data on it, they have someone's best professional judgment, and it may be species where there is a very small group of individuals that are specialists in that species, how do we manage that to be able to create trust?

Mr. BEAN. Mr. Chairman, I think that it is rarely the case, and is probably never the case, that the Fish and Wildlife Service makes decisions just based upon somebody's opinion, devoid of reference to published studies or other real data.

As I indicated in an earlier answer, there is often an absence of definitive data on many of the questions the Service has to answer, and, thus, it has to use judgment in how its interprets or applies the information and data that exists. But the Service takes seriously the statutory command to base its decisions on the best available scientific information and tries to do that consistently.

Mr. LANKFORD. Yeah. That is the grand challenge again. When you are dealing with a species, when you are dealing with someone who has published a paper that no one else has tracked before, and it, again, assumes it used to be higher than what it is now, "It is only this; certainly it was larger than that at some point," no one knows. And how do you track that? And now what do we do as a reaction to that?

Again, no one is looking to be able to wipe out a species, but neither are we looking for all of our lives to be turned upsidedown be-

cause someone wrote a research paper that was published. We have to be able to find a balance between those two.

Mr. BEAN. Certainly.

May I just offer the observation that, while it is obviously impossible to say what the population may have been at some point in the past, it is possible to determine that a species was present in certain places in the past where it is no longer present today. We have that from collection records, from museum records, from accounts from explorers and others. So it is possible to document loss of range for many of these species.

Mr. LANKFORD. Right. And we also have a documentation of loss of range for dinosaurs that we can document, as well, that was not due to human activity or whatever it may be. And so species come and go; we are very aware of that. And we have every obligation to be able to protect a species. As an Evangelical Christian myself, I have this overwhelming sense that we have a responsibility to take care of what God has given us. But it is also a challenge to be able to do that, in an economic sense, that also allows for the movement of people to be able to process through that.

There is a statement and there are several questions that I wanted to be able to put in the record. I think both of you all may have heard of a group called the U.S. Chamber of Commerce. They occasionally have disagreements on some of the ESA applications. I would like to ask unanimous consent, which I am pretty confident I will get, to be able to put this into the record, as well, and some of the other questions and thoughts that they had as a part of this.

Mr. LANKFORD. Final statements that either of you gentlemen would like to make, or observations or ideas?

Mr. BEAN. Just thank you for your interest. As you indicated when I talked to you yesterday, you wanted to have, you know, an honest, candid discussion, and I think we have had that. So I appreciate that very much.

Mr. LANKFORD. You bet. Thank you.

Mr. Rauch?

Mr. RAUCH. Thank you for the opportunity to come here and share our views with you.

Mr. LANKFORD. Thank you.

Obviously, this conversation is not done. We will continue to work on solutions and how we resolve some issues to be able to make this as clear as possible in the days ahead.

With that, this hearing is adjourned.

[Whereupon, at 4:31 p.m., the subcommittee was adjourned.]

APPENDIX

MATERIAL SUBMITTED FOR THE HEARING RECORD

Chairman Lankford Opening Statement
Subcommittee on Energy Policy, Health Care and Entitlements hearing entitled
"Examining the Endangered Species Act"
February 27th, 2013

Today, we are here to discuss the Endangered Species Act (ESA), which is now in its 40th year. The ESA was enacted 40 years ago to conserve habitats and species that are considered "endangered" or "threatened." President Nixon signed it into law with the support of 99% of Congress. At the time, there were high expectations for the ESA, with President Nixon stating that the new law will "protect an irreplaceable part of our national heritage—threatened wildlife." However, over the years, some flaws with the Endangered Species Act have surfaced.

There is significant concern that some are using the Act to advance other policy goals, such as stopping development, instead of for its intended purpose of protecting threatened animal and plant species. Concern also abounds over whether or not the law gives the implementing agencies enough time to properly process the candidates for species listing. In one instance, the Fish and Wildlife Service was asked in a petition to examine 374 separate aquatic species, all from one petition, in the statutory 90-day timeframe. As a result, the agency admitted that it was "only able to conduct cursory reviews of the information in our files and the literature cited in the petition." This puts the agencies in very difficult position: Process the enormous work brought by a petition within 90 days or face a lawsuit for missing the deadline from the same groups bringing the petition in the first place.

The massive amount of petitions leads to capitulation and to "sue-and-settle" agreements. Whether by choice or not, the federal government faces lawsuits that are very often settled to the financial benefit of environmental groups and their lawyers. In many of these cases, states and other affected stakeholders are not even aware of these negotiations, or what is being discussed in them, until they are settled. Also, there have been instances where much of the basis of these settlements remains sealed. Thus, communities and stakeholders affected by these listings don't have full view of how this all occurred.

In general, the lack of transparency of the data used to justify a species listing remains a major problem. In some cases, data gathered at taxpayer expense has not been publically released. Transparency is essential to public faith in government. The less information that the public has in understanding how the Endangered Species Act is carried out, the less support the Act will be able to claim. The general success rate of the ESA has come under criticism as well. Only a two percent recovery rate of the approximately 2,100 species listed as endangered or threatened since 1973. As I discussed previously, we've seen how

species get *on* the list. However, the above statistic begs the question: How do species get *off* the list? Is 2 percent enough for success?

Like all federal agencies in this time of belt-tightening, the Fish and Wildlife Service and NOAA Fisheries have finite resources. If they are spending all of their time and resources on getting species on the list, it is unclear if they are spending enough of these on getting species off the list, which is the reason it was passed in the first place 40 years ago. Some claim that success can be measured by adding species to the list, as their prospects will improve once there. I certainly hope that is the case. However, the goal of the law that was enacted 40 years ago is to rehabilitate these species and move them *off* the list.

If Americans are going to have faith in the Endangered Species Act, then they need to see that it works. Constantly heaping more species onto the listings while barely moving any off of it will undermine that faith and raise questions about the Act's effectiveness.

The ESA is jointly administered by the Fish & Wildlife Service at the Department of the Interior and the National Marine Fisheries Service under the National Ocean and Atmospheric Administration at the Department of Commerce. I am pleased that we have representatives of both of these agencies here today as witnesses. I thank them for coming and look forward to hearing their answers to the Subcommittee's questions.

Opening Statement
Rep. Michelle Lujan Grisham

Committee on Oversight and Government Reform Subcommittee on Energy Policy, Health Care and Entitlements Hearing on "Examining the Endangered Species Act"

February 27, 2014

This year marks the 40th anniversary of the Endangered Species Act (ESA), which has helped protect vulnerable ecosystems and endangered plants and animals from extinction. The ESA has successfully helped keep 90% of all the listed species from becoming extinct. I strongly support increased efforts to protect, stabilize, and ultimately remove the more than 2,140 species currently listed under the ESA.

But, the real strength of the ESA lies in the collaboration and partnership among conservationists, businesses, and landowners. For example, these stakeholders came together and developed their own plan to protect the Dunes Sagebrush Lizard in West Texas and New Mexico. They worked to create a novel combination of conservation mechanisms to protect the lizard along with the interests of important stakeholders. Their work has successfully kept the lizard off of the endangered species list and serves as a model for further collaboration.

I am pleased that the U.S. Fish and Wildlife Service has agreed to a similar conservation plan to protect the Lesser Prairie-Chicken. Developed by conservationists and the oil and gas industry, the Range-wide Oil and Gas Conservation Agreement with Assurances is an important step forward to protect this important bird and its habitat for generations to come. The flexibility of the ESA has ensured that farmers, ranchers, and landowners are given the tools and incentives to work together as essential allies to help solve this complex issue.

I look forward to continuing to work with local and regional stakeholders to ensure the continued protection of the Lesser Prairie-Chicken and other species that are similarly threatened. I also look forward to working with the Chairman to ensure that Congress properly facilitates these important relationships between industry and conservationists, in order to advance conservation objectives while meeting the nation's economic priorities.

Statement of the U.S. Chamber of Commerce

FOR: SUBMISSION FOR THE RECORD ON HEARING "EXAMINING THE ENDANGERED SPECIES ACT"

TO: HOUSE COMMITTEE ON OVERSIGHT AND GOVERNMENT REFORM

BY: WILLIAM L. KOVACS, SENIOR VICE PRESIDENT, ENVIRONMENT, TECHNOLOGY & REGULATORY AFFAIRS

DATE: FEBRUARY 27, 2014

The U.S. Chamber of Commerce is the world's largest business federation representing the interests of more than 3 million businesses of all sizes, sectors, and regions, as well as state and local chambers and industry associations. The Chamber is dedicated to promoting, protecting, and defending America's free enterprise system.

More than 96% of Chamber member companies have fewer than 100 employees, and many of the nation's largest companies are also active members. We are therefore cognizant not only of the challenges facing smaller businesses, but also those facing the business community at large.

Besides representing a cross-section of the American business community with respect to the number of employees, major classifications of American business—e.g., manufacturing, retailing, services, construction, wholesalers, and finance—are represented. The Chamber has membership in all 50 states.

The Chamber's international reach is substantial as well. We believe that global interdependence provides opportunities, not threats. In addition to the American Chambers of Commerce abroad, an increasing number of our members engage in the export and import of both goods and services and have ongoing investment activities. The Chamber favors strengthened international competitiveness and opposes artificial U.S. and foreign barriers to international business.

Positions on issues are developed by Chamber members serving on committees, subcommittees, councils, and task forces. Nearly 1,900 businesspeople participate in this process.

BEFORE THE COMMITTEE ON OVERSIGHT AND GOVERNMENT AFFAIRS OF THE U.S. HOUSE OF REPRESENTATIVES, SUBCOMMITTEE ON ENERGY POLICY, HEALTH CARE AND ENTITLEMENTS

"Examining The Endangered Species Act"

Written Statement of William L. Kovacs
Senior Vice President, Environment, Technology & Regulatory Affairs
U.S. Chamber of Commerce

February 27, 2014

On behalf of the U.S. Chamber of Commerce, thank you for the opportunity to submit this written statement for the record of the hearing, "Examining The Endangered Species Act." My name is William L. Kovacs and I am senior vice president for Environment, Technology and Regulatory Affairs at the U.S. Chamber of Commerce. The impact of the Endangered Species Act ("ESA") on the business community, including economic development, the construction of projects, and the creation of jobs, is particularly significant. I commend the Committee for its efforts and commitment to looking into the ESA, including how well it has worked since becoming law more than forty years ago.

I. INTRODUCTION

Under longstanding policy, the Chamber recognizes the need to protect certain species threatened with extinction, provided that this protection is done in a reasonable manner and is not used to unnecessarily impede development of lands and natural resources. The Chamber's main objective with the ESA is to ensure that the listing of endangered species and the designation of critical habitats are based upon sound science and balance the protection of endangered species with the costs of compliance and the rights of property owners.

Unfortunately, the implementation of the ESA over the last four decades has stunted economic development, halted the construction of projects, and burdened landowners – all with little to no success in the actual recovery of species. Like so many other facets of the regulatory process, the ESA regulatory agenda often has been driven by outside interest groups using the tactic of "sue and settle" in recent years. It is imperative that the federal agencies implementing the ESA strive to bring more transparency and stakeholder input to the process.

Any examination of the ESA also must include recognition of the impact of the Act on economic and project development in the United States. Significant swaths of land have been closed off to development in the United States, often resulting in the demise of entire industries and the decimation of surrounding communities. It is imperative that, while certain species threatened with extinction must be protected under the ESA, any such protection must be done reasonably and in consideration of the impact on the development of lands and natural resources.

II. THE IMPACT OF "SUE AND SETTLE" ON THE ESA

Over the past several years, the business community has expressed growing concern with the tactic of "sue and settle," where interest groups use lawsuits against federal agencies and subsequent, court-approved settlements to shape the regulatory agendas of agencies. Recent sue and settle arrangements increasingly highlight the fact that the rulemaking process itself is being subverted to serve the ends of a few favored interests groups.

A. The History of "Sue and Settle" Agreements

With these serious concerns in mind, the Chamber set out to determine how often sue and settle actually happens, to identify major sue and settle cases, and to track the types of agency actions involved. After an extensive effort, the Chamber was able to compile a database of sue and settle agreements and their subsequent rulemaking outcomes.[1] The overwhelming majority of sue and settle actions between 2009 and 2012 occurred in the environmental context, particularly under the Clean Air Act, Clean Water Act, and the Endangered Species Act.

The Chamber's report *Sue and Settle: Regulating Behind Closed Doors*, details that from 2009 to 2012, a total of 71 lawsuits were settled under circumstances that can be categorized as "sue and settle" cases under the Chamber's definition.[2] Significantly, settlement of these cases directly resulted in more than 100 new federal rules, many of which are major rules with compliance cost tags exceeding $100 million annually.

The ESA has been subject to an extensive amount of litigation and sue and settle agreements. In the past four years, the U.S. Fish and Wildlife Service ("FWS") has been petitioned to list an additional 1,230 species. In a 2011 sue and settle deal with environmental advocacy groups, the FWS agreed to two consent decrees that require the agency to propose an additional 757 species as new candidates to the list of endangered species under the ESA. Additionally, the consent decrees require the FWS to make final decisions on 251 species pending candidates. Adding this many species all at once imposes an overwhelming and brand new burden on the agency. In turn, the agency has to redirect resources away from other - often more pressing- priorities in order to meet deadlines.

B. The Influence of "Sue and Settle" on ESA Policies

Undoubtedly, sue and settle cases and other lawsuits are now very much driving the regulatory agenda of the ESA program at FWS. This was further highlighted by the FY 2011 FWS budget, which allocated $20.9 million for endangered species listing and critical habitat designation; the agency was required to spend more than 75% of this allocation ($15.8 million) undertaking the substantive actions required by court orders or settlement agreements resulting from litigation.[3]

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[1] *See* www.sueandsettle.com.
[2] https://www.uschamber.com/sites/default/files/documents/files/SUEANDSETTLEREPORT-Final.pdf
[3] *See* Testimony of Hon. Dan Ashe, Director, U.S. Fish and Wildlife Service before the House Natural Resources Committee (Dec. 6, 2011).

One of the primary reasons advocacy groups favor court-approved, sue and settle agreements is because the court retains long-term jurisdiction over the settlement, which means the plaintiff group can readily enforce perceived noncompliance with the agreement by the agency. The court in the endangered species agreements discussed above will retain jurisdiction over the process until at least 2018, thereby binding FWS Directors in the next Administration to follow the requirements of the 2011 sue and settle agreement. For its part, the agency cannot change any of the terms of the settlements (e.g., an agreed deadline for a rulemaking) without the consent of the advocacy group. Thus, even when an agency subsequently discovers problems in complying with a settlement agreement, the advocacy group typically can force the agency to fulfill its promises in the consent decree, regardless of the consequences for the agency or regulated parties.

For all of these reasons, "sue and settle" violates the principle that if an agency is going to write a rule, the goal should be to develop the most effective, well-tailored regulation that is based on sound science. Instead, rulemakings that are the product of sue and settle agreements are often rushed, sloppy, and poorly thought-out. These flawed rules often take a great deal of time and effort to correct. Similarly, rushed ESA listing decisions resulting from "sue and settle" agreements, particularly ones operating on unreasonable timeframes, run the risk of failing to allow for and rely upon meaningful stakeholder input, sound science, and peer-reviewed data.

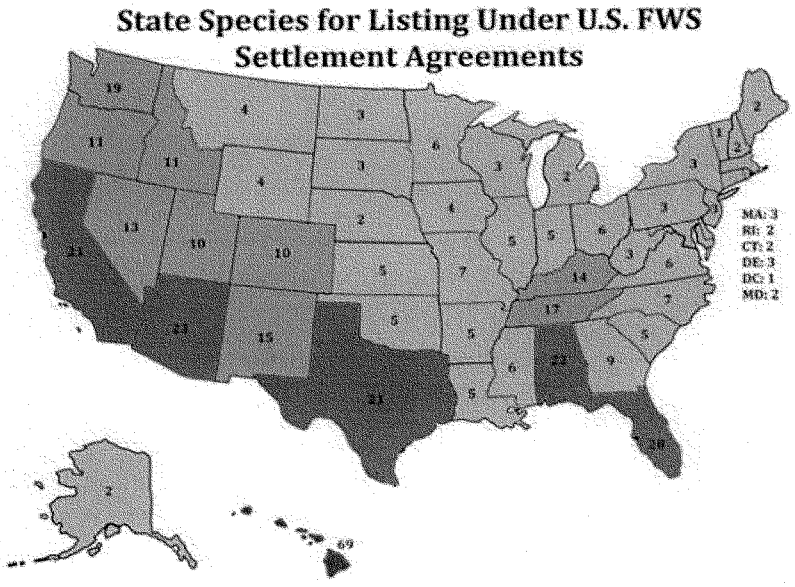
C. Transparency Needed to Counter "Sue and Settle"

One way to avoid some of these pitfalls would be to increase the transparency surrounding the lawsuits driving the ESA agenda. For instance, the agencies involved in the ESA, including the FWS and the National Oceanic and Atmospheric Administration ("NOAA"), should publish on their websites copies of any ESA-related notices of intent to sue that the agencies receive. The Environmental Protection Agency ("EPA") began undertaking a similar practice last year, resulting in more notice of potential litigation to the public, including the regulated parties themselves. Like the EPA, the FWS and the NOAA also should publish on their websites copies of any ESA-related complaints filed against the agencies. Again, increased transparency can only lead to a stronger regulatory process and more well-founded regulatory requirements.

III. IMPACT OF THE ESA ON ECONOMIC OPPORTUNITIES

Increasingly, Chamber members from a variety of industries, i.e. agriculture, transportation, oil and gas, construction, etc., and located throughout the United States are raising concerns over the ESA. As the listing proposals and decisions required by the 2011 sue and settle agreement continue to mount, the extent of U.S. lands potentially subject to the limitations of the ESA only grows. Indeed, the critical habitat designations associated with ESA listings often stymie growth and development. In fact, even proposed ESA listings and the threat of lands being designating as critical habitat can have the same effect.

The map below from the February 4, 2014 report of the Endangered Species Act Congressional Working Group shows the geographic extent of the listings from the 2011 sue and settle agreement.[4]



A. The Northern Long-Eared Bat

One example of the fallout from the 2011 sue and settle agreement is the FWS's October 2013 proposed listing of the Northern long-eared bat ("NLE bat") as "endangered" under the ESA. The NLE bat's range covers **39** states, reaching from Maine west to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east to the Florida panhandle.[5] This range includes some of the country's richest natural gas shale plays, like the Marcellus Shale in Pennsylvania and Ohio. Consequently, one of the economic bright spots for the U.S. in recent years – the shale gas revolution – may be under threat as a result of the proposed NLE bat listing.

[4] http://esaworkinggroup.hastings.house.gov/uploadedfiles/finalreportandrecommendations-113.pdf (p. 7).
[5] The NLE bat's range covers the following 39 states (including D.C.): AL, AR, CT, DE, FL, GA, IL, IA, IN, KS, KY, LA, ME, MD, MA, MI, MN, MS, MO, MT, NE, NH, NJ, NY, NC, ND, OH, OK, PA, RI, SC, SD, TN, VA, VT, WV, WI and WY.

In January of this year, the Chamber, along with dozens of other business organizations on the national and state level, filed comments with the FWS in response to the agency's proposed listing of the NLE bat as "endangered" under the ESA.[6] The other organizations weighing in included the American Petroleum Institute, the Independent Petroleum Association of America, the American Wind Energy Association, the American Association of State Highway Transportation Officials, the Gas Processors Association, and the National Association of State Foresters.

All of these groups urged the FWS not to list the NLE bat as "endangered." The Chamber argued that the FWS's proposal to list the NLE bat was supported by neither the record nor the law. The FWS acknowledged that the NLE bat is not in jeopardy of extinction because of any human activities. In fact, the general consensus – and even the opinion of the FWS itself – is that the sole threat to the NLE bat's population is a fungal disease discovered in 2006 called the White Nose Syndrome.

The proposed listing of the NLE bat could lead to the closure of a huge amount of public and private land in this country for economic development. The construction of important infrastructure projects, the creation of jobs, and economic prosperity are on the line with proposed ESA listings like the NLE bat. It is imperative that the listing process be based upon sound science and that it balance the protection of a species with the costs of compliance and the rights of property owners.

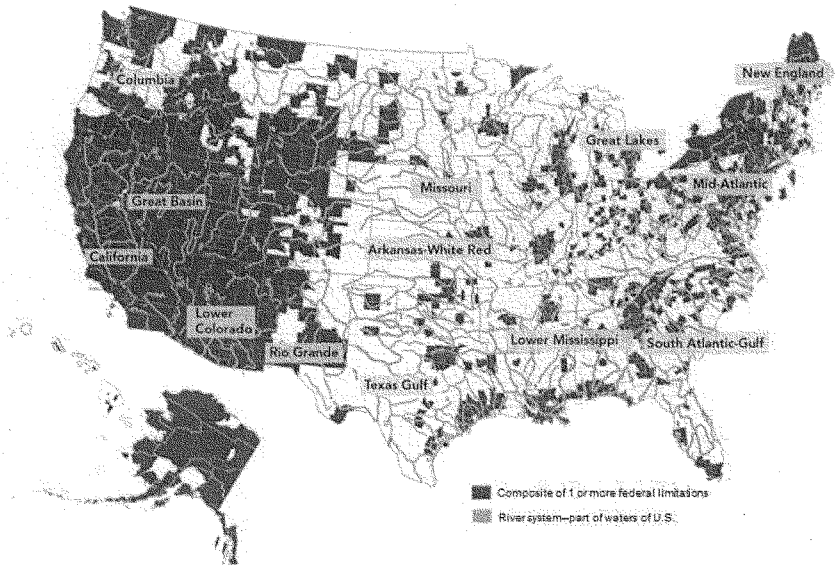
B. Where Do We Create Opportunities?

The listing of species under the ESA is only one piece of a much larger puzzle. That puzzle tells the story of what land is still available (and not available) in the U.S. for building, developing and constructing projects and opportunities. In other words, where can we create opportunities in the U.S.? Other pieces of the puzzle include air regulations for ozone and particulate matter, which ultimately close off areas of the country to development because of designations of "non-attainment." Then, there is the puzzle piece involving the EPA's plans to regulate an inordinate number of bodies of water under the "waters of the U.S. doctrine."

When these pieces are put together, the complete puzzle is a map of the United States showing potentially very little land available for developing economic and business opportunities.

[6] *See* http://www.regulations.gov/#!documentDetail;D=FWS-R5-ES-2011-0024-0089.

Where Do We Create Opportunities?[7]



The rulemaking processes that are leading to these different regulations, including ESA listings, must be done with transparency, sound science, peer-reviewed and quality data, and stakeholder input. As the map above shows, the stakes are too high for anything less to be done.

III. CONCLUSION

The ESA is undoubtedly in need of reform. There needs to be a balance between ensuring property and water right protection while successfully recovering and conserving species. ESA listings can have a negative economic impact on the business community because critical habitat designations often stymie growth and development. That is why it is important to examine the Act, including how it is and is not working, and to identify needed reforms. The Chamber commends this Committee for undertaking that examination effort. Thank you for the opportunity to submit a written statement today.

[7] *See* https://www.freeenterprise.com/energy-environment/video-where-can-we-build-anything-united-states, for the video, "Where Can We Build Anything in the United States?"

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

The Honorable James Lankford
Chairman
Subcommittee on Energy Policy, Health Care and Entitlements
Committee on Oversight and Government Reform
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

Enclosed are responses prepared by the Department of the Interior to questions submitted following the Subcommittee's February 27, 2014, oversight hearing on *"Examining the Endangered Species Act."*

Thank you for the opportunity to provide this material to the Subcommittee.

Sincerely,

Christopher P. Salotti
Legislative Counsel
Office of Congressional and Legislative Affairs

Enclosure

cc: The Honorable Jackie Speier
Ranking Member

Questions for
Mr. Michael Bean
Counselor, Fish and Wildlife and Parks
U.S. Department of the Interior

Representative Jason Chaffetz
Subcommittee on Energy Policy, Health Care and Entitlements
Committee on Oversight and Government Reform

Hearing: "Examining the Endangered Species Act"

1. It is widely documented that taxpayer funded studies and data are used by the Fish and Wildlife Service (FWS) when making its endangered species determinations. Current FWS practices preclude the sharing of studies and data related to ESA listings, even though public funding was used. Please describe the internal policy, guidance, regulations, and/or statute that allow FWS to keep publicly funded data from the public.

Response: The Administration is committed to decision-making that is transparent and supported by public participation and collaboration. In line with this commitment and because high-quality science and scholarly integrity are crucial to advancing the Department's mission, the Department carefully documents and fully explains its decisions related to the listing of species under the Endangered Species Act, and provides public access to that the supporting information and data through established Department and Bureau procedures. By creating the Scientific and Scholarly Integrity Policy in January 2011, the Department of the Interior was the first federal agency to respond to the Presidential Memorandum on Scientific Integrity and the guidance provided by the Office of Science and Technology Policy Memorandum on Scientific Integrity.

While certain information and data may occasionally be withheld from disclosure under the terms of the Freedom of Information Act (e.g., confidential commercial information obtained from a person), current FWS policies and practices do not keep publicly funded data from the public. Under Federal Acquisition Regulations, the government's access and distribution rights extend only to data "first produced in the performance of" a contract. The FWS routinely provides data that it produces or obtains with respect to endangered species determinations upon request. It also posts on regulations.gov a list of the publications, reports, and studies on which it relied in making its listing determinations. Often, however, the Service contracts for studies to analyze data that were first produced

by States, universities, or other non-federal entities. Such was the case with study by Garton et al. that was discussed at the hearing which was undertaken by researchers affiliated with the Idaho, Oregon and Washington State wildlife agencies. In these instances, FWS neither obtains, nor has any right to release, the underlying data. State law regarding release of wildlife data can be restrictive. For example, Texas Government Code Section 403.454 prohibits the disclosure to any person of information that "relates to the specific location, species identification, or quantity of any animal or plant life" for which a conservation plan is in place or even under consideration.

2. How does the FWS intend to define and establish a baseline habitat disturbance metric, that is based on the most recent and scientifically accurate data, within Greater Sage-Grouse habitat areas in Utah?

Response: The Fish and Wildlife Service bases all of its listing decisions on the best available scientific data and actively solicits data from stakeholders, including local and state governments Habitat loss and fragmentation has been identified in the scientific literature as the primary cause of declining sage-grouse populations. These two items, along with the lack of sufficient regulatory mechanisms to address habitat loss and fragmentation, were the primary factors in the FWS's 2010 warranted but precluded determination for the greater sage grouse. In March 2013 the FWS released the Conservation Objectives Team Report, developed by state and FWS employees, which identifies the degree to which threats that resulted in the 2010 warranted determination need to be reduced or ameliorated to conserve sage-grouse so that the species is no longer in danger of extinction or likely to become in danger of extinction in the foreseeable future. For each individual state within the range of sage-grouse, the report identified Priority Areas of Conservation (PACs), which are key habitats necessary for sage-grouse conservation. Recommendations in the report are focused on conserving these areas of highest conservation value to the species. The extent to which disturbance within these areas can be avoided or minimized will determine the extent to which this threat to the species is reduced, a fact that will be fully considered in our 2015 listing determination.

Disturbance caps are being considered as a key method to address continuing habitat loss and fragmentation, the primary cause of sage-grouse population declines and the key factors contributing to the 2010 warranted but precluded finding. The FWS has not set such caps but is instead working closely with the species experts (including state biologists) and the primary species habitat managers (The Bureau of Land Management and the Forest Service) to address

this issue. However the FWS continues to support avoidance and minimization of all impacts to Priority Areas of Conservation, as identified by the Conservation Objectives Team report, as critical to species conservation.

3. How does the FWS plan to partner with and utilize state wildlife agency expertise and data pursuant to Congressional intent outlined in the Fiscal Year 2014 Omnibus Appropriation law?

Response: The U.S. Fish and Wildlife Service, recognizing that collaborative efforts are critical to species recovery, maintains strong partnerships with a wide variety of stakeholders including Federal, State and local agencies, tribes, conservation organizations, industry, private landowners and other concerned citizens In each listing determination, the Service requests information from the states and when species are identified as candidates to be listed under the Endangered Species Act, the Service works very closely with States, as well as Tribes, private landowners, partners, and other Federal agencies to carry out conservation actions for these species to prevent further decline. For example, the Fish and Wildlife Service's sage grouse "conservation objectives team" relied largely upon state data in identifying "primary areas for conservation." In this and other examples, the Department and its various agencies recognize and utilize the wildlife data that the states maintain.

Partnerships with States are critical to the Service's efforts to conserve listed species. Section 6 of the ESA encourages States to develop and maintain conservation programs for threatened and endangered species. Federal funding is available to promote State participation.

Finally, recognizing the value of working closely with States, the Service and States formed the Joint Federal/State Task Force on Endangered Species Act Policy (ESA JTF) in 2010. It was designed to be an executive-level opportunity for discussion among the state and federal fish and wildlife agencies. It is made up of eight state fish and wildlife agency directors and four representatives from each of the Services, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. It was created to provide a process to work together to identify, address, and make recommendations on policy affecting fish and wildlife resources.

In addition, late last year Interior Secretary Sally Jewell took part in announcing the Western Governors Association's regional Crucial Habitat Assessment Tool, or CHAT. Like the several individual state CHATs that preceded it, this CHAT uses

state wildlife data to identify crucial habitats and important wildlife corridors so that developers and land use decision-makers can site new projects where they are unlikely to entail significant resource conflicts. Interior Department agencies, including not only the Service, but also the Bureau of Land Management and U.S. Geological Survey, provided both financial and technical support for the development of these CHATs and expect to use them in future decision-making.

4. Please describe the internal policy, guidance, regulations, and/or statute that allow FWS to disregard wildlife populations found on non-federal land?

Response: FWS does not disregard wildlife populations found on non-federal land. The 2012 revised recovery plan for the Utah prairie dog states that "we emphasize conserving extant colonies, many of which occur on non-Federal lands [and] establishing additional colonies on Federal and non-Federal lands." The recovery objectives set forth in that plan make no distinction between prairie dogs on federal and non-federal lands. Moreover, FWS has underscored the importance of Utah prairie dogs on non-federal lands by entering into Safe Harbor Agreements and Habitat Conservation Plans for such lands as well as working with the School and Institutional Trusts Lands Administration to establish a Utah prairie dog conservation bank on State lands.

5. Please provide me with any and all data – including but not limited to raw data such as statistics or figures, scientific literature, studies, tests, or any other type of information – used by FWS in making its endangered species determinations for the Greater Sage Grouse, Gunnison Sage Grouse and prairie dog.

Response: Attached, please find a list of the scientific literature used by the FWS in making its endangered species determinations for the Greater Sage Grouse, Gunnison Sage Grouse, and the Utah prairie dog. Since the complete scientific record for each of these species is quite voluminous, the Department will be happy to work with the Committee to identify specific documents that will assist the Committee in its oversight of the Endangered Species Act.

Endangered Species
Mountain-Prairie Region

UTAH PRAIRIE DOG

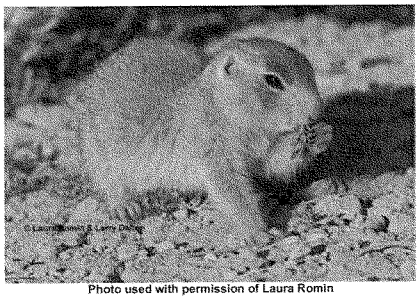


Photo used with permission of Laura Romin

Species Description: Prairie dogs occur only in North America. They are rodents within the squirrel family and include five species--the Utah prairie dog, the white-tailed prairie dog, the black-tailed prairie dog, the Gunnison prairie dog, and the Mexican prairie dog. The Utah prairie dog is currently listed under the Endangered Species Act as threatened. The total length of an adult Utah prairie dog is approximately 12-14 inches, the weight of an individual ranges from 1 to 3 pounds. Utah prairie dogs range in color from cinnamon to clay, with dark markings above the eyes and white on the tip of the tail. Utah prairie dogs are diurnal, burrowing animals. Breeding usually takes place in March and young are born in April after a 30 day gestation period. Emergence of the pups usually occurs from mid to late May. The Utah prairie dog's diet is composed of flowers, seeds, grasses, leaves, and even insects.

Distribution, Abundance, & Trends: The Utah prairie dog is the westernmost species of prairie dog. The species' range is limited to the southwestern quarter of Utah. Historically, Utah prairie dog colonies were found as far west as Pine and Buckskin Valleys in Beaver and Iron Counties, and may have occurred as far north as Nephi, southeast to Bryce Canyon National Park, east to the foothills of the Aquarius Plateau, and south to the northern borders of Kane and Washington Counties. The Utah prairie dog currently occurs in three areas within southwestern Utah including Awapa Plateau, Paunsaugunt, and West Desert (Map). Utah prairie dogs are found in elevations from 5,400-feet on valley floors up to 9,500-feet in mountain habitats. Utah prairie dog populations began to decline when control programs were initiated in the 1920s, and by the 1960s the species' distribution was greatly reduced as a result of poisoning, sylvatic plague (a nonnative disease), drought, and habitat alteration induced by agricultural and grazing activities. The exact magnitude of this decline is not known. However, by the early 1970s, the Utah prairie dog had been eliminated from major portions of its historical range and had declined to an estimated 3,300 individuals distributed among 37 Utah prairie dog colonies. From 1985 through 2009, the total estimated range-wide population (including juveniles) ranged from 23,752 to 54,195 animals, with an average population of 34,279. Trends are stable to increasing. Recent population estimates are among the highest recorded since listing. Specifically, five of the seven highest population counts have occurred since 2005.

Status: The Utah prairie dog was listed as an endangered species on June 4, 1973 (38 FR 14678), pursuant to the Endangered Species Conservation Act of 1969. The species' was downlisted to threatened in 1984 (49FR 22330). The Utah prairie dog's rangewide population has been stable to increasing over the last 30 years. However, threats remain across the range of the Utah prairie dog including plague, urban expansion, over-grazing, cultivated agriculture, vegetation community changes, invasive plants, OHV and recreational uses, climate change, energy resource exploration and development, fire management, poaching, and predation. These issues can be reduced to two overriding concerns: permanent habitat loss and fragmentation (i.e. largely from commercial and residential development), and plague.

The recovery priority number for the Utah prairie dog is 8C (see Table 1). Recovery priority numbers, which range from a high of 1C to a low of 18, are based on degree of threat, recovery potential, taxonomic distinctiveness, and presence of an actual or imminent

conflict between the species and development activities (C represents conflict). The rank of 8C is based on a moderate degree of threat (e.g., economic development activities and plague), a high degree of controversy regarding the species and its recovery, high recovery potential, and taxonomic standing as a species.

As previously mentioned, By May 1984, Utah prairie dog populations had expanded in portions of their range, and we reclassified the species to threatened status with a special rule to allow regulated take of Utah prairie dogs (49 FR 22330). Under the 1984 special rule, taking of up to 5,000 animals was authorized in the seasonal window of June 1 through December 31. This special rule was amended on June 14, 1991 (56 FR 27438), to increase the amount of regulated take throughout the species' range to 6,000 animals. In practice, take of Utah prairie dogs in association with the 1984 and 1991 special rules is only permitted in cases where Utah prairie dogs are causing damage to irrigated agriculture or pasture lands, as implemented by the UDWR permitting process under authority of UDWR Rule R657-19 Taking Nongame Mammals. We are in the process of revising the 1991 special rule to limit take to agricultural lands, properties adjacent to conservation lands, and areas where prairie dogs create human safety hazards or disturb the sanctity of significant human cultural or human burial sites (see Recovery Actions, below).

Recovery Efforts: A recovery plan for the Utah prairie dog was finalized in 1991. The plan's primary recovery criterion was to establish Utah prairie dog populations on public lands across three recovery areas: West Desert, Paunsaugunt, and Awapa Plateau. In 1972, the UDWR initiated a translocation program to move Utah prairie dogs from private agricultural lands to areas of historical occupancy on public lands. Translocations continued as a primary recovery action in the 1991 recover y plan. Despite these efforts to establish new Utah prairie dog colonies on federal lands, over 70 percent of the Utah prairie dog population still occurs on private lands.

We completed a Final Revised Recovery Plan for the species in 2012, our first revision of the 1991 recovery plan. Our recovery strategy for the Utah prairie dog focuses our attention on habitat loss and fragmentation and disease through a program that encompasses threats abatement, habitat protection, research, and monitoring. Increasing and securing populations of the Utah prairie dog on public land is still an important component of the revised recovery plan. However, the revised recovery plan also emphasizes conservation of the species on non-federal lands through programs with willing landowners, such as safe harbor agreements, conservation easements, and conservation banks. Recovery of the species will be achieved more rapidly if we increase conservation of the species on these lands in a way that simultaneously benefits private landowners and Utah prairie dogs.

The revised recovery plan also emphasizes research and management of plague in Utah prairie dog colonies. Plague is caused by a bacterium (Yersinia pestis) not native to North America. Fleas are the most common vectors. Plague occurs across the entire range of the Utah prairie dog and has the potential to result in complete loss or severe reduction in prairie dog colonies across the landscape. Management measures to control plague outbreaks (i.e., vaccines, insecticides) are being studied and their success may influence long term Utah prairie dog conservation on both federal and non-federal lands.

Overall, the revised recovery plan emphasizes: conserving extant colonies, many of which occur on non-Federal lands; establishing additional colonies on Federal and non-Federal lands via habitat improvement or translocations; controlling the transmission of plague; and monitoring habitat conditions. Examples of proposed recovery actions include continuing Utah prairie dog annual surveys and population monitoring; conserving prairie dog habitat on non-federal lands by purchasing conservation easements and establishing voluntary conservation agreements (e.g., safe harbor agreements) with willing landowners; protecting and improving habitat on federal lands by implementing vegetation treatments and minimizing impacts of proposed land use activities; minimizing impacts of disease such as plague; continuing the translocation of Utah prairie dogs to establish new colonies in suitable habitats; and developing a more comprehensive public outreach effort to promote a better understanding of the biological and habitat values of the Utah prairie dog.

We believe the Utah prairie dog is a very recoverable species. We will need a lot of assistance from partners to implement recovery actions in a manner that leads the species' to recovery goals. In this regard, the Utah Prairie Dog Recovery Implementation Program (UPDRIP or "Program") is a public private partnership to coordinate the recovery of the Utah prairie dog while balancing and accommodating land uses and needs of the human population throughout the species range. The UPDRIP partnership includes representatives from the USFWS, Utah Department of Natural Resources (UDNR), USFS, BLM, Natural Resources Conservation Service, NPS, UDWR, School and Institutional Trust Lands Administration (SITLA), Iron County, Garfield County, Wayne County, Piute County, Utah Farm Bureau, Panoramaland Resource Conservation and Development Council, Color Country Resource Conservation and Development Council, local municipalities, and environmental interests.

The UPDRIP was formalized in 2010, and the partnership is still in its early stages. There is currently limited funding available to pursue landscape-level conservation efforts for recovery of the species. However, the Program has already become a valuable tool for increasing coordination efforts and is making initial strides to formulate annual and long-range work plans for Utah prairie dog conservation. In addition, the support of UPDRIP partners has already proven important in obtaining some funding from various grant programs. Supporting and building the UPDRIP partnership into the future is essential if we are to recover the Utah prairie dog. More information on the Program and current updates on its efforts can be found at the UPDRIP website.

Recent Actions: GARFIELD COUNTY HCP The Service received a permit application from the Garfield County Commission (Utah) and are announcing the availability of a Draft Low-effect Habitat Conservation Plan (HCP) for the Utah prairie dog in Garfield County, Utah, for a 30 day public comment period. The low-effect habitat conservation plan (HCP) would authorize incidental take of the federally threatened Utah prairie dog from translocations and residential, commercial, and industrial developments from the vicinity of the town of Panguitch, Utah. The HCP and our associated permit would authorize the take of prairie dogs and habitat on no

more than 220 acres of habitat over a maximum 3-year period. Most of the take is limited to already developed areas or those areas projected for development in the near future. These areas do not serve to support current or future metapopulations and objectives for recovery of the species in the wild. Mitigation for the incidental take would include a combination of translocations of Utah prairie dogs to other sites or payment of a mitigation fee to a Utah prairie dog conservation fund. We request public comment on the draft low-effect HCP.

- Federal Register Notice: October 21, 2013 Low-Effect Habitat Conservation Plan for the Utah Prairie Dog in Garfield County, Utah
- Final Draft Low Effect Garfield County HCP

IRON COUNTY HCP On November 6, 2013, the Service issued a permit to the Iron County Commission (Utah) for their Final Low-effect Habitat Conservation Plan (HCP) for the Utah prairie dog in Iron County, Utah. The low-effect habitat conservation plan (HCP) and associated permit authorizes incidental take of the federally threatened Utah prairie dog from residential, commercial, and industrial developments in Iron County, Utah. The permit authorizes the take of no more than 600 acres of occupied Utah prairie dog habitat over a maximum 3-year period. Most of the take is limited to already developed areas or those areas projected for development in the near future. These areas do not serve to support current or future metapopulations and objectives for recovery of the species in the wild. Mitigation for the incidental take would include a combination of translocations of Utah prairie dogs to other sites or payment of a mitigation fee to a Utah prairie dog conservation fund.

- Final Low-effect Habitat conservation Plan for Utah Prairie Dog in Iron County, Utah
- HCP Permit TE-20942B for Iron County

The Service received a permit application from the Iron County Commission (Utah) and are announcing the availability of a Draft Low-effect Habitat Conservation Plan (HCP) for the Utah prairie dog in Iron County, Utah, for a 30 day public comment period. The low-effect HCP would authorize incidental take of the federally threatened Utah prairie dog from residential, commercial, and industrial developements in Iron County, Utah. The HCP and our associated permit would authorize the take of no more than 600 acres of occupied Utah prairie dog habitat over a maximum 3-year period. Most of the take is limited to already developed areas or those areas projected for development in the near future. These areas do not serve to support current or future metapopulations and objectives for recovery of the species in the wild. Mitigation for the incidental take would include a combination of translocations of Utah prairie dogs to other sites or payment of a mitigation fee to a Utah prairie dog conservation fund. We request public comment on the draft low-effect HCP.

- Federal Register Notice: September 3, 2013 Low-effect Habitat Conservation Plan for Utah Prairie Dog in Iron County, Utah
- Iron County Draft HCP

On August 1, 2012, we notified the public of our final revisions to a 4(d) rule designating protective regulations necessary and advisable to provide for the conservation of the Utah prairie dog. We are revising our special regulations to provide limits to the allowable take, and we are issuing new incidental take exemptions for otherwise legal activities associated with standard agricultural practices. We are also including take exemptions for areas where Utah prairie dogs create serious human safety hazards or disturb the sanctity of significant human cultural or human burial sites. Most other established provisions of the existing special rule not relating to these amendments remain unchanged. The previous special rule which was established in 1984 and amended in 1991. This final 4 (d) rule will support our overall recovery efforts by allowing management of prairie dogs on agricultural lands and gaining local community support by addressing issues where prairie dogs cause human safety hazards or disturb the sanctity of human cultural or burial sites.

- Federal Register Notice: August 1, 2012 Revising the Special Rule for the Utah Prairie Dog
- Press Release: August 1, Service Finalizes New Rules Regarding Take Allowances for the Utah Prairie Dog
- Final Environmental Assessment; Finding of No Significant Impact

On April 25, 2012, we released to the public the final revised Utah Prairie Dog Recovery Plan (this updates the previous 1991 recovery plan). The revised plan describes actions considered necessary for the species' recovery, establishes criteria for delisting, and estimates the time and cost for implementing recovery actions. This revised plan also served as the basis for the species' 5-year review.

- Federal Register Notice: April 25, 2012 Revised Recovery Plan for the Utah Prairie Dog
- Press Release: April 25, 2012
- Utah Prairie Dog Revised Recovery Plan

On April 25, 2012, we also reopened the comment period on our proposal to revise the species special 4(d) rule. A "special rule" specifies the protections deemed necessary and advisable to provide for the conservation of the species. The current 4(d) rule was established in 1991. On June 1, 2011, we proposed to revise this special rule (76 FR 31906). Today, we proposed a few additional changes based on public and peer review comments received. We are also making available for public review the draft Environmental Assessment on our proposed actions, in accordance with the National Environmental Policy Act.

- Federal Register Notice: April 25, 2012 Revising the Proposed Special Rule for the Utah Prairie Dog
- Press Release: April 25, 2012

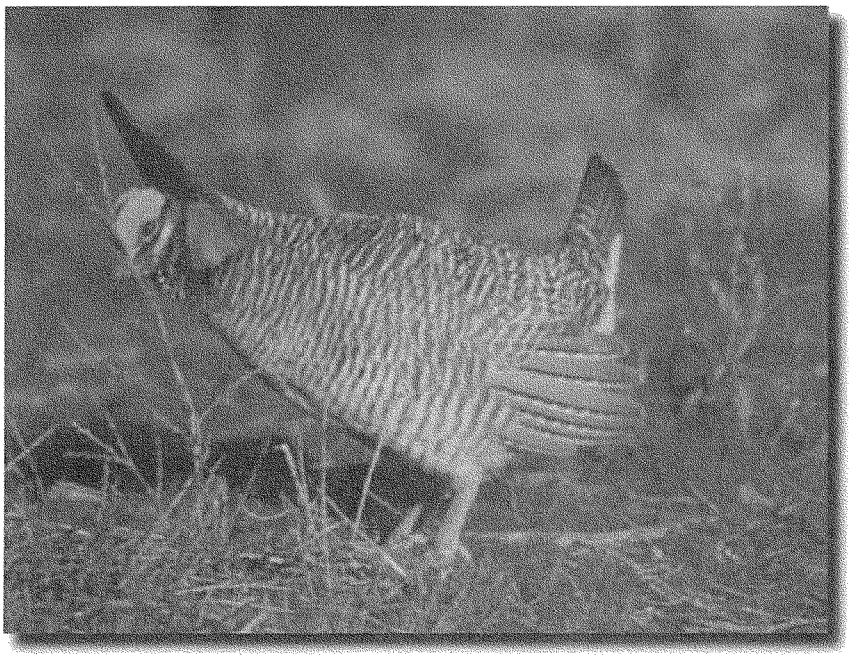
On June 20, 2011, the Service completed a revised petition finding for the Utah prairie dog and determined that there was not substantial information to show that reclassifying the species from threatened to endangered under the Endangered Species Act may be warranted (76 FR 36053).

Archives

More information can be found on the Service's ECOS webpage

Last updated: November 6, 2013

Lesser Prairie-chicken (*Tympanuchus pallidicinctus*): A Technical Conservation Assessment



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COVER PHOTO CREDIT

The lesser prairie-chicken photo was provided with permission by Christian A. Hagen from research he conducted in Kansas.

SUMMARY OF KEY COMPONENTS FOR CONSERVATION OF LESSER PRAIRIE-CHICKEN

Status

The overall distribution of the lesser prairie-chicken (*Tympanuchus pallidicinctus*) has declined an estimated 92 percent since settlement by people of European descent and an estimated 78 percent since the early 1960s. Concurrent with this decrease in occupied range, numbers of lesser prairie-chickens have declined at least 90 percent since European settlement, resulting in smaller, more isolated populations. As a consequence of these declines, the lesser prairie-chicken is a candidate for federal listing as a threatened or endangered species.

Primary Threats

The major threats to the lesser prairie-chicken in USDA Forest Service Region 2 are the loss, fragmentation, and degradation of habitat on both private and public lands. Conversion of native prairie habitat increasingly isolates populations, elevating the risk of localized extirpations and leading to an erosion of metapopulation viability. Populations throughout the species' range are vulnerable to land use practices that degrade or eliminate nesting and brood-rearing areas. Some of the fundamental threats to this species include:

- inappropriate timing and intensity of livestock grazing
- conversion of native prairie for development and crop production
- fragmentation of habitat with roads, utility corridors, fences, towers, turbines, and energy developments
- introduction and expansion of noxious weeds
- alteration of fire regimes
- planting of trees.

Primary Conservation Elements, Management Implications, and Considerations

In managing for the conservation of this species, land managers must consider practices associated with grazing, farming, burning, and mowing of potential and occupied habitat, as well as the impacts of urban development, roads, power lines, fences, oil and gas development, tree planting/encroachment, and off- road vehicles. The inappropriate timing and intensity of livestock grazing, in particular, can cause widespread degradation of habitat for lesser prairie-chickens by homogenizing the essential heterogeneous grassland landscape created by the native ungulate grazing fauna prior to European settlement. Features associated with human development (e.g., communities, roads, land use changes, herbicides) also contribute to habitat fragmentation, alter predation dynamics, and introduce disturbance and mortality factors.

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INTRODUCTION

This conservation assessment is one of many being produced to support the Species Conservation Project of the Rocky Mountain Region (Region 2), USDA Forest Service (USFS). The lesser prairie-chicken (*Tympanuchus pallidicinctus*) is the focus of an assessment because it has been designated a sensitive species by USFS Region 2 and petitioned for listing under the Endangered Species Act of 1973. Review of the listing petition by the U.S. Fish and Wildlife Service (USFWS) concluded that listing is warranted but currently precluded due to listing actions of higher priority. Threats to this species are considered by the USFWS to be moderate and imminent.

While this assessment addresses the biology of the lesser prairie-chicken throughout its range, it focuses on Region 2. However, because the overall range of the lesser prairie-chicken is relatively small, its biology, ecology, and management in Oklahoma, Texas, and New Mexico (outside Region 2) are relevant within Colorado and Kansas (within Region 2).

Goal of Assessment

Species conservation assessments produced as part of the Species Conservation Project are designed to provide land managers, biologists, and the public with a thorough discussion of the biology, ecology, conservation, and management of certain species based on existing scientific knowledge. The assessment goals limit the scope of the work to summaries of scientific knowledge, discussion of broad implications of that knowledge, and outlines of information needs. The assessment does not seek to develop specific prescriptions for management of populations and habitats. Rather, it provides the ecological background upon which management should be based and focuses on the consequences of changes in the environment that result from management (i.e., management implications). Furthermore, this assessment cites previously published management recommendations and examines the success of those recommendations that have been implemented.

Scope of Assessment

The assessment examines the biology, ecology, conservation, and management of lesser prairie-chickens with specific reference to the geographic and ecological characteristics of the USFS Region 2. Although a majority of the literature on the species originates from field investigations and planning outside the region, this document places that literature in the ecological and social context of Region 2. For example, lesser prairie-chickens are found outside Region 2 in Oklahoma, Texas, and New Mexico. Nevertheless, some of these areas have habitats and population characteristics comparable to areas in Region 2. In fact, some populations are shared between states. This assessment also is concerned with reproductive behavior, population dynamics, and other characteristics of lesser prairie-chickens in the context of the current environment. The evolutionary environment of the species is considered in conducting the synthesis, but placed in a current context.

Data Used to Produce this Assessment

In producing this assessment, most attention was focused on peer-reviewed sources such as journal publications, theses and dissertations, and agency and university technical reports. The numerous references that were not peer-reviewed were not considered, except in situations where peer-reviewed information was not available. In these situations, the nature of the information was clearly acknowledged. In addition, the strength of evidence for particular ideas is noted and alternative explanations are described when appropriate.

Treatment of Uncertainty

Most of the available research on lesser prairie-chickens is based on correlative information. Controlled experiments at the appropriate scale are extremely difficult to conduct on species that occupy broad home ranges where there is minimal management control. Consequently, we attempt to provide details of the referenced research (such as sample sizes) so that the reader can understand some of the strengths and weaknesses of the inferences. We also attempted to avoid references that were not peer-reviewed such as magazine and newspaper articles and some agency reports. Although peer-review does not eliminate uncertainty or the possibility of error, it at least assures that the research has undergone review by other scientists.

Publication of Assessment on the World Wide Web

To facilitate use of these conservation assessments, they are being published on the USFS Region 2 World Wide Web site. Placing the documents on the web makes them available to agency biologists and managers, other agencies, and the public more rapidly than publication

as a book or report. More importantly, future revision of the assessments will be facilitated. Revision will be accomplished based on guidelines established by Region 2.

Peer Review

Assessments developed for the Species Conservation Project have been peer reviewed prior to their release on the Web. Peer review was designed to improve the quality of communication and to increase the rigor of the assessment. Peer review of this assessment was administered by the Society for Conservation Biology, using two experts on the subject or related species.

MANAGEMENT STATUS AND NATURAL HISTORY

Management Status

The lesser prairie-chicken was petitioned for listing under the federal Endangered Species Act in 1995. The 12-month finding was "warranted but precluded" with threats considered to be moderate and imminent (U.S. Fish and Wildlife Service 1998). Lesser prairie-chickens are currently a candidate for listing with an assigned listing priority of 8 (scale of 1 to 12, with 1 being the most urgent; U.S. Fish and Wildlife Service 2004). Since 1973 the lesser prairie-chicken has been listed as state threatened in Colorado under the Nongame and Endangered or Threatened Species Conservation Act (closed hunting season). It is considered a game species in Kansas, with an annual limited harvest, and a gamebird in New Mexico (closed hunting season), Oklahoma (closed hunting season), and Texas (open hunting season). The lesser prairie-chicken is listed as a sensitive species by USFS Region 2 and a Management Indicator Species on the Comanche and Cimarron national grasslands (**Figure 1**). The Bureau of Land Management considers the lesser prairie-chicken in its regional management plans, primarily eastern New Mexico (Bureau of Land Management 2005). Partners in Flight has placed the lesser prairie-chicken on their Watch List with multiple causes for concern across its entire range, and has assigned it a combined vulnerability assessment score of 20 out of a maximum possible of 20 (Rich et al. 2004). The lesser prairie-chicken is on the International Union for Conservation of Nature and Natural Resources" (IUCN) Red List as a threatened species (Storch 2000).

Existing Regulatory Mechanisms and Management/Conservation Strategies

The USFS Region 2 considers the lesser prairie-chicken a sensitive species based on several characteristics including distribution, population abundance and trend, habitat vulnerability and trend, dispersal capability, and demographics. The official USFS policy on "Wildlife, Fish, and Sensitive Plant Habitat Management" (Amendment number 2600-95-7; June 23, 1995) lists numerous issues that apply to the lesser prairie-chicken. In the U.S. Code (Title 16, Chapter 35, § 1534), the Secretary of Agriculture is designated with the responsibility to "establish and implement a program to conserve fish, wildlife, and plants, including those which are listed as endangered species or threatened species..." The U.S. Code (Title 16, Chapter 35, § 1536) adds to this responsibility by mandating conference with the appropriate Secretary whenever an action is likely to jeopardize the continued existence of any species proposed for listing as threatened or endangered, or whenever an action might result in destruction or adverse modification of critical habitat proposed for listing.

FSM 2670.12 (Amendment number 2600-95-7; June 23, 1995) clarifies the authority of the USFS to deal with threatened and endangered species:

1. Manage "habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least viable populations of such species."

2. Conduct activities and programs "to assist in the identification and recovery of threatened and endangered plant and animal species."

3. Avoid actions "which may cause a species to become threatened or endangered."

FSM 2670.22 (Amendment number 2600-95-7; June 23, 1995) lists the objectives of the USFS with regard to sensitive species:

1. Develop and implement management practices to ensure that species do not become threatened or endangered because of USFS actions.

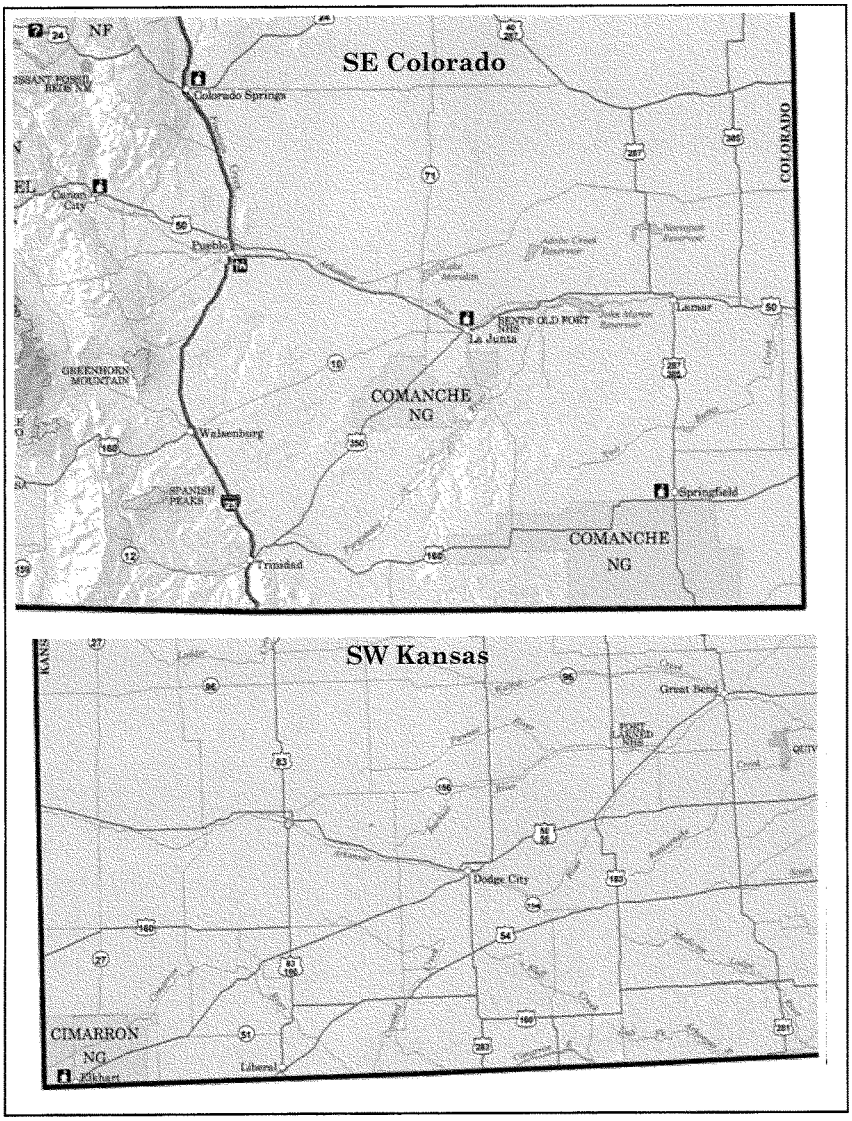

Figure 1. Location of national grasslands in southeastern Colorado and southwestern Kansas within the Rocky Mountain Region of the USDA Forest Service.

2. Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.

3. Develop and implement management objectives for populations and/or habitat of sensitive species.

FSM 2670.32 (Amendment number 2600-95-7; June 23, 1995) lists the official policy of the USFS with regard to sensitive species:

1. Assist States in achieving their goals for conservation of endemic species.

2. As part of the National Environmental Policy Act process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species.

3. Avoid or minimize impacts to species whose viability has been identified as a concern.

4. If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. (The line officer, with project approval authority, makes the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward Federal listing.)

5. Establish management objectives in cooperation with the States when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions. Establish objectives for Federal candidate species, in cooperation with the USFWS or the National Marine Fisheries Service and the States.

In contrast to sensitive species, Management Indicator Species (MIS) are chosen as indicators of particular management strategies. The lesser prairie-chicken has been designated as a MIS on the Comanche and Cimarron national grasslands (USDA Forest Service, **Figure 1**). The Resource Management Plan contains guidelines for management of lesser prairie-chicken habitat (U.S. Fish and Wildlife Service 2002). There also is a detailed management plan for lesser prairie-chickens in New Mexico (Massey 2001).

Most currently occupied habitat occurs on private lands in Region 2, where state and federal agencies have little regulatory authority to protect this species or its habitat (U.S. Fish and Wildlife Service 2002). Consequently, addressing the problems associated with conservation of lesser prairie-chickens will necessitate cooperation and coordination of efforts among federal and state agencies, non-governmental organizations, and private landowners (Massey 2001). The Wildlife Habitat Management Institute (1999) published habitat management guidelines for lesser prairie-chickens that emphasize cooperation and coordination between public agencies and private landowners. The Lesser Prairie-chicken Interstate Working Group (LPCIWG), comprised of the five state wildlife agencies within the current range of lesser prairie-chickens, in addition to other state, federal, and private organizations, has prepared a range-wide conservation strategy for lesser prairie-chickens (Mote et al. 1998). The IUCN also has produced a status survey and conservation action plan for grouse species worldwide, including the lesser prairie-chicken (Storch 2000).

Biology and Ecology

Systematics and general species description

The lesser prairie-chicken belongs to the Order Galliformes, Family Phasianidae, and subfamily Tetraoninae. The first description of the lesser prairie-chicken was published in 1873 by Ridgway, who considered it a race of the greater prairie-chicken (*Tympanuchus cupido*) (Baird and Ridgway 1873). In 1885 Ridgway amended his original description and assigned the lesser prairie-chicken specific status; at that time the scientific name was changed from *Cupidonia cupido* var. *pallidicincta* to the present designation *T. pallidicinctus* (Ridgway 1885).

The lesser prairie-chicken is a medium-sized grouse, similar to, but slightly smaller than, the greater prairie-chicken; total body length is 38 to 41 cm (Johnsgard 1983, Giesen 1998). Body mass averages 752 g for males and 712 g for females; however, considerable variation occurs among seasons, age and sex classes, and regions (Giesen 1998). Plumage is similar for males and females and typically is barred with alternating brown and buffy-white bands; the upper body is somewhat darker than the belly (Giesen 1998). The body is oval in shape, and the tail is short

and rounded in appearance. On the sides of the neck, males possess long tufts of feathers (pinnae) that they hold erect during courtship displays; females have smaller, less prominent, pinnae feathers. Males also exhibit bright yellow eyecombs above the eye, and dull red esophogeal air sacs on the sides of the neck during courtship behavior. The outer rectrices of males also have less horizontal barring than the outer rectrices of females (Pitman et al. 2005).

Currently, lesser prairie-chickens and greater prairie-chickens are recognized as distinct species (American Ornithologists' Union 1957, 1983). However relatively minor differences in appearance, habitat, and behavior between the two species have generated debate regarding the specific classification of the lesser prairie-chicken. In general, greater prairie-chickens are slightly larger and darker than lesser prairie-chickens, and the males have orange scarlet-edged air sacs (Schroeder and Robb 1993, Giesen 1998). Aldrich and Duvall (1955:8) believed that "... no characters [of the lesser prairie-chicken] differ from those of the other prairie chickens, except in degree; thus, only a racial difference is indicated". But Aldrich (1963:537) later stated that "... the lesser prairie-chicken appears to have sufficiently separated morphological characters to be considered a distinct species by most ornithologists." Short (1967) and Johnsgard (1983) considered lesser and greater prairie-chickens allopatric subspecies while Sharpe (1968) suggested that they were allospecies of one superspecies. However, Jones (1964a) examined the behavioral and morphological characteristics of both the lesser and greater prairie-chicken and concluded that specific status of the lesser prairie-chicken was warranted. In a comprehensive review of the reproductive behavior of Tetraonidae, Hjorth (1970) also treated the lesser prairie-chicken as a separate species. Examination of genetic variation among members of the genus *Tympanuchus* indicates low levels of interspecific divergence, suggesting recent speciation among the North American prairie-grouse (Ellsworth et al. 1994, Ellsworth et al. 1995, Gutiérrez et al. 2000, Drovetski 2002, Drovetski 2003). Ellsworth et al. (1994) postulated that morphological and behavioral differences observed within the genus *Tympanuchus* may result from sexual selection.

Reports of hybridization between the lesser prairie-chicken and other species in the genus *Tympanuchus* are rare (U.S. Fish and Wildlife Service 2002). In captivity, crosses between lesser prairie-chickens and greater prairie-chickens (*T. cupido pinnatus*) have produced fertile offspring (Crawford 1978). In recent years, traditional display sites (leks) with both lesser and greater prairie-chicken males have been observed north of the Arkansas River in western Kansas during the breeding season. Behavioral observations indicate that some males exhibit courtship behaviors and vocalizations intermediate between the two species, and recent hybridization has been confirmed (U.S. Fish and Wildlife Service 2002). Lesser prairie-chickens may be confused with greater prairie-chickens in areas where the two species overlap (primarily in Wallace, Logan, Gove, Trego, Scott, Lane, and Ness counties in western Kansas).

Distribution and abundance

Historical and current global distribution and abundance

The lesser prairie-chicken is endemic to the xeric grasslands of the southern Great Plains of North America (**Figure 2**; Giesen 1994a, Giesen 1998, Mote et al. 1998, Hagen et al. 2004). Few records exist to verify the historical distribution of lesser prairie-chickens prior to European settlement because the geographic region that is generally regarded as historical range (southeastern Colorado, southwestern Kansas, western Oklahoma, northern Texas, and eastern New Mexico) was largely unexplored during the 1800s (Aldrich and Duvall 1955, Sharpe 1968). The first expeditions to explore Colorado tended to bypass the southeastern part of the state (Rockwell 1908), and it was not until 1914 that lesser prairie-chickens were recorded officially from Baca County (Lincoln 1918). In Kansas and Oklahoma, the area south of the Arkansas River was considered "Indian Territory" or "No Man's Land" and was not officially opened for settlement until the late 1890s (Copelin 1959). At that time, settlement occurred rapidly, and the landscape changed "... almost before the species [lesser prairie-chicken] was described" (Sharpe 1968:40). Early records from Texas indicate that the historical range of the lesser prairie-chicken included the High and Rolling Plains in the panhandle part of the state (Jackson and DeArment 1963, Litton 1978). However, it has been suggested that "... even during the time of wide distribution, the lesser prairie-chicken may have been only a winter migrant in the southernmost part of its range in Texas." (Jackson and DeArment 1963:733). In eastern New Mexico, the lesser prairie-chicken is believed to have inhabited the area from Union County south to the New Mexico-Texas border (Bailey 1928, Sands 1968). Lesser prairie-chickens were reported in New Mexico first in 1854 when Capt. Chas L. Taplin mentioned in his notes that "prairie chickens" were numerous in the area northeast of the confluence of the Delaware and Pecos rivers in present

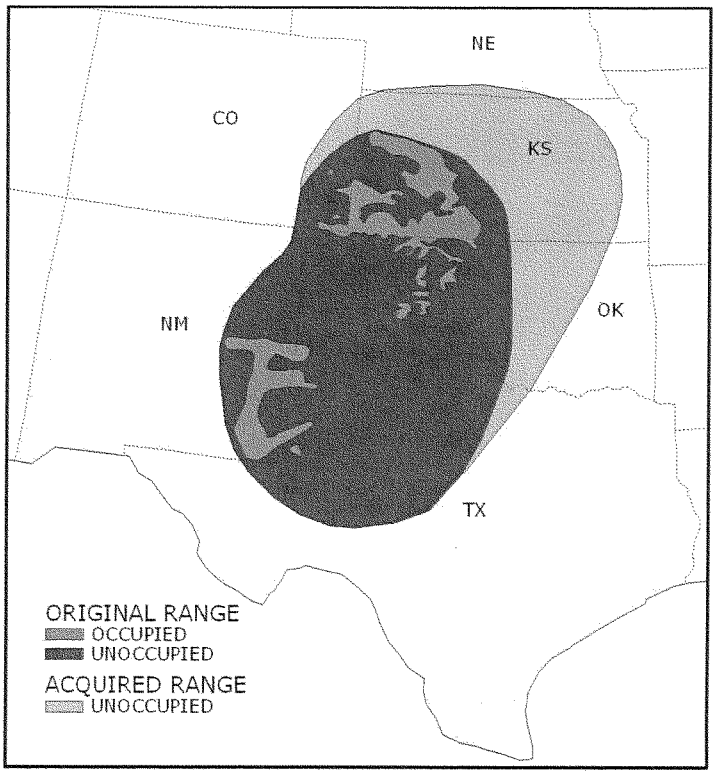

Figure 2. Original (pre-European settlement), acquired, and current distribution of lesser prairie-chickens in North America (based on Mote et al. 1998, Silvy and Hagen 2004).

day southeastern Eddy County (Bailey 1928). The type specimens for the lesser prairie-chicken were collected during this same expedition from the Staked Plains region by Capt. John Pope in 1854 near the Clear Fork of the Brazos River (Bailey 1928, citing Pope's diary).

Several references document the presence of lesser prairie-chickens in areas generally considered outside their historical range (Sharpe 1968). Bendire (1892, quoting William Lloyd) mentions birds observed in Concho County, and along the Middle Concho River in Tom Green County, Texas, and Bent (1932) noted winter flocks near Carlsbad, New Mexico. The eastern-most record of lesser prairie-chickens comes from Lawrence (1877:52), who identified specimens of lesser prairie-chickens that had been shipped from Pierce City, southwestern Missouri for sale in the Fulton Market, New York City: "... I got two in good condition. On examination they agreed accurately with Mr. Ridgway's description ... All I talked with said they had not noticed them before this winter." Although Lawrence likely identified these specimens correctly, it is not known if they were harvested in Missouri or brought in from elsewhere and simply shipped out of Pierce City (Sharpe 1968, Giesen 1998).

In Kansas, reports of lesser prairie-chickens outside their historical range also tend to occur during winter (Baker 1953). For instance, lesser prairie-chickens were shot as far east as Neosho County during December 1878 and January 1879, in Anderson County during January 1894, and in northern Logan County during January 1921 (Bent 1932, Baker 1953). Bent (1932) mentions anecdotal reports of lesser prairie-chickens in Nebraska, and Sharpe (1968) describes specimens of lesser prairie-chickens that were collected near Danbury, Red Willow County, Nebraska during the 1920s. Although Bailey and Niedrach (1965) considered the lesser prairie-chicken a former resident of the grassland areas of Nebraska, Sharpe (1968) believed that the occurrence of lesser prairie-chickens in that state represented a short-lived range expansion following settlement and the introduction of agriculture.

The distribution of lesser prairie-chickens during the 1800s is difficult to estimate because most observers at that time did not differentiate between the lesser prairie-chicken and the greater prairie-chicken, in part, because the two species are similar in appearance and the lesser prairie-chicken was not recognized as a distinct species until 1885 (Baker 1953, Sharpe 1968). It is accepted generally that during the late 1800s and early 1900s lesser prairie-chickens were abundant throughout their historical five-state range (Bent 1932, Sands 1968, Crawford 1980). Bent (1932: 280) describes the lesser prairie-chicken as "... still to be found in fair numbers in its restricted range, where it is protected, or not disturbed." Although there is no documented evidence of lesser prairie-chickens in Colorado prior to the 1900s (Giesen 2000), Bailey and Niedrach (1965:268) state that they were "... once fairly common in southeastern Colorado." In Kansas, they were reportedly abundant throughout their range until the dust bowl years of the 1930s (Baker 1953). Litton (1978) estimated that the population of lesser prairie-chickens in Texas may have been as high as two million birds prior to the 1900s. Judd (1905:20) mentions that "... one man shipped 20,000 of them from [Wheeler County, Texas] in a single season." Precise estimates of the historical abundance of lesser prairie-chickens in New Mexico and Oklahoma are unknown (Bailey and Williams 2000, Horton 2000).

The geographic distribution of the lesser prairie-chicken during the 1800s is estimated to have encompassed 358,000 km^2 (Taylor and Guthery 1980a, based on Aldrich 1963). By 1969 this area had been reduced to 125,000 km^2, and by 1980 27,300 km^2 of occupied habitat remained, representing a 78 percent decrease in the distribution of the lesser prairie-chicken since 1963, and a 92 percent decrease since historical times (**Figure 2**; Taylor and Guthery 1980a). Throughout their geographic distribution, lesser prairie-chicken numbers have declined an estimated 97 percent since the 1800s (Giesen 1998, Mote et al. 1998, Hagen et al. 2004).

Historical records of population numbers are rare but suggest that during the early decades of the twentieth century lesser prairie-chickens were relatively common within their five-state range (Sands 1968, Crawford 1980). However, as early as 1909 there was concern in Oklahoma regarding decreasing numbers of birds in the western part of the state (non peer-reviewed report, Duck and Fletcher 1944). During the 1930s, populations were nearly extirpated in Colorado, Kansas, and New Mexico, and markedly declined in Oklahoma and Texas (Baker 1953, Crawford 1980). Although accurate estimates are lacking, populations are believed to have fluctuated range-wide through the 1940s and 1950s. Populations modestly increased through the 1980s but appeared to decline again during the 1990s (based on total number of leks and number of males/lek; Mote et al. 1998). Survey data collected during the past four decades indicate that populations have declined in Oklahoma, New Mexico, and Texas, remained somewhat stable in Colorado (since the 1980s), and possibly have increased in Kansas in recent years (U.S. Fish and Wildlife Service 2002).

Conversion of native grassland for production of row crops is believed to be largely responsible for the range-wide decrease in occupied habitat. The current geographic range of the lesser prairie-chicken includes the extreme southeastern part of Colorado including Baca, Prowers, Kiowa, and Cheyenne counties (Giesen 2000); southwestern Kansas from the Oklahoma border north to Wallace and Ellis counties, and east to Ellis, Stafford, and Barber counties (Jensen et al. 2000); the panhandle and western Oklahoma including isolated parts of Cimarron, Texas, Beaver, Harper, Ellis, Roger Mills, Woods, and Woodward counties (Horton 2000); southeastern New Mexico including parts of Curry, Roosevelt, De Baca, Chaves, and Lea counties (Bailey and Williams 2000, Massey 2001); and the panhandle of Texas in parts of Lipscomb, Hemphill, Wheeler, Gray, Donley, Collingsworth, Bailey, Cochran, Yokum, and Terry counties (Sullivan et al. 2000). Because of the infrequent observations of birds and the small number of regular surveys, no accurate distribution maps are available based on Breeding Bird Surveys or Audubon Christmas Bird Counts.

Concurrent with the decrease in occupied range, numbers of lesser prairie-chickens have declined at least 90 percent since the 1800s (Mote et al 1998, Hagen et al. 2004). In 1980, the range-wide population was estimated to be between 44,000 and 53,000 birds (U.S. Fish and Wildlife Service 1998). Recent population estimates for the lesser prairie-chicken are 800 to 1,000 in Colorado and 20,000 to 31,000 in Kansas (U.S. Fish and Wildlife Service 2002). Rich et al. (2004) estimated the range-wide population to be 32,000. Current density estimates indicate that the number of leks per area is variable: 0.1 to 0.2 leks per km^2 in Colorado (Giesen 2000); 1.8 to 2.1 leks per km^2 in Kansas; <0.1 to 0.1 leks per km^2 in Oklahoma; and 0.1 leks per km^2 in New Mexico (U.S. Fish and Wildlife Service 2002). Although actual numbers of the overall breeding population are unknown, most individual populations are believed to be less than 1,000 individuals (Storch 2000).

Historical and current distribution and abundance in Colorado

Documentation of the historical distribution and abundance of lesser prairie-chickens prior to 1900 is lacking, but it is possible that suitable habitat in southeastern Colorado supported populations before settlement by people of European descent (Giesen 2000). Bailey and Niedrach (1965:268) reported that lesser prairie-chickens were common in southeastern Colorado "... when the unbroken grasslands stretched from horizon to horizon...". Populations are believed to have been greatest within occupied range south of the Arkansas River (Hoffman 1963). Nevertheless, Cooke (1897) did not include the lesser prairie-chicken in his review of the bird species in Colorado. However, at this time only two ornithologists had explored the eastern part of Colorado from Pueblo to the Kansas border. One of these men, Captain P. M. Thorne, lived in Fort Lyon, Colorado along the Arkansas River, well within the established historic distribution of the lesser prairie-chicken (Aldrich and Duvall 1955). Although he shot and recorded approximately 160 bird species during a 5-year period, none were the lesser prairie-chicken (Cooke 1897). The first recorded lesser prairie-chicken in Colorado was collected in 1914 in Baca County by Frederick C. Lincoln, who also collected specimens during 1916 near Holly in neighboring Prowers County (Lincoln 1918). Bailey (Bailey and Niedrach 1965: 268) collected lesser prairie-chickens in 1923 in Baca County. At that time he described the countryside as "... rolling, unbroken land, with waving bluestem grass [*Andropogon* spp.] waist high in the swales, and yucca [*Yucca* spp.] and wormwood [*Artemisia* spp.] on knolls..." Bailey went on to write that "...soon after, extensive cultivation and successive seasons of drouth caused the destruction of the grasslands, resulting in the virtual extirpation of the species [lesser prairie-chicken] from the state."

Early reports suggest that lesser prairie-chickens occurred in suitable sand sagebrush (*Artemisia filifolia*) and mixed grass habitats in southeastern Colorado including Baca, Prowers, Bent, Kiowa, Lincoln, and Cheyenne counties (Hoffman 1963, Giesen 2000). Giesen (2000) suggested that the drought of the 1930s, heavy grazing of rangeland, and conversion of native habitat for production of row crops resulted in a significant reduction and fragmentation of the lesser prairie-chicken distribution in the state. Many of the mixed-grass plant communities were converted to shortgrass prairie (mixed prairie maintained by grazing as a shortgrass disclimax) and farmland, which provided less favorable cover for lesser prairie-chickens (Hoffman 1963).

Little was known about the status of lesser prairie-chicken populations until 1959, when the Colorado Division of Wildlife located a small resident population in Baca and Prowers counties and began surveys of historic and active lek sites (Hoffman 1963). During the 1960s lesser prairie-chickens were considered rare in the state (Hoffman 1963), and in 1973 they were officially listed as threatened (Giesen 1998).

Although some lek sites were monitored during the 1960s and 1970s, systematic surveys of lesser prairie-chicken populations throughout the state were not begun by the Colorado Division of Wildlife until 1980 (Giesen 2000). The total autumn population in 1979 was an estimated 400 to 500 individuals (Crawford 1980). In 1980, two populations of lesser prairie-chickens were known to reside in Prowers (2 leks) and Baca (20 leks) counties (Taylor and Guthery 1980a). Survey efforts by the Colorado Division of Wildlife were intensified during the 1980s, when the breeding population is believed to have peaked at 1,000 to 2,000 birds (Giesen 2000). By the late 1980s, the breeding population was known to be distributed in Baca, Prowers, and Kiowa counties (Giesen 1994a). Fewer than 50 leks were known to exist during the early 1990s (Andrews and Righter 1992). By the mid-1990s, the known distribution of lesser prairie-chickens included small populations in southeastern Baca County (primarily on the Comanche National Grasslands), in Baca County southeast of Springfield, and in Prowers and Kiowa counties (Giesen 1994a). The Colorado Division of Wildlife estimated a total population of 800 to 1,000 lesser prairie-chickens in the state in 1997

(U.S. Fish and Wildlife Service 2002). A small isolated population of birds was discovered on private land in Cheyenne County in 1998.

The total population was still estimated to be less than 1,500 breeding individuals in 2000 (Giesen 2000). Survey data collected during 2000 indicated the presence of 317 birds on 27 lek sites (U.S. Fish and Wildlife Service 2001). During 2001, 298 lesser prairie-chickens were counted on a total of 30 leks, a decrease of 6 percent from the previous year (U.S. Fish and Wildlife Service 2002). In general, survey data collected by the Colorado Division of Wildlife from the 1950s to present suggest that the abundance of lesser prairie-chickens in the state has remained relatively stable, or has increased slightly, in recent decades (Giesen 2000). Currently, isolated populations of lesser prairie-chickens occur on private and public land in Baca, Prowers, Kiowa, and Cheyenne counties (Giesen 2000). The core population of lesser prairie-chickens in the state occurs east of Campo on the Comanche National Grassland (Giesen 1994a). In recent years there has been a downward trend for lesser prairie-chicken populations on the Comanche National Grassland (USDA Forest Service 2003).

Historical and current distribution and abundance in Kansas

The historical distribution of the lesser prairie-chicken in Kansas is difficult to determine due to the fact that early observers often confused it with the greater prairie-chicken (Baker 1953). Schwilling (1955) examined available records and estimated that the original range included 39 counties in the southwestern quarter of the state, from the Oklahoma border, north to the Smoky Hill River, and east to Harper and Kingman counties. Colvin (non peer-reviewed report in 1914) describes 15,000 to 20,000 lesser prairie-chickens feeding in grain fields in Seward County during the autumn of 1904, and in neighboring Meade County residents were known to harvest lesser prairie-chickens in place of domestic poultry (Baker 1953). Schwilling (1955:5) believed they were found originally in "... moderate numbers", and Baker (1953:8) reported that birds were "abundant" prior to the 1930s. Populations declined, and lesser prairie-chickens were nearly extirpated from Kansas during the dust bowl years of the 1930s as heavy grazing of rangeland, coupled with several years of drought, reduced available food and cover (Baker 1953). During this time, many of the tallgrass prairie communities were eliminated and replaced with shortgrass prairie (Baker 1953). Additionally, conversion of native grasslands for production of row crops reduced much of the available habitat (Crawford 1980). Although lesser prairie-chickens reportedly nested in Graham County sometime prior to the 1950s, verified documentation is lacking (Baker 1953, Schwilling 1955). A survey by the Kansas Forestry, Fish, and Game Commission in 1950 determined that lesser prairie-chickens were resident in 14 counties in the southwestern part of the state, primarily south of the Arkansas and Cimarron rivers, from Morton County north to extreme southwestern Greeley County, east to southern Pawnee County, and south to southwestern Comanche County (Baker 1953). By 1963 the distribution was largely restricted to areas near the Cimarron and Arkansas rivers, and populations were most abundant in Morton, Kearny, and Finney counties (Taylor and Guthery 1980a, Horak 1985).

The lesser prairie-chicken population in Kansas was estimated at 10,000 to 15,000 individuals during the late 1960s (Sands 1968). During the 1970s the range of lesser prairie-chickens in the state extended from Hamilton, Stanton, and Morton counties east to Reno, Kingman, and Harper counties (Taylor and Guthery 1980a). The population was estimated at 17,000 to 18,000 individuals during the autumn of 1979 (Crawford 1980, Taylor and Guthery 1980a). In some Kansas counties, significant population declines occurred in concert with the conversion of native habitat to center-pivot irrigated cropland (Jamison 2000). Lek survey data (number of leks per survey route and number of males per lek) examined for 1964 through 1998 indicate a general downward trend in lesser prairie-chicken numbers throughout their statewide distribution (Applegate and Riley 1998, Jensen et al. 2000). Similarly, in recent years there has been a downward trend in lesser prairie-chicken populations on the Cimarron National Grassland (USDA Forest Service 2003).

The Conservation Reserve Program (CRP) is a federal program initiated in the mid-1980s to conserve water, soil, and wildlife resources by paying farmers to plant and maintain perennial cover crops of grasses, forbs, and shrubs. CRP is believed to have provided increased residual cover for lesser prairie-chickens in recent years, and 165 "new" lek sites have been located in 16 counties north of the Arkansas River since 1997 (U.S. Fish and Wildlife Service 2002). CRP in Kansas is noteworthy because of special efforts to plant native grasses and to inter-seed with forbs. Survey efforts by the Kansas Department of Wildlife and Parks indicate that lesser prairie-chickens currently occupy 31 of the original 39 counties assumed to comprise its historical distribution; the previous estimate of occupation was

only 19 of 39 counties (Jensen et al. 2000). The latest population estimate is 20,000 to 31,000 birds (U.S. Fish and Wildlife Service 2002). Although Jensen et al. (2000) hypothesized that population increases observed on a local scale may reflect use of shrinking habitat patches, the apparent expansion in occupied habitat suggests that these trend observations are real.

Discontinuities in regional distribution

Several sources of information can be used to evaluate discontinuities in the distribution of lesser prairie-chickens. For instance, surveys of lesser prairie-chickens in Region 2 have helped identify where birds occur (Applegate 2000). Additionally, research on lesser prairie-chicken behavior suggests that most dispersal/ seasonal movements are <10 km (Copelin 1963, Giesen 1998), but perhaps up to 44 km in a fragmented landscape (Jamison 2000). Information on habitat use by lesser prairie-chickens (Taylor and Guthery 1980a, Giesen 1998, Mote et al. 1998) and the distribution of suitable habitats throughout Region 2 may be used to evaluate populations that are isolated and/or if movement corridors are limited. Our understanding of the current distribution pattern of lesser prairie-chickens (**Figure 2**) suggests that lesser prairie-chickens may be relatively continuously distributed within Kansas while populations in Colorado (Kiowa and Cheyenne counties) are relatively small, fragmented, and isolated. Although the distribution of lesser prairie-chickens in Prowers and Baca counties is believed to be continuous with lesser prairie-chicken range in Kansas and Oklahoma respectively, populations in this portion of Kansas have themselves become fragmented. Thus connectivity with populations outside of Colorado may be an important factor in developing long-term conservation strategies.

In Kansas, lesser prairie-chickens have recently expanded their distribution north of the Arkansas River, but the CRP lands believed responsible for the increased range and number of birds are inherently ephemeral, suggesting that populations in the expanded range may be unstable. Continuity of populations of lesser prairie-chickens may be over-estimated in Kansas, in part because large populations tend to be sub-sampled while small populations tend to be completely counted. Hence, it is possible that the populations in Kansas may not be as continuous as they are represented. Improvements in the quality of distribution data, as well as dispersal/movement data are needed to highlight areas where population isolation may be a problem in Region 2. Understanding factors that influence habitat use (quality, configuration, juxtaposition, fragmentation, patch size) also are important.

Activity patterns and movements

Circadian

Lesser prairie-chickens roost at night and feed during the day. Jones (1964a) reported two main feeding periods, morning and evening. Broods are more variable and may forage throughout the day, but feeding is most common in the morning and evening (Giesen 1998). Crawford and Bolen (1973) recorded male lesser prairie-chickens regularly making short visits to stock ponds during March and April, usually 1 to 3 hours after sunrise and 1 to 3 hours before sunset. Courtship activity primarily occurs during morning and evening hours (Hjorth 1970). During relatively warm weather in the middle of the day, birds often rest or loaf; during the spring males may loaf on leks (Hjorth 1970) and during summer birds may loaf in the shade of oak (*Quercus* spp.) motts or clumps of bunchgrass (Schwilling 1955, Copelin 1963, Jackson and DeArment 1963, Donaldson 1969).

Like other species of prairie grouse, lesser prairie-chickens spend most of their time on the ground but commonly fly when disturbed, and between foraging, breeding, loafing/roosting areas, and water sources (Giesen 1998). Most flights are <1 km although birds are capable of flying further (Giesen 1998). Copelin (1963: 43) observed that birds flushed by a raptor generally flew "... a fourth to a half mile or more away".

Winter season

Lesser prairie-chickens tend to form flocks during winter (Giesen 1998), but little is known about flock stability or behavior. Schwilling (1955) reported the occurrence of winter flocks in southwestern Kansas from early October to February. He observed small flocks of 10 to 15 birds but noted that flock size tended to increase with snow and cold temperatures. During the relatively mild winter of 1954-55, flocks were usually less than 50 individuals. In contrast, the winter of 1951-52 was particularly severe, and flocks of up to 500 lesser prairie-chickens were observed. Similarly, Copelin (1963) working in Oklahoma noted that as the weather became colder, the number of birds in flocks increased. Flocks of 15 to 80 individuals have been recorded in New Mexico during autumn/early winter (Ahlborn 1980).

Daily movements of lesser prairie-chickens tend to increase through autumn and winter and decrease in late winter/early spring (Taylor and Guthery 1980b, Jamison 2000). The increase in daily movements

by birds in Texas coincided with the cessation of the autumn display period and the increased use of sunflower fields as foraging areas. Juvenile males moved the farthest (from the lek where captured), especially during November and December (Taylor and Guthery 1980b). Similarly, Campbell (1972) examined hunter recoveries of banded male lesser prairie-chickens from October through December in New Mexico and found that juvenile males moved an average 8.8 km (n = 9, range 0.4 to 21.0 km) from their lek of capture while adult males moved 3.4 km (n = 4, range 0.5 to 4 km). In general, most birds remain relatively close to lek sites during winter. In Texas 79 to 100 percent of locations of 19 radio-marked individuals were within 3.2 km of their lek of capture (Taylor and Guthery 1980b). In Oklahoma, Copelin (1963) observed 114 banded lesser prairie-chickens, 79 percent of which were within 3.2 km of their capture location and 97 percent of which were within 6.4 km. However, in New Mexico, Ahlborn (1980) monitored 15 radio-marked lesser prairie-chickens, and by early winter 11 birds had moved on average 11.0 km (range 1.6 to 21.1 km) to grain fields; distances moved were similar for adult (average = 11.6 km, n = 6) and juvenile birds (average = 10.2 km, n = 5).

Home range size of adult males in Texas averaged 365 ha (n = 4) during November and decreased to 50 ha (n = 1) by February (Taylor and Guthery 1980b). Home range size of one adult female was 308 ha during January and then decreased to 62 ha in February. The autumn/winter home range size of four lesser prairie-chickens monitored in New Mexico averaged 298 ha (Candelaria 1979). Home range size of male lesser prairie-chickens (age classes combined) in Kansas was largest during October (average = 433 ha, n = 23; Jamison 2000).

Spring season

During early spring, male lesser prairie-chickens begin to congregate on breeding areas termed leks (Giesen 1998). Median home range of males ranged from 12 to 140 ha during April and May in southwestern Kansas (Jamison 2000).

In New Mexico, pre-nesting home range (measured from time of capture on lek to nest initiation) averaged 63 – 231 ha (n = 66; Merchant 1982, Riley et al. 1994) and was noted to increase during drought conditions (average = 122 ha during drought conditions [n = 18] vs. average = 63 ha at other times [n = 8]); Merchant 1982). Daily movements of 40 female lesser prairie-chickens during the pre-nesting period averaged 390 m per day in New Mexico (Riley et al. 1994) and home range averaged 231 ha (Candelaria 1979). Haukos (1988) recorded daily movements of 0.1 to >6 km (n = 55) by females during the breeding and pre-incubation periods; he attributed the larger distances to inter-lek movements.

Females initiate laying their first clutch 1 to 2 weeks after copulation and usually lay one egg per day with occasional skips of 1 day. Incubation of the clutch begins when the last egg is laid and usually lasts for 24 to 26 days (Giesen 1998). When females commence incubation, daily movements decrease and are restricted to feeding forays, often <30 minutes duration and usually 0.3 km from the nest site (Sell 1979, Giesen 1998). Incubation recesses typically occur during early morning and evening hours (Sell 1979, Giesen 1998). Females are able to initiate a second nest following destruction or abandonment of their first clutch, and replacement clutches usually are laid within 2 weeks of nest loss (Giesen 1998). In New Mexico, home range size of nesting females ranged from 9 to 92 ha (n = 33; Merchant 1982, Riley et al. 1994); daily movements averaged 250 m per day (n = 12; Riley et al. 1994).

Summer season

Home range size and daily movements tend to be less during the summer than at other times of year. Spring/summer home range size in Colorado was smaller for males (211 ha, n = 19) than females (596 ha, n = 14) primarily because males remained close to their leks (Giesen 1998). Males often loaf and/or rest near leks during summer, and although occasional courtship behavior is observed, no breeding activity takes place (Jones 1964a, Giesen 1998). During late summer, birds may make daily trips to obtain water (Jones 1964a), but the necessity of this activity is unclear. Home range size may increase in years of drought, possibly because of reduced cover and availability of insect food. The average home range size of female lesser prairie-chickens was 174 ha (n = 7) during a year of normal precipitation, compared to 464 ha (n = 8) in a drought year (Merchant 1982). Home range size of broods averaged 47 ha in New Mexico during a year of normal precipitation (Ahlborn 1980). Copelin (1963) recorded a home range size of at least 104 ha for one brood in Oklahoma during a dry summer.

Females with broods tend to have larger home ranges and more extensive daily movements than unsuccessful females without broods (Riley et al. 1994). Home range size averaged 119 ha (n = 3), and daily movements averaged 280 m per day (n = 3) for

brood females; home range size averaged 73 ha (n = 19) and daily movements 220 m per day (n = 19) for unsuccessful females (Riley et al. 1994). Broods tend to feed most in the morning and evening, and during hot weather they may loaf in the shade of oak motts or clumps of bunchgrass in midday (Schwilling 1955, Copelin 1963, Jackson and DeArment 1963, Donaldson 1969). Daily brood movements may increase as the chicks age; in southwestern Kansas, movements averaged 248 m per day (n = 14, range 195 - 434 m) for broods less than 14 days of age and 320 m per day (n = 8, range 186 - 658 m) for broods 14 to 60 days of age (Jamison 2000). Broods of different ages sometimes combine during late summer (Copelin 1963).

Autumn season

Chicks are able to fly short distances at 2 weeks of age and are independent at 12 to 15 weeks of age (Giesen 1998). Little published information is available regarding aspects of brood break-up or the autumn phase of dispersal. Taylor and Guthery (1980c) had one of four radio-tagged juvenile males move 12.8 km in 5 days during early December; they suggested that this movement represented a dispersal movement. Copelin (1963) observed three juveniles on lek sites during autumn approximately 0.9, 1.1, and 3.2 km, respectively, from their place of capture (assumed brood territory).

Males sometimes visit lek sites in autumn and exhibit courtship behavior, but the display is less frequent and less intense than during spring and no breeding occurs (Copelin 1963). In Oklahoma, small flocks of juveniles visited lek sites in late September (suggesting that brood break up had begun at this time), and females occasionally visited lek sites during October and November (Copelin 1963).

Broad-scale movement patterns

Bent (1932:280) believed that the lesser prairie-chicken was a migratory species, breeding in the northern part of its historical distribution and wintering in the south, primarily central Texas. He did not have any information regarding the seasonal movement of birds between these areas but noted "... comparatively little seems to be known and still less has been published on the habits and distribution of the small, light-colored, lesser prairie chicken ...". Sharpe (1968) noted that many observations outside the normal range occurred during winter months, and he suggested they may have represented individuals searching for a winter food source. Jackson and DeArmént (1963) considered the lesser prairie-chicken a winter migrant in the southernmost part of its historical range in Texas, but Taylor and Guthery (1980a) argued that the distribution of suitable habitat in these areas suggested that these birds most likely were residents.

In general, there is little documentation of historical movement patterns of lesser prairie-chickens, and it is unknown if large-scale migration movements occurred. Existing lesser prairie-chicken populations are not known to migrate between breeding and winter areas (Giesen 1998). However, individuals are capable of, and do make, long distance movements; one female captured in Kansas and released in Colorado traveled approximately 300 km that same year back to Kansas (Giesen 1998). Lesser prairie-chickens make seasonal movements between breeding and wintering areas, but most movements are restricted to suitable habitat within a radius of 3 - 4 km from the lek they use (Taylor and Guthery 1980a, Giesen 1998). Many aspects of seasonal patterns of movement are not understood clearly.

Population connectivity

There are no natural barriers impeding the connectivity of lesser prairie-chicken populations throughout most of their range. However, alteration of habitat through loss, fragmentation, and degradation (**Figure 3** and **Figure 4**) clearly has created large areas uninhabited by lesser prairie-chickens (**Figure 2**). Many of these ecological barriers appear to be large enough to prohibit or slow the frequency of movements by lesser prairie-chickens between patches of habitat and between populations. For instance, populations in Kiowa and Cheyenne counties, Colorado are small, with <100 birds each, and they are isolated by at least 20 km from other populations within and outside the state (Giesen 2000). Although lesser prairie-chickens in Prowers and Baca counties are believed to be contiguous with populations in Oklahoma and Kansas, respectively, the populations in these states also have become fragmented (Giesen 1994a). The lesser prairie-chickens in southwestern Kansas may have a more contiguous distribution, but the habitat in the border areas with Colorado is fragmented. It is not currently known how fragmentation influences the demographics of lesser prairie-chicken populations (Jensen et al. 2000).

Habitat

Regional habitat

The geographic distribution of the lesser prairie-chicken in Region 2 includes two main ecoregions.

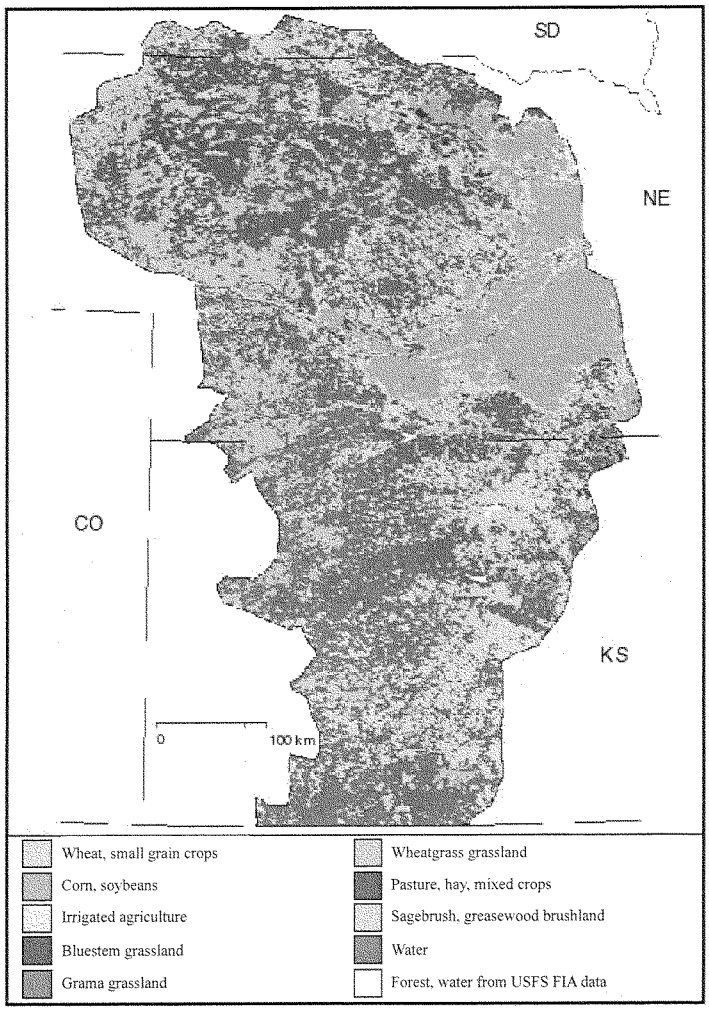

Figure 3. Distribution of major cover types in the Central Mixed Grass Prairie physiographic area as estimated mostly with 1990 U.S. Geological Survey data and provided by Partners in Flight (http://www.cast.uark.edu/pif/gif/34.nfor.gif, December 1, 2004).

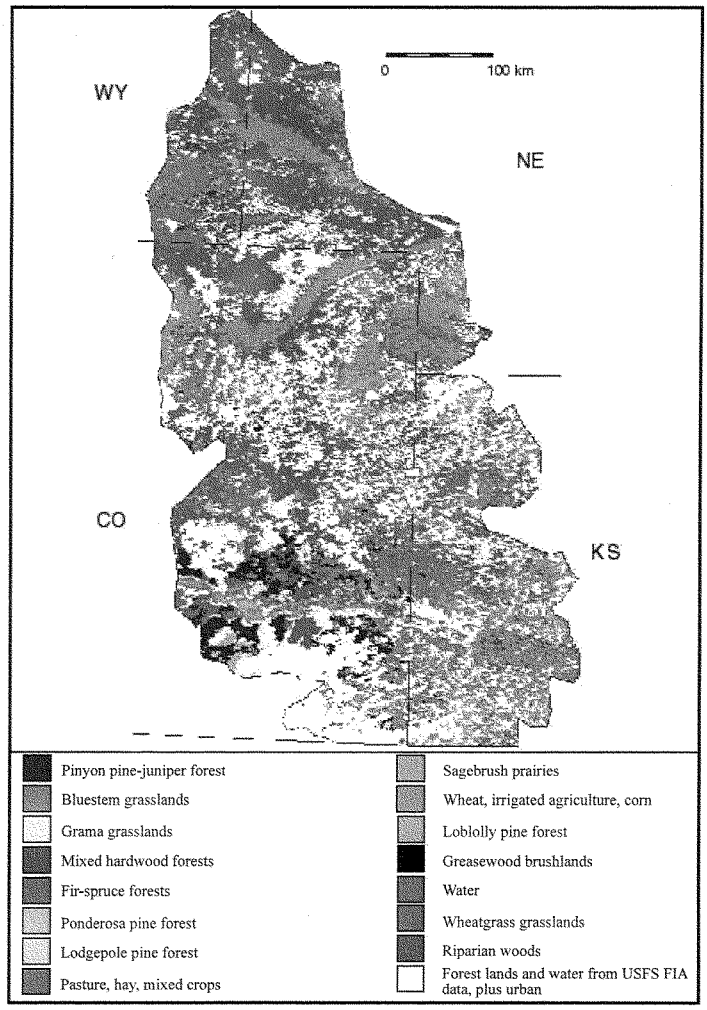

Figure 4. Distribution of major cover types in the Central Short Grass Prairie physiographic area as estimated mostly with 1990 U.S. Geological Survey data and provided by Partners in Flight (http://www.cast.uark.edu/pif/gif/36.nfor.gif, December 1, 2004).

The Great Plains-Dry Steppe Province Ecoregion of southeastern Colorado and southwestern Kansas is characterized by rolling plains and tablelands, shortgrass prairie, and Mollisol soils with a high level of precipitated calcium carbonate and low humus content (http://www.fs.fed.us/r2/nebraska/gpng/matrix/ecoregions.html). Most precipitation occurs during the summer months, but evaporation often exceeds precipitation, resulting in low moisture levels. Average annual temperature is 7 °C but may reach 16 °C in the southern reaches. The Great Plains Steppe Province Ecoregion of southwestern and south-central Kansas is characterized by flat and rolling plains, mixed-grass steppe vegetation, and, generally, Mollisol soils. Annual precipitation levels range from 51 to 64 cm, and average annual temperature is 15 °C. The western boundary of this ecoregion shifts with changes in precipitation. Dry periods favor the dominance of short grasses, resulting in a boundary shift to the east; during wet years tall grasses are favored, and the boundary shifts west.

The regional distribution of current suitable habitat can be illustrated for major portions of the lesser prairie-chicken range in Region 2 using the physiographic areas as defined by the U.S. Geological Survey for Partners in Flight. Although these physiographic regions were defined, in part, from data provided by Breeding Bird Surveys, they illustrate the distribution of major habitat types that are relevant to lesser prairie-chickens. The two primary physiographic areas in Region 2 include the Central Mixed-grass Prairie (**Figure 3**) and the Central Shortgrass Prairie (**Figure 4**.); only small portion of the New Mexico Mesa and Plains is in Colorado. General habitat categories are quantified in **Table 1**.

Lesser prairie-chickens are endemic to the xeric grasslands of the southwestern Great Plains. Historical habitat of the lesser prairie-chicken is poorly documented but is believed to have coincided with the sand sagebrush-bluestem and shinnery oak (*Quercus havardii*)-bluestem vegetation associations described by Kuchler (1964) and Taylor and Guthery (1980a). Currently, throughout their range lesser prairie-chickens occur in mixed-grass dwarf-shrub vegetation associations, usually found on sandy soils. Two main habitat associations are used: 1) sand sagebrush dominated rangelands in Colorado, Kansas, and parts of Oklahoma (**Figure 5**), and 2) shinnery oak-bluestem plant communities in Oklahoma, Texas, and New Mexico (**Figure 6**; Taylor and Guthery 1980a, Giesen 1998, Mote et al. 1998). Bidwell et al. (1995) describes lesser prairie-chicken habitat as savanna-type vegetation created by the interspersion of shrub and grass cover.

In Region 2, outside of CRP-dominated areas, lesser prairie-chickens use sand sagebrush communities with mixed bunchgrasses, primarily sand dropseed (*Sporobolus cryptandrus*), red threeawn (*Aristida longiseta*), and sideoats grama (*Bouteloua curtipendula*) (Giesen 1998). An interspersed pattern of cover types is believed to be important for supporting the different life history stages of lesser prairie-chickens (Cannon and Knopf 1981a, Bidwell et al. 1995). Jamison (2000) examined habitat selection by males in an area of fragmented sand sagebrush habitat in southwestern Kansas. At the broad scale (approximately 588,452 ha of habitat), lesser prairie-chickens selected sand sagebrush prairie in all months studied, despite the fact that this habitat type comprised only 10 percent of available habitat. At the local scale (home range), males generally selected sand sagebrush prairie throughout the year; at this scale sand sagebrush comprised 57 percent of the available habitat. The presence of Acrididae and total invertebrate biomass also were higher in use than non-use areas during summer (Jamison et al. 2002a). Invertebrate biomass was, in turn, positively associated with abundance of native forbs, leading Jamison et al. (2002a) to suggest that native forbs are important components of habitat quality. In other portions of Region 2, populations of lesser prairie-chickens have been documented in landscapes dominated by crops, short grasses, and CRP lands generally planted to native tall grasses (Jamison 2000).

In Oklahoma, Texas, and New Mexico lesser prairie-chickens often use shinnery oak habitats dominated by mid-tall grasses such as sand bluestem (*Andropogon hallii*), little bluestem (*A. scoparium*), sand dropseed, threeawn, and blue grama (*Bouteloua gracilis*) (Cannon and Knopf 1981a, Giesen 1998). Taylor and Guthery (1980b) monitored 19 radio-marked birds during autumn and winter and concluded

Table 1. Quantity of habitat types in USDA Forest Service Region 2 physiographic regions, as estimated with 1990 U.S. Geological Survey data, and provided by Partners in Flight (http://www.cast.uark.edu/pif/, December 1, 2004).

Physiographic region	Grassland	Shrubland	Cropland	Pasture/hay	Forest	Other	Area (ha)
Central Shortgrass Prairie	77.9%	3.7%	14.5%	0.3%	3.2%	0.4%	17,055.668
Central-mixed Grass Prairie	57.9%	0.0%	40.3%	1.1%	0.5%	0.2%	22,107,300

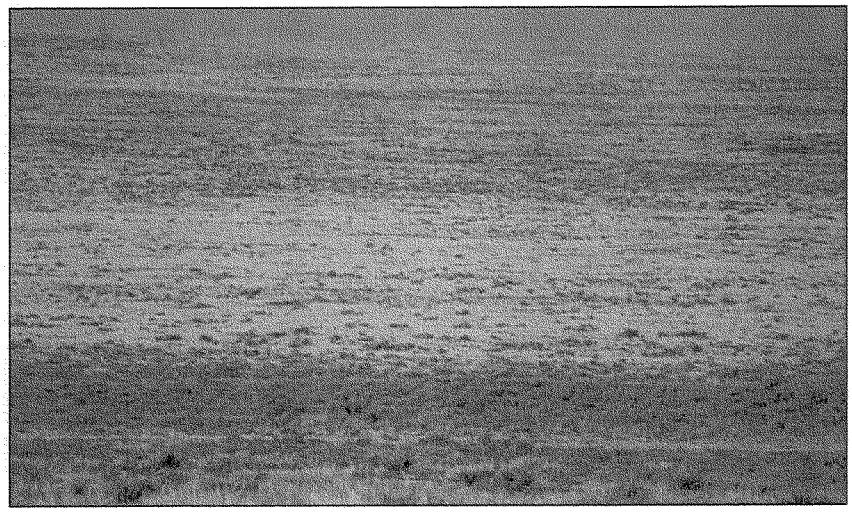

Figure 5. Example of sand sagebrush landscape on the Comanche National Grassland in southeastern Colorado. Photograph by Michael A. Schroeder.

Figure 6. Example of shinnery oak landscape in western Oklahoma. Photograph by Michael A. Schroeder.

that shinnery oak-sand sagebrush, shinnery oak-little bluestem, and sunflower (*Bouteloua* spp.) vegetation types were used more than expected, given their availability on the Texas study area. Winter foraging and roosting sites of eight radio-marked males in New Mexico were almost entirely in High Plains Bluestem Subtype (HPBS) vegetation that was dominated by grasses, 59 to 66 percent (basal composition), especially threeawn (Riley et al. 1993a). Females nested in specific subclasses of HPBS vegetation; nine of 37 (24 percent) nests were located in HPBS-1 that was dominated by sand bluestem (12 percent of the study area), 21 (57 percent) of nests were located in HPBS-2 that was dominated by little bluestem (44 percent of the study area), and seven nests (19 percent) were located in HPBS-3, where grasses and shinnery oak were present in similar amounts (33 percent of the study area) (Riley et al. 1992). Wisdom (1980) noted that 78 percent of nest sites in New Mexico were located in clumps of bluestem grasses, even though these grasses comprised 32 percent of the vegetation. Ahlborn (1980) recorded observations of five radio-marked females with broods and found higher use of sandhill and shinnery oak-midgrass vegetation types than shinnery oak-bluestem, reverted cropland, and shortgrass-snakeweed (*Gutierrezia sarothrae*) habitats in New Mexico.

Habitat in Colorado

The original mixed-grass plant communities within the historical distribution of the lesser prairie-chicken have been replaced with shortgrass communities as a consequence of the replacement of native grazers with domestic cattle, combined with the drought of the 1930s (Hoffman 1963). As a consequence of the replacement of native grazers (especially bison) with domestic cattle, combined with the drought of the 1930s (Hoffman 1963). These shortgrass rangelands are dominated by sand sagebrush and mixed bunchgrasses, primarily sand dropseed, red threeawn, and sideoats grama (Giesen 1994b). Other common plants include small soapweed (*Yucca glauca*), broom snakeweed, western ragweed (*Ambrosia psilostachya*), and Russian thistle (*Salsola kali*) (Giesen 1994b). Average annual precipitation is approximately 40 cm, but because rainfall often comes in the form of thunderstorms, precipitation levels are highly variable throughout the area (Giesen 2000). Grazed rangeland interspersed with occasional cropland is the dominant land use (Giesen 1994b).

Habitat in Kansas

Similar to Colorado, the original habitats that supported lesser prairie-chicken populations in Kansas changed after the drought of the 1930s. Baker (1953: 9) stated "... the residents of southwestern Kansas report that these sandy lands supported stands of tall grasses before the drought of the 1930 - 1940 decade. These grasses were eliminated over wide areas during the drought, and were replaced by sagebrush; to date the grasses have not completely recovered." Currently, lesser prairie-chickens occur in sandy, mixed and shortgrass prairies and occasionally sand prairie habitat in the southwestern part of the state (Mote et al. 1998, Jensen et al. 2000). Populations have also expanded into areas dominated by CRP (Fields 2004). Dominant vegetation in native habitats includes sand sagebrush, blue grama, sideoats grama, paspalum (*Paspalum* spp.), bluestem grasses, western ragweed, sunflowers, and Russian thistle. Other common plants include prickly pear cactus (*Opuntia* spp.) and small soapweed; buffalo-gourd (*Cucurbita foetidissima*) and purple poppy mallow (*Callirhoe* spp.) occur in disturbed areas (Jamison 2000). Soils are generally classed as Tivoli-Vona and are in the choppy sands category. Average annual precipitation is 50 cm. Dominant land use practices include center-pivot irrigated cropland and livestock grazing of rangeland (Jensen et al. 2000).

Lek habitat

Physiognomic features and aspects of plant structure are more important than plant species composition *per se* when evaluating lek site characteristics (Jamison et al. 2002b, Hagen et al. 2004). Lek sites typically are located on ridge tops in open areas, with good visibility, where the vegetation is short or sparse (Davison 1940, Copelin 1963, Jones 1963, Jones 1964a, Sharpe 1968, Donaldson 1969, Ahlborn 1980, Taylor and Guthery 1980a, Applegate and Riley 1998, Giesen 1998). Hjorth (1970:390) observed leks in sand dune fields in Kansas and suggested that "smooth ground" may be relatively more important than elevation. Near agriculture areas, leks may be situated in wheat, bare corn, cut hay, and cultivated fields (Copelin 1963, Crawford and Bolen 1976a, Applegate and Riley 1998). Swales are used occasionally in Oklahoma (Donaldson 1969), and Copelin (1963) noted leks on shortgrass meadows in valleys when sand sagebrush vegetation on nearby ridges was tall and dense. Disturbed areas such as ground-level roads, abandoned oil pads, herbicide

treatment plots, and windmill sites also have been used by lesser prairie-chickens as lek sites (Crawford and Bolen 1976a, Sell 1979, Taylor 1980, Locke 1992).

Vegetation height at lek sites in sand sagebrush grassland in Oklahoma averaged 10 cm (Jones 1963). In Colorado, density of sand sagebrush on nine lek sites averaged 310 plants per ha, with a mean height of 41 cm. Plant species composition included buffalograss (*Buchloe dactyloides*, 20 percent), blue grama (19 percent), red threeawn (17 percent), and sideoats grama (16 percent) (non peer-reviewed report, Giesen 1991). In western Oklahoma, medium-tall grass sites were only used if the vegetation had been mowed or grazed (Donaldson 1969), and in Colorado the taller grasses present on lek sites were kept short by grazing (non peer-reviewed report, Giesen 1991). Donaldson (1969) noted that lek sites where vegetation growth was rapid tended to be abandoned earlier than those with shorter vegetation.

Nest habitat

Female lesser prairie-chickens construct nests that are shallow, bowl-shaped depressions in the substrate that they line with dried leaves, grasses, and feathers (Bailey 1928, Bent 1932, Copelin 1963, Donaldson 1969, Giesen 1998). Nest bowl dimensions average 20 cm wide by 7 to 10 cm deep (Copelin 1963, Sell 1979, Haukos 1988).

Females typically nest in shinnery oak and sand sagebrush dominated grasslands (Giesen 1998, Mote et al. 1998), but in some cases CRP habitats (Fields 2004). Nests tend to be located in areas with high canopy cover, moderate vertical/horizontal cover, and residual vegetation (**Table 2**, **Figure 7**; Haukos and Smith 1989, Giesen 1998, Mote et al. 1998, Pitman 2003). In Colorado, nests often are situated beneath shrubs (69 percent of 29 nests) or in bunchgrasses (31 percent of 29 nests; Giesen 1994b). In shinnery oak grasslands, nests usually are located in areas dominated by tall bunchgrasses, especially bluestems; 30 of 37 nests (81 percent) in New Mexico were located in the High Plains Bluestem Subtype vegetation where sand bluestem and little bluestem were the dominant grasses (Riley et al. 1992). In areas where grasses are reduced by grazing and/or drought, nests may be located in shrub cover (Riley 1978, Merchant 1982).

The mean height and density of vegetation at the nest site typically is greater than the surrounding habitat (Giesen 1998): 43 cm above nest vs. 18 cm within 9 m (n = 37, Wisdom 1980); 42 to 52 cm above nest vs. 29 to 31 cm within 3 m (n = 24, Wilson 1982); 61 cm above nest vs. 29 cm within 9 m (n = 18, Riley 1978). Haukos and Smith (1989) monitored 13 nests in Texas, all of which were situated in cover provided by residual grasses, primarily purple three-awn (*Aristida purpurea*); percent overhead cover and plant height averaged 43 percent and 45 cm. In southeastern Colorado, the average height of the tallest vegetation measured at 29 nest sites was 51 cm (range 29 - 81 cm; non peer-review report, Giesen 1991). Wilson (1982) located nests in shinnery oak grassland and noted that areas with greater vegetation height (average = 34 cm), percent litter (average = 39 percent), and canopy cover (average = 37 percent) were used most commonly. Sell (1979) found increased sand sagebrush structural density and canopy cover at nest sites located in shinnery oak/sand sagebrush grasslands.

Table 2. General habitat characteristics at nesting and brooding-rearing sites for lesser prairie-chickens (adapted from Jamison et al 2002b, Hagen et al. 2004). Region 2 states are in bold.

Location	Nesting habitat			Brood-rearing habitat			Reference
	Shrub	Grass	Forb	Shrub	Grass	Forb	
Colorado	7%	29%	1%				Giesen 1994
Kansas	15%	37%	8%				Pitman 2003
Kansas				17%	26%	11%	Hagen et al. 2004
Oklahoma				23%	8%	16%	Jones 1963
Oklahoma				14%	51%	35%	Donaldson 1969
Texas					42%		Haukos and Smith 1989
Texas	25%	8%	2%				Wilson 1982
New Mexico	46%	46%	8%				Riley et al. 1992
New Mexico				30%	50%	20%	Ahlborn 1980
New Mexico				43%	43%	15%	Riley and Davis 1993

Figure 7. Lesser prairie-chicken nest in southwestern Kansas (Hagen et al. 2004). Photograph by Christian A. Hagen.

Grasses were found to be taller at successful nests (average height = 67 cm, n = 10), than unsuccessful nests (average height = 35 cm, n = 26; Riley et al. 1992). In shinnery oak grasslands, nest success was highest for nests located in sand bluestem cover. Riley et al. (1992) suggested that the large dense clumps formed by this grass species provide effective concealment from predators, as predation accounted for nearly 81 percent of nest loss in their study. Davis et al. (1979) noted more litter and less bare ground at successful than unsuccessful nest sites. Applegate and Riley (1998) considered good nest habitat a mix of 65 percent tallgrasses, 30 percent shrubs (shinnery oak or sand sagebrush), and some forbs. Riley et al. (1992) suggested that high quality nest cover not only offers concealment from predators but also mitigates adverse effects of high temperatures, winds, low relative humidity, and solar radiation. Wisdom (1980) noted that 34 of 37 nests (92 percent) in his study were situated on north-facing or northeast-facing slopes or in relatively small depressions, and high dunes usually were located to the south and west of the nest site offering protection from prevailing winds.

Giesen (1994b) found that nests on the Comanche National Grassland in Colorado were located in shrub cover (69 percent of 29 nests), primarily sand sagebrush (12 of 29 nests), while bunchgrasses provided cover for nine nest sites. Pitman (2003) observed similar tendencies in southwestern Kansas. Nest habitat had greater height of shrubs, forbs, and grasses than the adjacent rangeland, and the height of the tallest vegetation over the nest averaged 51 cm (measurements taken after hatch or nest loss). Density of sand sagebrush cover averaged 3471 plants per ha (range 0 – 12,667). Height-density of nest site vegetation averaged 3.2 dm (range 1.0 – 6.5 dm) vs. 2.0 dm (range 1.0 – 3.4 dm) for adjacent areas. Canopy cover at nest sites averaged 7 percent (range 0 – 36 percent) sand sagebrush, 29 percent (range 9 to 62 percent) grass species, and 1 percent (range 0 – 7 percent) forbs. Vegetation tended to be sparsely distributed; data from intercept transects indicated 70 percent (range 38 to 88 percent) bare ground.

Summer habitat

Most research on greater prairie-chicken broods has determined that brood habitat must be structured so that chicks can travel easily, broods are adequately protected from predators and weather, and the chicks and brood female are provided with the necessary

nutritional requirements (**Table 2**). Similar criteria likely are important for evaluating lesser prairie-chicken brood habitat. Jones (1963) concluded that broods in western Oklahoma used areas dominated by shrub and half-shrub life-forms. Percentage of forbs, especially western ragweed, usually was higher in brood-use areas than habitats used by males and unsuccessful females. In his study, vegetation with a high percentage of forbs consistently had more insects per unit area than other vegetation types; insects are important diet items for chicks and adult birds (see Food Habits section; Jones 1963). Similarly, Jamison et al. (2002a) determined that broods selected areas with high invertebrate biomass, and these areas also had high abundance of native forbs. Donaldson (1969:44) noted that brood foraging areas were "... low in stature and of a rather open aspect...". Brood foraging sites in New Mexico were vegetated sparsely and dominated by shinnery oak and three awn grass species (Riley and Davis 1993). In general, brood sites had less grass and shorter vegetation than nest sites located in the same area. During hot weather, broods loaf in shade provided by moderate to tall vegetation, such as shinnery oak motts, little bluestem, or sand bluestem (Copelin 1963, Jones 1964b). In New Mexico, Ahlborn (1980) found that broods used areas with an open canopy (25 percent coverage), an average vegetation height of 30 cm, a relatively high basal composition of shrubs and forbs, and sparse basal plant cover.

Several studies report lesser prairie-chickens loafing in the shade of small trees or shrubs during hot weather (Copelin 1963, Jones 1964b). Jones (1964b) reported that birds in western Oklahoma often loaf in dwarf half-shrub vegetation (63 percent of observations) such as those dominated by skunkbrush sumac *(Rhus aromatica)*. They are also known to take dust-baths in loose dry soil (Giesen 1998). Small patches of short vegetation, surrounded by taller vegetation, were common sites for night roosts in Oklahoma (Jones 1963). Copelin (1963) located roosting sites in grassed ravines, draws, and on ridges, where the vegetation height did not exceed 1 m; heavily grazed pastures were not used for roosting. Jamison (2000) mentions lesser prairie-chickens roosting in crop fields. Birds roost singly or in small flocks; individual night roosts are spaced from <1 to 6 m apart (Copelin 1963, Jones 1964a).

Autumn and winter habitat

Jones (1963) noted that 59 percent of winter feeding observations were in tallgrass habitat types. In Texas, lesser prairie-chickens increasingly used shinnery oak-sand sagebrush habitat through the winter (Taylor and Guthery 1980b). Various studies report the use of crop fields for feeding areas. Birds used sunflower fields in Texas during December and January (Taylor and Guthery 1980b), sorghum fields during autumn/winter in New Mexico, Oklahoma, and west Texas (Jones 1964b, Crawford and Bolen 1976a, Ahlborn 1980), and corn fields in southwestern Kansas (Jamison 2000). Lesser prairie-chickens may move relatively long distances to agriculture fields. For instance, Ahlborn (1980) recorded 11 of 15 radio-marked birds moving to grain fields (sorghum) in November, with an average distance moved of 10.9 km (range 1.6 - 21.1 km). Some populations, however, demonstrate little to no use of agricultural crops for forage (Riley et al. 1993b).

Jones (1964b) reported that birds in western Oklahoma loaf in sand sagebrush through the winter. They roosted in areas of tall vegetation or in drifts of snow (Jones 1963). Copelin (1963) observed winter flocks flying 2.4 km between grain fields and roosting areas during morning and evening.

Landscape configuration

Jones (1963) concluded that lesser prairie-chicken habitat generally consists of small patches of short grass interspersed with large patches of shrub or half-shrub vegetation. Lesser prairie-chickens use a variety of life-form vegetation types, such as tallgrass, midgrass, dwarf half-shrub, and midforbs, for breeding, foraging, and roosting activities throughout the year (Jones 1963). Consequently, they require a diversity of life-forms within their home range (Taylor and Guthery 1980a). Because lesser prairie-chickens have relatively small home ranges (Riley et al. 1994, Jamison 2000) and most nesting and brood rearing activity occurs within 3 km of lek sites (Giesen 1998), diversity of plant succession and species composition are important at the local scale.

At the broad scale, landscape-level configuration of rangeland and cropland may influence population density and trends. For example, Crawford and Bolen (1976a) recorded lek density and average number of males per lek in west Texas, and they found the largest populations where native rangeland comprised 63 to 95 percent of the landscape and cultivated fields (primarily minimum tillage sorghum) the rest. Lek sites generally did not occur in areas where cultivation exceeded 37 percent. Cannon et al. (1982) examined Landsat data of shinnery oak rangeland in western Oklahoma and found a positive correlation between percentage of grassland habitat and density of displaying males (based on spring lek surveys). Woodward et al. (2001) examined the

relationship between number of displaying males per lek and vegetation change within 4.8 km of the lek, for historical lek sites in Oklahoma, Texas, and New Mexico during the period 1959 to 1996. Landscapes where the number of males per lek declined typically had higher rates of landscape change (11 percent per decade) and loss of shrubland cover types (3.8 percent per decade) than landscapes associated with leks that did not decline (2 percent and 1 percent per decade, respectively; Woodward et al. 2001). Average decline in total shrubland cover was almost four times greater in landscapes where numbers of males per lek declined (Woodward et al. 2001).

Throughout the geographic range of lesser prairie-chickens, there is a correlation between lek locations and nest sites. Females usually nest 1.2 to 3.4 km from the lek where they were captured (Giesen 1998). In southeastern Colorado, the distance from the lek of capture to a female's nest averaged 1.8 km (range 0.2 – 4.8 km, $n = 31$) and was greater than the mean distance between the nest site and the closest lek (average = 1.0 km, range 0.2 – 2.5 km; Giesen 1994b). Distance between the nest site and the nearest lek does not differ between successful and unsuccessful nests, but successful nests exhibit less variation in distance from lek sites (Phillips 1990).

Females move their broods soon after hatch. Because young broods are unable to fly, suitable brood habitat for foraging and concealment has to be within walking distance of the nest. Daily movement of broods are usually <300 m (Giesen 1998), and movements tend to be greater for broods 14 to 60 days of age (average = 320 m, $n = 8$) than younger broods (average = 248 m, $n = 14$; Jamison 2000). Ahlborn (1980) recorded movements of five radio-marked broods for approximately 7 weeks post hatch; average maximum distance moved by broods was 1148 m, and all recorded locations were within 1.5 km of a lek site.

Occupied versus unoccupied habitat

Lesser prairie-chickens typically use contiguous grassland habitat containing a mosaic of seral stages (Bidwell et al. 1995, Applegate and Riley 1998). Adequate nesting cover and brood-rearing habitat are believed to be critical habitat components for prairie grouse (Kirsch 1974, Bidwell et al. 1995, Hagen et al. 2004). For example, lack of nesting/brood-rearing habitat has been suggested to be the primary factor limiting the greater prairie-chicken (Westemeier et al. 1998). Habitat that could be used by lesser prairie-chickens is made unavailable when range management practices do not leave adequate cover for nesting or brood rearing (Mote et al. 1998). Additionally, grasslands occupied by lesser prairie-chickens may be sensitive to heavy grazing during drought conditions (U.S. Fish and Wildlife Service 2002); significant population declines of lesser prairie-chickens have been recorded during drought years (Mote et al. 1998). In Kansas, Hagen (2003) found a negative correlation between site occupancy and anthropogenic features. Many grouse species are relatively poor dispersers (Braun et al. 1994); thus habitat suitable for lesser prairie-chickens may be unoccupied because of isolation from viable populations.

Food habits

Diet items

Studies of lesser prairie-chicken diets have focused on populations inhabiting shinnery oak rangelands. There are few studies of lesser prairie-chicken food habits in sand sagebrush-dominated grasslands such as those found in Region 2. Lesser prairie-chickens typically forage on the ground on a wide array of items including insects, seeds, leaves, buds, and cultivated grains (Jones 1963, Giesen 1998). Water is also used in many areas, but its necessity has not been determined (Copelin 1963, Crawford and Bolen 1973, Candelaria 1979, Davis et al. 1979, Sell 1979).

Vegetative composition of the diet varies among regions, seasons, and age classes (Jones 1963, Crawford and Bolen 1976a, Davis et al. 1980, Riley et al. 1993b). In part, these differences result from variation in food availability and habitats. For instance, in shinnery oak-grassland habitats in eastern New Mexico, shinnery oak (acorns, leaves, and galls) comprised 49 percent of the spring diet, 21 percent of the summer diet, and 69 percent of the winter diet of adult birds (Davis et al. 1980, Riley et al. 1993b). Shinnery oak comprised 23 percent of the autumn diet of birds (age unknown) in western Texas (Crawford and Bolen 1976a). In western Oklahoma, buds and fruits of skunkbush sumac and six-week fescue (*Festuca octoflora*) were the highest ranked diet items throughout the year (Jones 1963). In some areas, cultivated grains are important food sources; sorghum comprised 43 percent of the autumn diet of lesser prairie-chickens in western Texas (Crawford and Bolen 1976a). Other grains commonly eaten by lesser prairie-chickens (if available) include corn and wheat (Schwilling 1955, Crawford and Bolen 1976a, Ahlborn 1980, Jamison 2000). In southwestern Kansas, lesser prairie-chickens are known to use alfalfa fields as foraging areas (Jamison 2000).

A striking aspect of the lesser prairie-chicken diet is the relatively high proportion of insects consumed by adult birds; percent volume insect matter in the summer diet of adult lesser prairie-chickens was as high as 23 percent in Oklahoma (Jones 1963) and 55 percent in eastern New Mexico (Davis et al. 1980). Important insect prey items for adults include short-horned grasshoppers (Acrididae; Schwilling 1955, Davis et al. 1980, Riley et al. 1993b) and darkling beetles (Tenebrionidae; Crawford and Bolen 1976a).

Insects are the primary diet items of chicks (Jones 1963, Davis et al. 1980). The diet of chicks less than four weeks of age was 100 percent insects, predominately short-horned grasshoppers (Acrididae, 50 percent), treehoppers (Membracidae, 26 percent), and long-horned grasshoppers (Tettigoniidae, 12 percent) (n = 10; Davis et al. 1980). When chicks are less than two weeks of age, treehoppers (Membracidae) may comprise as much as 80 percent of the diet (Davis et al. 1980). Jones (1963) examined seven droppings and one crop from chicks approximately one month old and concluded that insects comprised 85 percent of the diet; Carabidae (27 percent) and Orthoptera (42 percent). Davis et al. (1980) examined crop contents of chicks 5 to 10 weeks of age, and although chicks had begun to consume mast, seeds, and other vegetative material, insects constituted 99 percent of the diet. During this period, short-horned grasshoppers were the most common prey item (approximately 80 percent of all insects consumed). Captive greater sage-grouse (*Centrocercus urophasianus*) chicks require insects in their diet for survival, especially during the first three weeks of age; for older chicks, survival and growth rates increased as the proportion of insects in the diet increased (Johnson and Boyce 1990).

Diet and behavior

Little information exists regarding foraging behavior, daily intake, and nutritional requirements of lesser prairie-chicken chicks. However, the most critical time for the young of most grouse is the first 20 days after hatch, when chicks have a rapid growth rate (Dobson et al. 1988). Merchant (1982) monitored nesting behavior of radio-marked females in two years of contrasting weather, a year of average precipitation vs. drought. During the drought year, females nested on average 11 days later, had smaller first clutches, and were less likely to renest than did females during the year when precipitation levels were normal. He suggested that the lower reproductive effort observed during the drought year resulted from a lack of food resources important to females for reproduction. These behavioral observations appear to explain the positive correlation between precipitation and harvest levels in New Mexico (Brown 1978). A relationship between productivity and weather has also been observed with sharp-tailed grouse (*Tympanuchus phasianellus*; Flanders-Wanner et al. 2004).

Most feeding activity occurs during the early morning and late afternoon (Giesen 1998). Taylor and Guthery (1980b) noted increased daily movements of radio-marked birds during autumn coinciding with cessation of the autumn display period and increased use of sunflower fields as foraging areas. Crawford and Bolen (1973) recorded male lesser prairie-chickens regularly making short visits to stock ponds during March and April. Copelin (1963) observed lesser prairie-chickens visiting free water (stock ponds) daily, or twice daily, from October through March, and Jones (1964a) noted birds visiting water sources during late summer and autumn.

Food abundance and distribution

Insects are important diet items for all age classes, but especially chicks. Although insect abundance may be high in habitats with a high proportion of forbs (Jones 1963, Jamison 2000), relatively little is known about insect/plant associations important to lesser prairie-chickens. Forb diversity and abundance on rangelands are influenced by grazing practices (Fuhlendorf and Engle 2001), as well as burning, mowing, and chemical spraying. Additionally, drought conditions may decrease species richness of eastern grasslands by contributing to the loss of annual species, woody species, and perennial grasses, forbs, and legumes (Tilman and Haddi 1992). Recolonization of grasslands by native annual species may take several years even when precipitation levels return to normal (Tilman and Haddi 1992).

Grain crops are used as a food resource by some populations of lesser prairie-chickens (Crawford and Bolen 1976a). Availability of grain crops may vary both annually and regionally as it is determined largely by agriculture practices (crop rotation, tilling, harvest) and policies (such as those associate with the CRP).

Breeding biology

Breeding behavior

Lesser prairie-chickens are one of several species of Tetraoninae that have a lek mating system: 1) males provide no parental care; 2) females come to an arena or lek where most males aggregate for mating; 3) display

sites used by males do not contain specific resources required by females except the males themselves; and 4) females can choose a mate at the lek (Bradbury 1981). Lekking species typically exhibit elaborate courtship behaviors and displays (Bradbury 1981, Höglund and Alatalo 1995).

The primary display performed by male lesser prairie-chickens during the lekking period in spring is referred to as "gobbling" (Davison 1940, Sharpe 1968). The gobbling display (Sharpe 1968, Hjorth 1970, Johnsgard 1983, Giesen 1998) consists of the following behaviors:

- the tail is raised to its highest extent and is slightly fanned
- the pinnae are raised and positioned forward, almost parallel with the ground
- the wings are drooped and the primaries are spread
- the head and neck are extended forward
- the yellow-orange superciliary eye-combs are enlarged
- stamping of the feet moves the body in a forward motion
- the esophageal air sacs are inflated producing a "booming" vocalization.

The vocalization produced by males during this display is of relatively low frequency and high intensity and has been referred to as a "gobbling" (Sharpe 1968), "bubbling" (Grange 1940), or "yodelling" (Hjorth 1970) sound. Grange (1940:129) phonetically described this sound as "*quoodle-oook, quoodle oook*". The gobbling display functions in both territory defense and courtship, and performed collectively, it may advertise the presence of a lek to females in the vicinity. Male lesser prairie-chickens also perform antiphonal "gobbling" whereby males in adjacent territories display jointly by alternating gobbling displays in a duet fashion (Hjorth 1970). Antiphonal "gobbling" gradually increases in frequency; up to 10 "gobbles" may be produced in rapid succession during one bout of antiphonal "gobbling" (Sharpe 1968). In addition to the gobbling display, males perform a flutter jump, or wing beat, display, especially when females are on or near the lek (Sharpe 1968, Hjorth 1970, Haukos 1988). Males use short wing bursts to leap 2 or 3 m into the air, sometimes landing 180° from their take-off orientation (Hjorth 1970). A cackle vocalization usually accompanies the flutter jump display (Hjorth 1970); cackle vocalizations were heard for 16 of 20 flutter jump displays (Sharpe 1968).

Males commence visiting lek sites during March in Colorado (Hoffman 1963), February in Kansas, Texas, and Oklahoma (Davison 1940, Schwilling 1955, Copelin 1963, Sell 1979), and as early as January in New Mexico (Merchant 1982). The spring display period usually lasts until mid-May or mid-June (Copelin 1963, Hoffman 1963). However, Jones (1964a) found lesser prairie-chickens attending lek sites in Oklahoma during all months of the year except August and December. An autumn display period may occur (Crawford and Bolen 1976a, Taylor and Guthery 1980a, Jamison 2000), but male attendance is less regular and the displays are less intense than during the spring breeding period (Copelin 1963). A decline and eventual cessation of lek activity occurs through autumn as temperatures become colder (Copelin 1963).

Males visit a lek during morning and evening hours; evening attendance is more common during spring (Crawford and Bolen 1975, Giesen 1998). Males usually arrive on leks 30 to 60 minutes prior to sunrise and remain for 3 to 4 hours (Giesen 1998). Factors such as weather, season, and temperature may influence male attendance and/or display activity at the lek (Davison 1940, Schwilling 1955, Copelin 1963, Hoffman 1963, Merchant 1982). During spring, the number of males attending a lek peaks from sunrise to 105 minutes later (Crawford and Bolen 1975); courtship displays may be most intense around sunrise (Copelin 1963). During calm conditions displaying males may be heard by a human observer from a distance of >3 km (Schwilling 1955). Because leks, and hence individuals, can be located during the spring display period, surveys for lesser prairie-chickens typically are conducted at this time.

On lek sites, male lesser prairie-chickens establish territories that they actively defend against other males (Copelin 1963, Sharpe 1968, Hjorth 1970, Campbell 1972, Haukos 1988). These territories generally consist of a core area, in which neighboring males are seldom encountered, and peripheral or boundary areas where aggressive encounters with other males occur (Sharpe 1968, Robel 1970). The area of the territory may vary with the dominance rank of the male; centrally located territories of dominant males tend to be smaller than those of peripheral males (Giesen 1998). Territory sizes in Oklahoma ranged from 3.6 to 4.5 m in diameter (Copelin 1963) and were all >7 m in diameter in a study

in Kansas (Hjorth 1970). Territory boundaries often follow natural features of the landscape (Giesen 1998) but may shift if the substrate is such that boundaries are poorly defined (Haukos 1988). Territorial boundaries are not rigidly observed as a dominant male will follow a female into the territory of an adjacent male, and in some cases males have been observed leaving the lek to follow a departing female (Sharpe 1968). Haukos (1988) described small subgroups of males on a lek and a dominance hierarchy among males in these subgroups rather than a linear hierarchy of dominance among all males attending a lek. Territories also have been observed to change between morning and evening display periods (Haukos 1988).

Similar to other species of prairie grouse, a dominant male on a lek is responsible for the majority of copulations; of 13 successful copulations 85 percent were by the socially dominant male (Sharpe 1968). The number of males observed at leks increases early in the spring. By the peak of the breeding season, the number of males attending leks tends to be relatively stable then rapidly drops off as female visitation declines (Giesen 1998).

The peak of female attendance on leks varies regionally and with weather. Peaks occur during late April-early May in Oklahoma (Copelin 1963), early-mid April in Texas (Crawford and Bolen 1975, Haukos 1988), early-mid April in New Mexico (Merchant 1982), early April in Colorado (Giesen 2000), and early-mid April in Kansas (Schwilling 1955). Drought conditions may delay the peak in female attendance by 7 to 10 days in Texas (Haukos 1988) and as much as two weeks in New Mexico (Merchant 1982). During the peak of mating activity, females may visit the lek singly (Davison 1940) or in small flocks (Sharpe 1968, Haukos 1988). Social dominance interactions have been observed within these flocks whereby the socially dominant female may prevent subordinate females from mating (Sharpe 1968, Haukos 1988).

The peak period for females to lay and incubate eggs is during April to June, and the peak brood season is during May to July (Giesen 1998). Little is known about the timing of brood break-up and dispersal, but the former appears to be common when the chicks are 12 to 15 weeks of age (Giesen 1998).

Breeding site fidelity

Lek sites generally are considered traditional because they are frequently used by lesser prairie-chickens year after year (Copelin 1963, Hoffman 1963, Campbell 1972, Giesen 1998). Males, in particular, exhibit high fidelity to their lek site among years (Davison 1940, Copelin 1963, Giesen 1998). Although many lek sites of prairie grouse are permanent, several temporary or satellite leks may also be established within a region during the breeding season (Robel et al. 1970b, Hamerstrom and Hamerstrom 1973, Schroeder and Braun 1992). The presence of satellite leks may reflect population fluctuations, becoming more common when the population increases (Hamerstrom and Hamerstrom 1973, Schroeder and Braun 1992). Attendance of males at satellite leks may coincide with decreased attendance by males at neighboring leks (Haukos and Smith 1999). Although the proportion of birds that establish territories on leks is unknown, in a study conducted in Kansas, 100 percent of 76 radio-marked male lesser prairie-chickens attended a lek (Jamison 2000). This estimate is, however, potentially biased, as the males in this study were initially captured at lek sites.

Once males establish a breeding site, they typically display fidelity to that lek in subsequent years (Campbell 1972). In New Mexico, four of 114 (3.5%) recaptures of banded males were located on leks different from where they were banded (Campbell 1972). These four recaptures represented three birds, two yearlings, and one adult. Similarly, Haukos and Smith (1999) recaptured 35 banded males within the same season; only one adult and one yearling were captured at a lek other than where they were banded. Mobility of males among leks was higher in a fragmented landscape in Kansas (Jamison 2000). Of 48 banded males, 21 percent (n = 10) were recaptured at leks other than where they were banded; distances moved between lek of capture and new lek ranged from 0.4 to 4.4 km (Jamison 2000). However, three of the 10 males in Jamison's study were initially captured at what he termed "unstable" or "satellite" leks, and four of the 10 males were yearlings. Haukos and Smith (1999) noted that satellite leks generally formed later in the season and coincided with decreased attendance on permanent leks. They hypothesized that satellite leks consisted of individuals, primarily yearling birds, that were unable to establish territories on permanent leks. The yearling:adult ratio of males attending leks was 3.8:1 for leks active 2 years and 1.0:1.0 for leks active >6 years (Haukos and Smith 1999). Yearling males also have been observed on more than one lek during a single breeding season (Campbell 1972). This is comparable to greater prairie-chickens where yearling males have been observed on as many as six different leks in a single breeding season, and occasionally on two different leks during the same morning (Bowman and Robel 1977, Schroeder and Braun 1992).

Variation in the stability of leks can reflect population changes or the relocation of leks among years (Crawford and Bolen 1976a, Jamison 2000). Similar lek dynamics have been observed for greater prairie-chickens, whereby localized habitat changes resulted in the formation of a new lek near a previously established lek site (Schroeder and Braun 1992). Giesen (1998) reported an annual lek turnover rate of 14 percent for all permanent and satellite lesser prairie-chicken leks on his study area in Colorado.

There is little published information regarding lek visitation by female lesser prairie-chickens. Haukos and Smith (1999) recaptured one banded female on two different leks, three days apart. However, female greater prairie-chickens commonly visit more than one lek during a breeding season, and visits to as many as six different leks have been documented (Schroeder 1991). The distance between a female's nest and the nearest lek averaged 1.0 km and was less than the distance between a female's nest site and the lek where she was captured (average = 1.8 km, $n = 31$; Giesen 1994b). In general, females nest within 3.4 km of the lek where they were captured (Giesen 1998).

Parental care, brood break-up, and dispersal

Parental care is provided by females; the males play no role in incubating eggs or rearing chicks (Giesen 1998). Females incubate their clutches for 24 to 26 days; complete hatching of the clutch may take one or two days. The chicks are precocial. They generally leave the nest within 24 hours following hatch and travel to insect-rich habitats. Females regularly brood their chicks throughout the day, especially when the chicks are young. Broods are relatively mobile, but little is known regarding factors that influence brood behavior and movements.

Scant information is published regarding aspects of brood break-up and juvenile dispersal, especially movements by females. Brood break-up tends to occur when the chicks are 12 to 15 weeks of age, after which they form mixed flocks with adult birds (Giesen 1998). Copelin (1963) banded juvenile lesser prairie-chickens during summer, and in autumn he recaptured 14 individuals (unknown sex) on lek sites. All 14 were within 4.7 km of their respective brood ranges, and six were less than 1.6 km. Taylor and Guthery (1980b) followed 19 radio-marked lesser prairie-chickens from October through February. One juvenile male moved 12.8 km in a 4-day period during the second week of December. Jamison (2000) monitored lesser prairie-chickens in a fragmented landscape and recorded two of 76 radio-marked males making relatively long distance movements during the latter part of March and early April. One adult male moved 13.5 km; the other bird, a yearling, moved 44.0 km. The number of days to complete these movements and whether they ever returned to the study area are unknown. Additionally, two males banded as chicks were later recaptured at lek sites. One male was located that autumn on a lek approximately 2.2 km from its hatch site and 2.9 km from its brood range; the other was recaptured the following spring on a lek approximately 2.3 km from its hatch site and 1.1 km from its brood range.

There is a tendency for juvenile females to move farther than juvenile males between their autumn/winter range and first breeding area; 17 of 27 males moved 0.0 to 0.7 km to their first breeding area while three of five females moved greater than 3.2 km (Copelin 1963). This is consistent with evidence from studies with other species of prairie grouse (Hamerstom and Hamerstrom 1973 for greater prairie-chickens; Connelly et al. 1998 for sharp-tailed grouse; Schroeder et al. 1999 for sage-grouse), indicating that females tend to disperse farther than males. Thus, in a given population, males are far more localized than females. Consequently, dispersal movements by females may be particularly important in maintaining gene flow.

Demography

Genetic characteristics and concerns

Generally, a population is defined as the individuals of a specific species in a particular group or area. In most instances, a population is an assemblage of groups distributed over a large area (Soulé 1987). Fundamental to population genetics is the fact that small or isolated populations (with few individuals and no immigration) lose genetic variation over time, thereby increasing the probability of extinction and decreasing the probability of future adaptive change (Lande and Barrowclough 1987). The genetic structure of a population is determined by mutation, random genetic drift, natural selection, and gene flow; as gene flow is decreased, genetic variation is lost due to random genetic drift (Ewens et al. 1987, Slatkin 1987). Genetic variation is believed to be important for a population's long-term persistence because it prevents the deleterious effects of inbreeding and the random loss of alleles through genetic drift. The amount of genetic variation in a population is, in part, a function of what is termed "effective population size", or the "... number of individuals in an ideal population that would have the same genetic properties (in terms of random genetic

drift) as an actual population with its own complicated pattern of demographics, sex ratio, etc." (Lande and Barrowclough 1987:99).

As an example, greater prairie-chickens in Illinois declined from an estimated several million birds distributed over 60 percent of the state during the mid-1800s, to an estimated 2000 individuals in 179 subpopulations in 1962, to a low of 46 birds in two populations by 1994. The decline in numbers between 1962 and 1994 occurred despite extensive management efforts to improve habitat, control nest parasites (ring-necked pheasants [*Phasianus colchicus*]), and control predators (Westemeier et al. 1998). Declines in reproductive parameters such as egg fertility (fertile incubated eggs per total eggs) and hatching rate (hatched eggs per total eggs in fully incubated clutches) were associated with a contraction and decline of the population (Westemeier et al. 1998). Genetic studies indicated significantly lower levels of genetic diversity in the Illinois population than in larger, more contiguous populations (Bouzat et al. 1997). The introduction of greater prairie-chickens from relatively continuous populations in Minnesota, Kansas, and Nebraska resulted in significant increases in egg fertility and hatching rates in the Illinois population (Westemeier et al. 1998). Westemeier et al. (1998) concluded that the Illinois population would have inevitably gone extinct without this intervention, as it would have been unable to recover the genetic variation necessary to offset environmental effects.

Genetic issues are important considerations for management of lesser prairie-chickens as the broad-scale loss and fragmentation of the species' historical range have isolated some populations and/or reduced or eliminated others (Bouzat and Johnson 2004). Moreover, because lesser prairie-chickens have a lek mating system and potentially limited dispersal, calculations of effective population size may underestimate the ideal population needed to maintain genetic diversity (Bouzat et al. 1997, Johnson et al. 2004). Although genetic viability of lesser prairie-chicken populations is a recognized concern, research has not shown a relationship in genetic heterogeneity between Oklahoma (relatively fragmented) and New Mexico (relatively unfragmented; Van Den Bussche et al. 2003). However, a similar examination of relatively small and fragmented populations of greater prairie-chickens in Wisconsin showed substantial effects (Johnson et al. 2003, Johnson et al. 2004). The Wisconsin findings appeared related to the length of time the population had been isolated and fragmented. A comparison of genetic samples collected in 1951 with samples collected in the late 1990s illustrated a dramatic loss of genetic heterogeneity (Bellinger et al. 2003).

In Colorado, the lesser prairie-chicken is limited mostly to a few small populations in the southeastern corner of the state. Genetic viability is a concern for the isolated populations in Kiowa and Cheyenne counties as these populations each number less than 100 individuals (Giesen 2000). Kansas has the largest estimated number of lesser prairie-chickens in the five-state range. However, while this population is believed to be contiguous, landscape configuration in the southwestern border areas is characterized by isolated grassland fragments (Jensen et al. 2000). It is possible that this fragmentation influences demographic processes such as dispersal, and consequently genetic interchange (Bellinger et al. 2003, Johnson et al. 2003, Bouzat and Johnson 2004, Johnson et al. 2004).

Lesser prairie-chickens have expanded their range in Kansas in recent years (U.S. Fish and Wildlife Service 2002). Greater prairie-chicken populations also have responded positively to CRP. In some areas both species overlap, and mixed leks are becoming common. Although the rate of hybridization during pre-settlement times cannot be determined, it is probable that differences in habitat use served as an isolating mechanism between the two species (Jones 1963, Sharpe 1968). Hybrid birds have been observed in Kansas, but the frequency of hybridization, the fertility of hybrids, and the potential long-term impact of hybridization are unknown (U.S. Fish and Wildlife Service 2002). Lesser prairie-chicken populations north of the Arkansas River are low density, and consequently they may be particularly susceptible to the negative effects of hybridization (U.S. Fish and Wildlife Service 2002). Similarly, hybridization has been recorded between greater prairie-chickens and sharp-tailed grouse in areas where populations are sympatric (Ammann 1957, Sparling 1980). In these cases, hybrid birds are fertile, and it has been suggested that sharp-tailed grouse eventually become the dominant species, as F1 females appear to show a preference for sharp-tailed males (Sparling 1981, Toepfer et al. 1990).

Life history characteristics

Although yearling males (0.5 to 1.5 years of age) are physiologically able to breed, adult males are believed to do most of the breeding (Giesen 1998). Most females are believed to breed the first year following hatch and usually lay one completed clutch *per se*ason. Clutch size averages 10.9 eggs (range 8 – 14, $n = 95$ nests from eight studies; review by Giesen

1998, Hagen 2003, Fields 2004). Females may renest if their first clutch is depredated, but renest clutches tend to be smaller (Merchant 1982, Giesen 1998, Hagen 2003, Fields 2004). Hagen (2003) and Fields (2004) found that average clutch sizes in Kansas were four to six eggs larger for first nests than for renests. Hatching success of eggs (proportion of eggs that hatch in fully incubated clutches) was 100 percent in Oklahoma (n = 47 eggs from four clutches; Copelin 1963) and >90 percent in Colorado (Giesen 1998). No information is available regarding fertility of eggs.

Nest success (proportion of nests that hatch at least one egg) varies among studies: 15 percent in Texas (n = 13, Haukos 1988), 37 percent in Texas (n = 8, Sell 1979), 67 percent in Oklahoma (n = 6, Copelin 1963), 47 percent in New Mexico (n = 17, Riley 1978), 36 percent in New Mexico (n = 14, Ahlborn 1980), 28 percent in New Mexico (n = 36, Riley et al. 1992), 26 percent in Kansas (n = 74, Jamison 2000), 26 percent in Kansas (n = 172, Hagen 2003), and 54 percent in Kansas (n = 35, Fields 2004). Nest success was 54 percent (7 of 13 nests hatched) in New Mexico during a year of average precipitation, but it was 0 percent (0 of 11 nests hatched) during a year of severe drought (Merchant 1982). Average nest success throughout the range, including unpublished data from Colorado, is 30 percent for 12 studies (Giesen 1998, Hagen 2003, Fields 2004). Hagen (2003) found that first nests tended to be more successful (28.9 percent, n = 142) than renests (13.3 percent, n = 30) in southwestern Kansas. Annual variation in nest success may occur because of differences in weather, age structure of nesting females, and predation rates (Bergerud 1988b, Fields 2004), as well as availability of suitable nesting cover (Riley et al. 1992).

Few studies have examined survival of chicks from hatching to independence (Hagen 2003). Based on observations recorded from July through September, Davison (1940) reported an average brood size of 5.2 to 7.5 chicks per brood in Oklahoma over a 4-year period. Copelin (1963) reported an average brood size of 6.2 to 7.3 chicks per brood over four years. Merchant (1982) reported an average brood size of 7.8 chicks per brood (n = 17 observations) during a year of average precipitation and 3.5 chicks per brood (n = 4 observations) during a dry year. However, brood sizes reported in these studies may be over-estimated as counts tend to decrease later in the season. Young broods typically have more chicks than older broods, as chick survival averages only 24 percent during the first 35 days following hatch (Hagen 2003). Survival for chicks between 35 days of age and the following spring was estimated to be 53.9 percent in southwestern Kansas (Hagen 2003). Inaccurate counts also may occur because broods occasionally mix later in the season (Copelin 1963). Jamison (2000) examined brood survival of lesser prairie-chickens and the pattern of attrition from hatch to independence for individually identifiable chicks. The daily survival of chicks was 94.1 percent/day during the first 14 days and 98.3 percent/day from 14 to 60 days after hatch. The estimated overall survival rate of chicks for the 60-day period after hatch was 19 percent. Jamison (2000) concluded that average brood size, calculated from flush count data, tended to overestimate the survival rate of chicks, as factors such as total brood loss and brood-mixing were not considered. For instance, in Jamison's (2000) study nearly half of the females monitored suffered total brood loss within two weeks of hatch.

Annual survival was estimated as 35 percent for 67 males banded in New Mexico, using capture-recapture techniques (Campbell 1972). Campbell indicated that these estimated survival rates may be low by as much as 5 to 10 percent because of the possibility that some birds could not be recaptured. Campbell (1972) reported a complete turnover of banded male lesser prairie-chickens in a 5-year period. Annual survival estimates for lesser prairie-chickens in Kansas were 45 percent for 311 males (Hagen et al. 2005) and 43 percent for 227 females (Hagen 2003). Survival was estimated to be 60 percent for yearling males and 43 percent for adult males (Hagen et al. 2005). Survival also tended to be higher for yearling females than for adults (**Table 3**; Hagen 2003, Hagen et al. 2004). Female survival tended to be lowest during the nesting period during May (Hagen 2003). Survival rate for radio-marked females was estimated to be 59 percent during mid-March to mid-May in Texas (n = 46, Haukos 1988) and 41 percent during April to August in New Mexico (n = 41, Merchant 1982).

We adapted a population model (Caswell 2001) to evaluate the finite rate of population change (λ) for a well-studied lesser prairie-chicken population in southwestern Kansas (**Figure 8**, **Table 3**; Hagen 2003). Although data for other portions of the lesser prairie-chicken range exist, the data sets are not as complete. The rate of growth for this population was estimated to be 0.689. This value was extremely low, well below the 1.0 rate necessary for a stable population. In the original research upon which this analysis was based, the study had been divided into two portions with growth rates of 0.544 and 0.754, respectively (Hagen 2003). Explanations for the low rate include habitat alteration and support of the population with immigration from surrounding areas (Hagen 2003).

Table 3. Parameter values for productivity and survival for female lesser prairie-chickens in southwestern Kansas (Hagen 2003). Although Hagen separated some of the parameters by age and study area, many of the values were combined (weighted means) for the table below.

Parameter	Estimate	n
Likelihood of nesting at least once	100%	-[a]
Clutch size for first nests	12.1 eggs	151 nests
Success rate for first nests	28.9%	142 nests
Likelihood of renesting following failure of first nest	30.3	99
Clutch size for renests	7.7	29
Success rate for renests	13.3	30
Assumed sex ratio of eggs	1:1	-[b]
Hatchability for eggs in a successful nest	100%	-[c]
Survival of hatched chicks to 34 days of age (fledging)	23.6	38
Average number of female fledglings produced (F in Figure 8)	0.44	-[d]
Survival of juveniles from fledging to the next spring (S_J in Figure 8)	53.9	32
Annual survival of yearlings (S_Y in Figure 8)	52.1	57
Annual survival of adults (S_A in Figure 8)	36.9	98

[a]This data was not provided by Hagen (2003), but assumed to be close to 100%.

[b]Sex ratio data varies substantially (Geisen 1998), so a ratio of 1:1 was assumed.

[c]This data was not provided by Hagen (2003), but was likely close to 100% based on the summary of data in Geisen (1998).

[d]The average number of female fledglings produced combines nesting and renesting likelihood, success, and clutch size, as well as chick survival throughout 34 days of age.

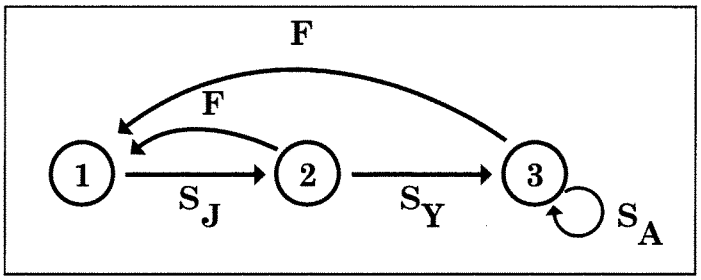

Figure 8. Life cycle diagram for the lesser prairie-chicken (based on techniques in Caswell 2001). Data for the parameters is provided in **Table 3**.

Hagen (2003) conducted sensitivity and elasticity analyses on the effect of vital rates on the estimation of λ. Because the elasticity analysis differs from the sensitivity analysis, in that the results are scaled for comparison, Hagen focused on the elasticity analysis. Hagen's analysis showed that survival of chicks between hatch and 34 days had the largest impact on λ. The next most important parameters included the survival and productivity of adults, respectively.

The knowledge of which demographic components (life stages) exert the greatest effect on population growth is important for managers to consider (Caswell 1989). Nest success and chick survival are generally considered the most significant features influencing population dynamics of prairie grouse (Bergerud 1988b, Peterson and Silvy 1996, Wisdom and Mills 1997, Schroeder and Baydack 2001). Sensitivity analysis of vital rates for lesser prairie-chicken populations indicates that nest success and chick survival have the greatest effect on population growth (Hagen 2003). Hagen (2003) also noted that the populations of lesser prairie-chickens he studied in Kansas would not have maintained themselves without immigration from outside the population.

Population regulation

Numerous intrinsic factors (e.g., spacing behavior) and extrinsic factors (e.g., weather, predation, habitat, disease) have been suggested to influence survival and reproduction in various grouse species (Angelstam 1988, Hannon 1988); however, the relative importance of the various factors and how they interact often is unclear (Boag and Schroeder 1992, Zwickel 1992, Braun et al. 1993, Schroeder and Robb 1993). Lesser prairie-chickens are highly social throughout the year; even during the breeding season. Males form flocks with other males from the same lek, and females often visit leks in small groups (Sharpe 1968, Haukos 1988, Giesen 1998). Although females select nesting areas, whether or not these areas are defended is unclear; in some cases, individuals have been found nesting 14 m apart (Copelin 1963). Dominant females also have been observed to drive off other females on leks (Sharpe 1968, Haukos 1988). This has also been noted in greater prairie-chickens (Robel 1970). This type of behavior has been considered to significantly impact populations in other species of grouse (Hannon 1988). However, the importance of this type of behavior on lesser prairie-chicken demography is unknown.

In contrast to intrinsic factors, extrinsic factors (e.g., weather, predation, habitat degradation, disease) have been well documented. The most common threats to grouse populations are habitat loss, fragmentation, and degradation and the interaction of these processes to create increasingly isolated populations that are more susceptible to predation, disease, declines in genetic diversity, and increases in vulnerability to extinction through stochastic events (Fritz 1979, Davies 1992, Bergmann and Klaus 1994, Mote et al. 1998, Storch 2000). In the case of lesser prairie-chickens, the conversion of native rangeland directly eliminates critical nesting habitat (Mote et al. 1998, Hagen et al. 2004) and results in fragmentation of remaining areas. Although low levels of cultivated cropland (specifically grain crops) have not been detrimental to some populations (Crawford and Bolen 1976a), in many cases, crops (e.g., cotton grown in Texas) do not provide the cover and food resources required by lesser prairie-chickens (Sullivan et al. 2000). Habitat quality, composition, and structure of rangeland vegetation are factors limiting the distribution and numbers of lesser prairie-chickens in some areas, as evidenced by the 92 percent reduction in range (Taylor and Guthery 1980a, Davies 1992, Giesen 1994b).

The lack of suitable nesting cover is considered a limiting factor for greater prairie-chickens throughout their range (Kirsch 1974). Residual vegetation is a critical habitat component for lesser prairie-chickens as nest success has been positively correlated with increased height and density of grasses at nest sites (Riley et al. 1992). For instance in east-central and southeastern New Mexico, 4 percent of the available nesting habitat is considered "good", 16 percent is rated fair, and 80 percent is considered unsuitable-poor (Bailey et al. 2000). Habitat degradation caused by heavy grazing may adversely impact nest success (Hagen et al 2004), as relatively dense cover is believed to provide greater concealment of nests from predators for most species of grouse (Bergerud 1988a, Bergerud 1988b). This effect may be exacerbated by drought (Merchant 1982). Predation is a significant cause of failed nests; 85 percent (n = 55) of nest loss was attributed to predation in Kansas (Jamison 2000), and 65 percent (n = 25) of nests were destroyed by predators in New Mexico (Riley et al. 1992). In addition, predation during the nesting season can be a significant mortality factor for females. Haukos (1988) monitored 34 radio-tagged females from mid-March to mid-May. Of these, 16 (47 percent) were predated; eight mortalities were attributed to raptors and five to coyotes.

In Colorado, a landscape dominated by croplands and shortgrass rangelands limits the expansion of lesser prairie-chickens from core areas in the state (Giesen 1994a). Grazing is a common land use practice throughout the prairies of this region, and where grazing practices fail to leave adequate cover for nesting, it is likely detrimental to lesser prairie-chickens (Taylor and Guthery 1980a, Hagen et al. 2004). For instance, species of warm season native grasses (bluestems) that provide nesting cover are maintained by light to moderate grazing intensity (Mote et al. 1998) and are reduced greatly by heavy grazing (Riley et al. 1992). Additionally, the effects of grazing systems in Region 2 are influenced by the occurrence of periodic droughts, some of which may be severe (Mote et al. 1998). Drought conditions reduce vegetative growth and residual cover (Giesen 2000), as well as plant species richness in subsequent years (Tilman and Haddi 1992). During years of drought, rangelands may be overgrazed, resulting in loss of cover in subsequent years (Hamerstrom and Hamerstrom 1973, U.S. Fish and Wildlife Service 2002).

The first couple of weeks after hatch, when chicks are developing thermoregulatory ability, is a critical period for many species of galliformes (Dobson et al. 1988). Heat stress due to hot, dry weather during the nesting season has been suggested as a factor contributing to mortality of young chicks (Merchant

1982). Merchant (1982) recorded smaller brood sizes during a drought year when the high temperature during the first 10 days after hatch averaged 38.8 °C. Surveys conducted on his study area the following spring indicated a lower total number of males on leks, a lower number of occupied leks, and a lower number of males per lek than the previous spring.

Reduction in abundance of native forbs may negatively impact lesser prairie-chickens as broods preferentially select areas with high invertebrate biomass and these areas are associated with high forb abundance (Jamison et al. 2002a). Additionally, chick survival may be reduced if broods are forced to make extensive movements through unsuitable and potentially risky habitats. Many species of hawks, owls, and mammals are known predators of chicks, and mortality can be high, especially during the first couple of weeks after hatch. For instance, in southwestern Kansas, Jamison (2000) found 57 percent mortality of chicks and total brood loss for approximately 50 percent of broods during the first two weeks following hatch. The estimated mortality rate of chicks from hatch to 60 days of age was 81 percent.

Habitat fragmentation is increasingly common within lesser prairie-chicken range (Mote et al. 1998, Hagen et al. 2004), but its impact on survival and productivity is unclear. It has been suggested that habitat fragmentation may impact nest success negatively by forcing birds to nest in marginal habitats, increasing travel time through unsuitable areas, and increasing the diversity and density of predators (Ryan et al. 1998, Schroeder and Baydack 2001). Areas with less than 63 percent shinnery oak rangeland may be incapable of supporting lesser prairie-chicken populations in west Texas (Crawford and Bolen 1976a). Lesser prairie-chickens in Kansas appeared to avoid nesting near anthropogenic features (Pitman 2003). However, "threshold" levels of fragmentation are unknown for other parts of the range (Mote et al. 1998). In fragmented areas, nest loss for lesser prairie-chickens may be higher than in larger, more continuous tracts, as has been observed for other species of ground-nesting birds in grassland habitats (Braun et al. 1978, Johnson and Temple 1990). Lesser prairie-chickens have limited dispersal capabilities. Thus, populations may become isolated if separated by large areas of unsuitable habitat since dispersal rates may be inadequate for maintaining connectivity and genetic viability of populations (Mote et al. 1998).

The openness of lesser prairie-chicken habitat is important. Evidence suggests that predation of prairie grouse nests is lower in treeless grasslands than in areas interspersed with brushy cover (McKee et al. 1998). Taller trees may provide nest and roost locations for raptor species that prey on lesser prairie-chicken chicks and adults.

Conversion of cropland to CRP apparently has benefited lesser prairie-chickens in southwestern Kansas (U.S. Fish and Wildlife Service 2002). Although CRP acreage accounts for one third of the cropland in Baca County, Colorado, increases in occupied range and numbers of lesser prairie-chickens have not been observed in this state (Giesen 2000). However, several kilometers of shortgrass prairie often separate CRP lands from occupied lesser prairie-chicken range in the southeastern part of Colorado, perhaps precluding their use by prairie-chickens.

Community ecology

Predation

Intensity of predation pressure varies and is believed to be linked to changes in predator foraging strategies during population fluctuations of primary prey items (Schroeder and Baydack 2001). For example, during years of scarce prey, predators may search more intensively and, consequently, increase their probability of encountering grouse nests (Angelstam 1983). There is evidence that predation levels in grouse populations also are influenced by aspects of habitat quality, such as fragmentation and degradation. In fragmented landscapes, lesser prairie-chickens are forced to move greater distances and more frequently between patches of suitable habitat. This exposes them to higher predation risks. Ryan et al. 1998 found that fragmentation of nesting habitat subjected female greater prairie chickens to increased levels of predation as the density and diversity of predators may be increased in these areas (Braun et al. 1978, Schroeder and Baydack 2001).

The predator community of the prairies has changed significantly since pre-European settlement, and many generalist predators such as coyotes and skunks have increased in range and numbers (U.S. Fish and Wildlife Service 2002). Modification of grassland habitats by power poles, wind machines, fence lines, and tree plantings may increase predation levels by creating favorable hunting perches and nest sites for raptors, and establishment of livestock watering sites may alter the local distribution of some mammalian predators.

Observations of predation events involving lesser prairie-chickens are rare (Mote et al. 1998). One published account documented five instances where northern harriers (*Circus cyaneus*) successfully killed birds (Haukos and Broda 1989). Numerous avian and mammalian species are believed to be predators of lesser prairie-chickens and their nests (Giesen 1998). Primary predators of adult and juvenile birds include rough-legged hawk (*Buteo lagopus*), red-tailed hawk (*B. jamaicensis*), prairie falcon (*Falco mexicanus*), Cooper's hawk (*Accipiter cooperii*), northern harrier, ferruginous hawk (*B. regalis*), golden eagle (*Aquila chrysaetos*), great horned owl (*Bubo virginianus*), coyote (*Canis latrans*), and badger (*Taxidea taxus*; see reviews by Giesen 1998, Haukos and Broda 1989). Major nest predators include coyote, Chihuahuan raven (*Corvus cryptoleucus*), bull snake (*Pituophis melanoleucus*), striped skunk (*Mephitis mephitis*), badger, and ground squirrel (*Spermophilus spilosoma*; Haukos 1988, Riley et al. 1992, Giesen 1998, Jamison 2000).

Competition

The historical distributions of lesser prairie-chickens and greater prairie-chickens were geographically continuous but not overlapping (Aldrich 1963). Greater prairie-chickens generally were found in mixed to tallgrass prairies while lesser prairie-chickens occupied xeric grasslands with a shrub component of shinnery oak or sand sagebrush. Jones (1963) believed that these habitat differences were great enough to serve as an isolating mechanism between the two species. However, in recent years a sympatric distribution of greater and lesser prairie-chickens has been recorded in west-central Kansas as a result of range expansion by both species, and mixed leks are increasingly common (U.S. Fish and Wildlife Service 2002). How the sympatric occupation of habitat influences the use of resources by either species has not been established.

Anecdotal evidence indicates that ring necked-pheasants will harass male lesser prairie-chickens during the breeding season (Mote et al. 1998). Hagen et al. (2002) also found that there was a 4 percent probability of parasitism by ring-necked pheasants on lesser prairie-chicken nests during a study in Kansas. Nest parasitism adversely affects greater prairie-chicken nest success because host nests are less successful due to higher rates of predation and abandonment and, in some cases, females will leave the nest with pheasant chicks before their own eggs hatch (Vance and Westemeier 1979).

Parasites and disease

Parasites of lesser prairie-chickens, the intensity of parasite infections, and the impact of parasites and disease on populations are poorly understood (Peterson 2004). A summary of reported parasites and disease agents suggests that they are common throughout the range (**Table 4**). Although parasites are known to cause significant mortality in some grouse species, such as red grouse (*Lagopus lagopus scoticus*) in Scotland (Hudson 1992), there is little documentation of similar patterns in lesser prairie-chickens (Giesen 1998). Nevertheless, caution should be exercised before dismissing the potential for population-level impacts (Peterson 2004). For example, there has been no documented exposure of lesser prairie-chickens to the West Nile virus. Because that virus has had dramatic impacts on some populations of greater sage-grouse (Naugle et al. 2004), its potential impacts on lesser prairie-chickens should be considered. In some cases, ring-necked pheasants can carry *Heterakis gallinarum* with few effects while gray partridges (*Perdix perdix*) are likely to die (Tompkins et al. 2000a and b). Consequently, in areas of pheasant and partridge overlap, partridge populations may be reduced or eliminated. This type of relationship has not been observed in lesser prairie-chickens.

Envirogram

We developed an envirogram (Andrewartha and Birch 1984) to describe the relationship between lesser prairie-chickens and their environment (**Figure 9**). This envirogram considers resources (primarily habitat for cover and food), malentities (negative stressors in the environment), and predators. The diagram illustrates the continuum of potential relationships between baseline factors in the environment versus the more proximal causes. These factors are illustrated on a horizontal axis from left to right, or ultimate to proximal, respectively.

This type of relationship can be illustrated for lesser prairie-chicken chicks, which depend on insects during their first weeks after hatch. Insect abundance can depend on numerous factors, one of which is plant diversity. Likewise, plant diversity can depend on numerous factors, one of which is the introduction and expansion of noxious weeds. The prevalence of noxious weeds can be increased by reduced competition from native plant species and/or site disturbance. A site can be disturbed by numerous factors, such as the building of a road. Hence, the building of a road is one of the

Table 4. Reported parasites and disease agents of lesser prairie-chickens (modified from Peterson 2004).

Group/Species	State (*n* positive/total *n*)	Reference
Cestodes		
Rhabdometra odiosa	Texas (15/41)	Pence et al. 1983
Nematodes		
Heterakis isolonche	Texas (21/41)	Pence and Sell 1979, Pence et al. 1983
Subulura sp.	Kansas (54/91)	Robel et al. 2003
Tetrameras sp.	Kansas (81/88)	Addison and Anderson 1969
Oxyspirura petrowi	Kansas (53/56)	Robel et al. 2003
Oxyspirura petrowi	Unknown	Addison and Anderson 1969
Oxyspirura petrowi	Texas (25/41)	Pence and Sell 1979, Pence et al. 1983
Physaloptera sp.	Texas (16/41)	Pence et al. 1983
Mallophaga		
Lagopoecus sp.	Oklahoma	Emerson 1951
Goniodes cupido	Oklahoma	Emerson 1951
Hematozoa		
Plasmodium pedioecetii	New Mexico (2/29)	Stabler 1978
Plasmodium pedioecetii	Texas (2/8)	Stabler 1978
Plasmodium pedioecetii	New Mexico (4/32)	Smith et al. 2003
Other protozoa		
Eimeria tympanuchi	New Mexico (5/64)	Smith et al. 2003
Bacteria		
Mycoplasma sp.	Oklahoma and Kansas	Peterson 2004
Salmonella sp.	Oklahoma and Kansas	Peterson 2004
Pasteurella multocida	Kansas	Peterson 2004
Viruses		
Infectious bronchitis virus	Texas (10/35)	Peterson et al. 2002

root causes (but not the only one) in the loss of insects needed by lesser prairie-chickens.

CONSERVATION

Land Management and Its Implications for Lesser Prairie-Chicken Conservation

Land use conversion and habitat fragmentation

Land management practices significantly influence the quality and availability of habitat for lesser prairie-chickens as this species requires extensive areas of grassland with suitable cover throughout its range (Wildlife Habitat Management Institute 1999, Hagen et al. 2004). Because lesser prairie-chickens have relatively small home ranges (Copelin 1963, Giesen 1998), they require an interspersion of nesting, brood-rearing, roosting, and lekking habitats at the local scale. Prior to European settlement, a combination of disturbances (grazing by ungulates, fires, direct and indirect impacts of Native Americans) is believed to have created a patchy distribution of grasslands at differing stages of succession at both local and broad scales (Kay 1998, Fuhlendorf and Engle 2001, Samson et al. 2004). Disturbance patterns in the prairie landscape are believed to have resembled a shifting mosaic whereby recently disturbed patches were intermixed with areas undisturbed for several years (Fuhlendorf and Engle 2001), thus creating a heterogeneous landscape at spatial and temporal scales. This diversity of habitat at the landscape level is believed to be important for the persistence of lesser prairie-chicken populations (U.S. Fish and Wildlife Service 2002).

Landscape level evaluation of occupied range suggests that areas of population decline are characterized by greater rates of landscape change and loss of shrubland cover than areas of population stability or increase (Woodward et al. 2001). Stability

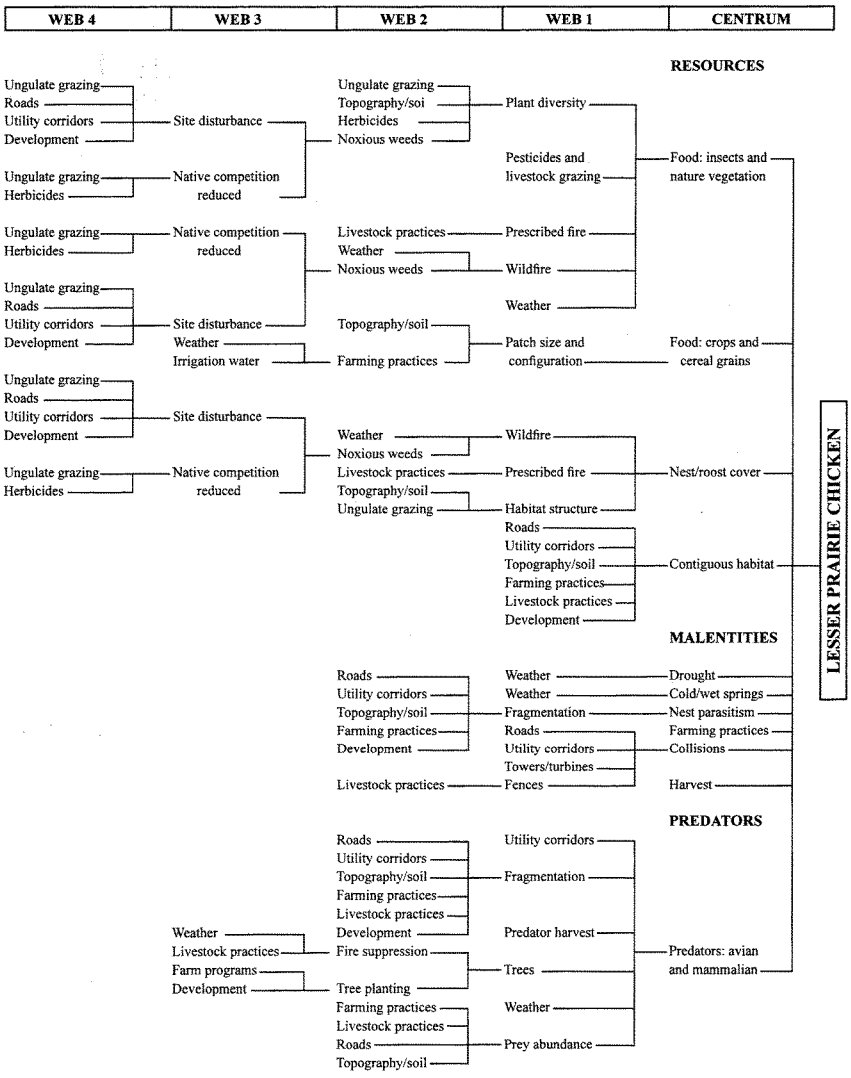

Figure 9. Envirogram (based on Andrewartha and Birch 1984) for lesser prairie-chickens.

of land use and continuity of grassland habitat in areas occupied by lesser prairie-chickens have been suggested as important factors in maintaining stable populations. However, many landscape level factors, such as patch size, configuration, and juxtaposition of required habitat types (e.g., nesting, brood-rearing, foraging), are poorly understood (Woodward et al. 2001). At the broad scale, habitat fragmentation increasingly isolates populations, placing them at greater risk of extinction due to loss of genetic heterogeneity and stochastic events. For instance, in Texas an entire population of 20 endangered Attwater's prairie-chickens (*Tympanuchus cupido attwateri*) was lost following a major hurricane (Silvy et al. 1999). Increases in fragmentation can also affect local predation rates (Braun et al. 1978, Schroeder and Baydack 2001), which in turn may impact nest success and chick survival, two factors that have the greatest impact on growth rates of lesser prairie-chicken populations (Hagen et al. 2004).

Small and isolated populations, such as those in Kiowa and Cheyenne counties, Colorado, may be at a particularly high risk of extirpation (Giesen 2000). Although Toepfer et al. (1990) suggested that 100 male greater prairie-chickens were enough to support population persistence over a relatively long period, the actual number needed may be much larger. For instance, Morrow et al. (2004) observed that a population with approximately 250 male Attwater's prairie-chickens declined rapidly toward extinction. Closed populations of greater prairie-chickens where the number of males is less than 500 have persisted for more than 25 years in Minnesota, and populations with less than 250 males have persisted for 50 years in Wisconsin (Westemeier and Gough 1999). However, recent evidence for Wisconsin indicates that those populations with between 70 and 327 males (1998 data, Anderson and Toepfer 1999) have been insufficient to maintain genetic heterogeneity (Bellinger et al. 2003, Johnson et al. 2003, Johnson et al. 2004).

Conversion of native prairie clearly has had a long-term impact on lesser prairie-chickens. Silvy et al. (2004) argued that the lack of sufficient quantity of suitable habitat was the factor most responsible for the long-term declines of this species. According to estimates by Samson et al. (2004), 45.9 percent of the central mixed-grass prairie (**Figure 3**) and 35.7 percent of the central shortgrass prairie (**Figure 4**) has been converted to cropland (**Table 1**). When condition and patch size are factored in, the remaining amount of suitable habitat for lesser prairie-chickens is much less than these figures would indicate.

Lesser prairie-chickens may use cropland as foraging areas in Region 2, but the relative value of cropland depends on the type of crop grown, its juxtaposition to suitable grassland cover, and farming practices that influence the availability of waste grain. As the proportion of cropland increases, the resulting loss and fragmentation of grassland areas reduce the quantity and quality of habitat for lesser prairie-chickens. Although areas in west Texas, where cultivation exceeds 37 percent of the landscape, appear unable to support populations of lesser prairie-chickens (Crawford and Bolen 1976a), threshold levels of cultivation are not known for other regions (Mote et al. 1998). Cannon and Knopf (1981a) determined that limited agriculture (0 to 32 percent) had an unclear effect on the density of displaying males, and this effect may have been overwhelmed by lesser prairie-chicken responses to rangeland quality. Lesser prairie-chickens are known to use alfalfa fields as foraging areas throughout their range (U.S. Fish and wildlife Service 2002). However, many pastures contain introduced grass species that do not provide the diversity of vegetation and structure required by lesser prairie-chickens (Mote et al. 1998). Center-pivot irrigated cropland also has eliminated or fragmented a significant amount of sand sagebrush prairie within the lesser prairie-chicken range in Kansas (Jensen et al. 2000). However, since 1981 water conservation measures have limited the increase in center-pivot irrigation.

The recent expansion of lesser prairie-chickens into 16 counties north of the Arkansas River in Kansas is believed to reflect increased CRP-enrolled acreage in the southwestern part of the state (U.S. Fish and Wildlife Service 2002). The landscape in the expanded range is dominated primarily by CRP-enrolled lands, crops, and shortgrass prairie (Jamison 2000). In some cases, CRP provides the only available grassland habitat (Rodgers et al. 2000), and nesting success on CRP-enrolled lands may be relatively high (Field 2004). CRP-enrolled lands comprise 13 percent of the total area of 15 core counties in southwestern Kansas enrolled in CRP (2004 statistics, http://www.fsa.usda.gov/crpstorpt/r1sumsn/ks.htm, December 1, 2004).

CRP-enrolled lands comprise a similar portion of the lesser prairie-chicken range in Colorado. Only 17 percent of the total area of Baca, Kiowa, and Prowers counties is enrolled in this program (based on 2004 statistics; http://www.fsa.usda.gov/crpstorpt/r1sumsn/co.htm, December 1, 2004). Although evidence suggests that birds in Colorado occasionally use CRP-enrolled lands as roosting cover, there has been no

apparent increase in lesser prairie-chicken populations in Colorado since the program was initiated, and no leks have been documented on CRP-enrolled lands (Giesen 2000). However, much of the CRP-enrolled lands adjacent to lesser prairie-chicken range lack both diversity and abundance of grass and forb species, in contrast to the CRP in Kansas (Fields 2004). Additionally, much of the early CRP-enrolled acreage in Colorado was planted in *Bromus* spp., which tends to flatten during winter and thus provides insufficient cover when compared with native habitat (Sullivan et al. 2000). Despite this observation, there has been no direct effort to compare the suitability of CRP for lesser prairie-chickens in Colorado with the suitability of CRP in Kansas. It is also of regional concern that CRP habitats are temporary and may disappear or change with future enrollments and the economics and politics of land use. Additionally, in times of severe drought, grazing and haying of CRP-enrolled fields may be permitted.

Livestock grazing

Lesser prairie-chickens are endemic to grasslands of the Great Plains, and like other species of grassland birds, they evolved with grazing ungulates, in particular bison (*Bison bison*). Historical patterns of grazing are believed to have created an interspersion of heavily, moderately, and lightly grazed habitat types (**Figure 10**). In contrast, modern grazing systems tend to reduce rangeland heterogeneity (Fuhlendorf and Engle 2001), and lesser prairie-chickens require a diversity of habitat types to meet their life history requirements. For instance, mid-tall grass species provide nesting habitat, while shortgrass vegetation sites are used for breeding display. Suitable nesting habitat is considered a limiting factor for prairie grouse (Kirsch 1974), and nest success and chick survival are believed to be the most important demographic factors influencing lesser prairie-chicken populations (Hagen et al. 2004). In Kansas, approximately 50 percent of broods experience total brood loss, and chick mortality at the end of 60 days post hatch approaches 81 percent (Jamison 2000). Residual vegetation provided by mid-tall grass species is a critical component of quality nesting habitat (Riley et al. 1992).

Habitat condition is now largely determined by land management practices associated with livestock production. Grazing is not necessarily detrimental to lesser prairie-chicken habitat, but grazing systems that reduce or eliminate cover used for nesting and brood rearing decrease habitat quality (Hagen et al. 2004, U.S. Fish and Wildlife Service 2002). Many of the mid-tall grass species used by lesser prairie-chickens for nesting habitat are also preferred forage by cattle. As a result, grazing practices may leave inadequate cover for nesting females in many areas (**Figure 11**; U.S. Fish and Wildlife Service 2002). Although various grazing systems (e.g., rest-rotation, deferred grazing) are practiced, grazing systems are of limited value if the stocking rate is too high (Svedarsky and Van Amburg 1996). Holechek et al. (1999) extensively reviewed published grazing studies and concluded that a stocking rate that uses 50 percent of the available forage results in rangeland deterioration of semi-arid grasslands.

Heavy grazing by livestock that results in lack of secure cover for nesting is considered a major threat to the long term persistence of lesser prairie-chicken populations (Hagen et al. 2004). In heavily grazed habitats, lesser prairie-chickens tend to nest under shrubs (Giesen 1994b); however, these nests are less successful as nest success is associated with increased cover of residual grasses at the nest site (Riley at al. 1992, Giesen 1994b). Grazing practices that do not leave adequate cover for nesting and brood rearing are also detrimental to lesser prairie chickens because birds are forced to nest in small patches of cover or in marginal areas where nest success may be lower due to increased predation (Mote et al. 1998). Hunt (2004) found that vegetative characteristics associated with overgrazing explained approximately 19 percent of the variation between active and inactive sites in New Mexico; overgrazed sites were less likely to be active.

Although nesting and brood-rearing habitats are vital to lesser prairie-chicken populations, grazing practices that leave adequate cover to meet all seasonal requirements are necessary (Hagen et al. 2004). Partial recovery of habitat on the Comanche National Grassland from historical levels of relatively heavy grazing is believed to be responsible for the apparent increase in lesser prairie-chicken numbers in Colorado between the 1970s and late 1990s (Giesen 2000). Direct interactions between livestock and lesser prairie-chickens are difficult to observe. However, one study of artificial nests in grassland habitat recorded 75 percent nest loss due to damage by cattle (e.g., trampling, crushing by muzzle, eggs kicked out of nest) in all grazing treatments studied (Paine et al. 1996).

Rangelands used by lesser prairie-chickens typically receive low levels of rainfall and are subject to periodic droughts (i.e., 1930s, 1950s, 1990s; Mote et al. 1998). Declines in lesser prairie-chicken populations have been noted to coincide with periodic drought conditions experienced in the Great Plains

Figure 10. Ungrazed habitat with a Daubenmire plot in southwestern Kansas. Photograph by Christian A. Hagen.

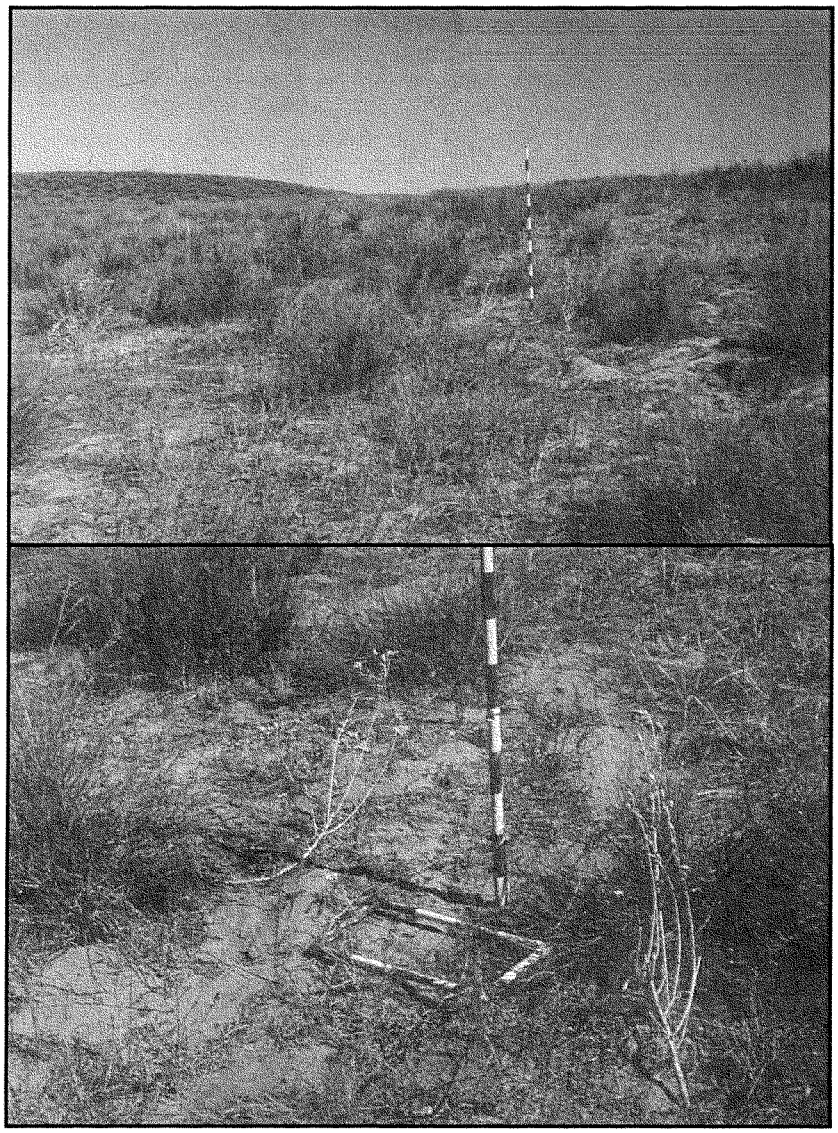

Figure 11. Grazed habitat with a Daubenmire plot in southwestern Kansas. Photograph by Christian A. Hagen.

region (Crawford 1980). In a drought year in New Mexico, female lesser prairie-chickens laid fewer eggs in first nests, produced fewer chicks per brood, and were less likely to renest than during a year with normal precipitation (Merchant 1982). The negative effect of drought is believed to be largely indirect, as lack of precipitation reduces vegetative growth, and hence residual cover, in subsequent years (Giesen 2000). In contrast, Giesen (2000) illustrated a positive relationship between annual precipitation and the total number of leks and males counted the following spring on a 41 km^2 area of the Comanche National Grassland. He suggested that above average precipitation levels experienced in the region between 1975 and 1998 may have indirectly had a positive effect on lesser prairie-chicken populations by influencing the quantity/quality of herbaceous growth, and hence, residual cover.

Under drought conditions, prairie-chicken habitat may easily be degraded by heavy livestock grazing (Hamerstrom and Hamerstrom 1961, Giesen 2000, U.S. Fish and Wildlife Service 2002). During drought conditions in New Mexico, lesser prairie-chickens used ungrazed or lightly grazed areas for nesting and brood rearing (Merchant 1982). During drought, forage consumed by livestock may not be replaced by vegetative growth, suggesting that stocking rates that maintain suitable cover requirements for lesser prairie-chickens need to be evaluated in terms of the periodic drought conditions that occur throughout its range.

Another implication of livestock grazing is the frequent control of shrubs within the range of the lesser prairie-chicken, usually in an effort to improve the forage for livestock. Broad-scale use of herbicides to eradicate sand sagebrush is known to decrease avian diversity and abundance for as long as five years post application (Rodgers and Sexson 1990). Jackson and DeArment (1963) determined the effects of sand sagebrush control to be deleterious to lesser prairie chickens in Texas. Cannon and Knopf (1981a) found a positive correlation between density of displaying males and sand sagebrush in sand sagebrush rangelands.

In contrast, carefully planned herbicide treatments may to help increase herbaceous cover when combined with appropriate grazing strategies (Donaldson 1966, Doerr and Guthery 1983, Olawsky and Smith 1991). Prescribed fire can have similar long-term effects on vegetation, for as long as seven years following the burn (Snyder 1997). However, such practices are believed to most often reduce the necessary shrub cover for lesser prairie-chickens. These practices have been especially common in the shinnery oak habitats outside of Region 2 (Boyd 1999, Boyd and Bidwell 2001, Jamison et al. 2002b, U.S. Fish and Wildlife Service 2002).

Pesticides and herbicides

Pesticide treatment of rangeland and cropland may indirectly impact lesser prairie-chickens, especially chicks, by reducing insect prey No studies have examined the direct effect of chemical spraying on lesser prairie-chicken populations (U.S. Fish and Wildlife Service 2002), but 63 of 200 greater sage-grouse died after feeding in an alfalfa field sprayed with dimethoate (Blus et al. 1989). Lesser prairie-chickens are known to use alfalfa fields throughout their range (U.S. Fish and Wildlife Service 2002), and exposure to organophosphorus insecticides appears to pose a potential direct threat. Chemical treatment to reduce sand sagebrush density may be detrimental to lesser prairie-chickens as has been found for other grassland bird species, especially when herbicides are applied over extensive solid-block treatment areas (Rodgers and Sexson 1990).

Development

Development may be a problem where incursions fragment, reduce, and/or degrade available lesser prairie-chicken habitat. In addition, development typically is accompanied by changes in land use practices and often introduces other changes that alter habitat suitability.

Road building and expansion may be a problem due to loss, fragmentation and degradation of habitat, noise, introduction of other disturbances, and mortality as a result of collisions with vehicles. In Texas, construction of an elevated road through a lek resulted in abandonment (Crawford and Bolen 1976b). Although the actual area occupied by a roadway may be relatively small, the total impact of a roadway on the surrounding habitat may be much greater. In a range-wide conservation assessment of the greater sage-grouse, Interstate 80 in southern Wyoming was found to have a significant impact on the distribution of leks, particularly within 4 km of the interstate (Connelly et al. 2004). This has been noted for other species of birds as well (Reijnen et al. 1995). Roadways create disturbed sites that are often favorable for incursion and/or spread of noxious weeds, and they may also increase the likelihood of wildfires (Connelly et al. 2004). Smaller roads may attract people with off-road vehicles that destroy vegetation (Bailey and Williams 2000). Noise pollution from vehicle traffic, oil/gas drilling operations, and gravel crushing operations

may degrade habitat quality for lesser prairie-chickens, but clear cause and effect relationships are difficult to quantify and most evidence is anecdotal (Massey 2001, Hagen et al. 2004, Hunt 2004). Moreover, impacts from noise may be confounded by the loss and fragmentation of habitat that usually accompanies such activities.

Oil and gas extraction sites directly eliminate habitat for lesser prairie-chickens; approximately 1.6 ha of habitat loss is associated with each site (Bailey and Williams 2000). Such activities also introduce roads that not only fragment habitat but may also contribute to degradation through incursions of weeds, predators, off road vehicles, vertical structures, and noise (Crawford and Bolen 1976b, Candelaria 1979, Davis et al. 1979). Bailey and Williams (2000) and Massey (2001) reported that lesser prairie-chickens in New Mexico are largely extirpated in areas where drilling operations are most dense. Hunt (2004) found that factors associated with petroleum development explained approximately 32 percent of the variation between active and inactive lek sites in New Mexico; leks in petroleum areas were much less likely to be active.

The resulting increase in habitat fragmentation and introduction of structures and human activity associated with development often create a cascade of environmental changes that affect habitat suitability. For instance, the diversity, abundance, and patterns of use by potential predators may be altered dramatically as human activity alters the natural landscape (Schroeder and Baydack 2001, Connelly et al. 2004). The introduction of vertical structures (e.g., trees, transmission lines, wind turbines, communication towers, buildings, and fences) increases nesting, perching, and roosting sites for raptors and corvids, and as such can impact lesser prairie-chicken populations by affecting the frequency of mortality by predation (Hagen et al. 2004). Fatal collisions with towers, lines, and fences have been recorded for many species of birds in prairie habitats (Faanes 1987), including lesser prairie-chickens. It has been suggested that lesser prairie-chickens may fly low to the ground, thus making collisions with fences more of a problem for them than other species of grouse (Bidwell 2003). The range of the lesser prairie-chicken is an area being targeted for development by wind power, due to the relatively high winds characteristic of northern Texas, western Oklahoma, western Kansas, eastern Colorado, and northeastern New Mexico (**Figure 12**; Elliott et al. 1987). Lesser prairie-chickens also may exhibit a behavioral aversion to anthropogenic structures in their environment (**Table 5**), indicating that the sphere of impact associated with these structures may be greater than supposed (Rodgers et al. 2000, Pitman 2003, Hagen et al. 2004, Robel 2004). Lesser prairie-chickens tended to avoid power lines and buildings in Kansas (Pitman 2003).

The planting of windbreaks, encroachment of eastern red cedar (*Juniperus virginiana*) and Osage orange (*Maclura pomifera*), and increased tree establishment in riparian areas degrade lesser prairie-chicken habitat by reducing the openness of grasslands. Tree encroachment in the eastern-most counties of their historical range is believed to limit the occurrence of lesser prairie-chickens. Collectively, these factors significantly contribute to landscape level changes recorded for areas with declining populations (Woodward et al. 2001). The negative impact of trees appears directly related to their use as perch and nest sites by potential predators and indirectly related to avoidance of vertical structures by lesser prairie-chickens.

Consumptive and non-consumptive recreational use

The role of regulated harvest as a factor in the decline or extirpation of some lesser prairie-chicken populations is not clear. Over-harvest of populations, particularly during the 1930s and 1950s, is one reason given for the long-term downward trend in lesser prairie-chicken populations (U.S. Fish and Wildlife Service 2001). The effects of hunting pressure may be disproportionately high for small or fragmented populations, as fragmentation of habitat may decrease the resilience of these populations to hunting (Braun et al. 1994). Hunter harvest of sharp-tailed grouse is known to have variable effects on populations; harvest rates acceptable in some populations may negatively impact others (Connelly et al. 1998). Recent analysis of patterns of mortality in hunted greater sage-grouse populations found that adult females sustain a higher hunting mortality during autumn than adult males, 42 percent and 15 percent, respectively (Connelly et al. 2000). They suggested that female greater sage-grouse may be more susceptible to hunting mortality than males because of their association with broods and brood behavior; males tend to be more dispersed at this time. In this case, hunting may be additive to winter mortality for sage-grouse, especially for females, and essentially reduce the spring breeding populations. If a similar pattern of hunting mortality of breeding age females occurs for lesser prairie-chickens, declining populations and those that are small and isolated may be especially vulnerable to hunting pressure.

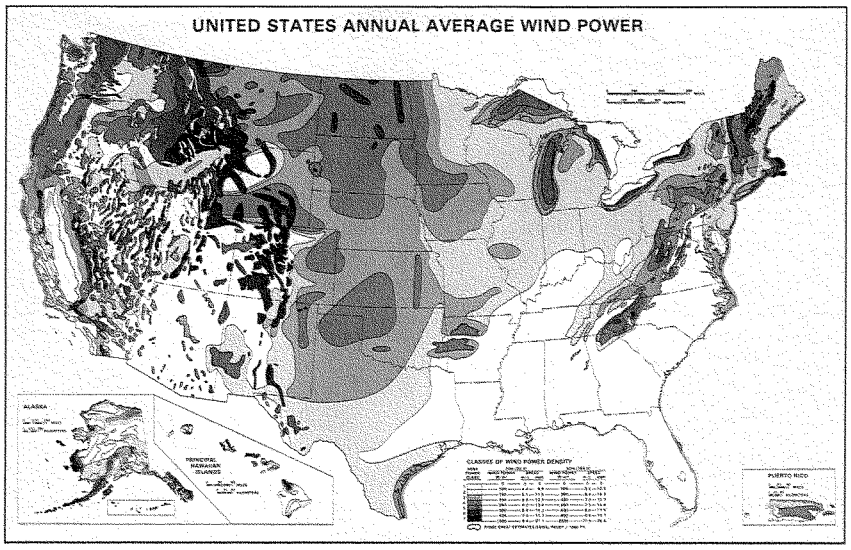

Figure 12. Map of average annual wind power and speed throughout the United States (http://rredc.nrel.gov/wind/pubs/atlas/maps/chap2/2-01m.html, December 1, 2004).

Table 5. Distances (m) to anthropogenic features from lesser prairie-chicken nest (n = 187), other use (n = 44), and non-use (n = 38) sites in southwestern Kansas (adapted from Hagen et al. 2004).

Use category	Power line	Wellhead	Building	Road
Nest sites	1,320	564	2,129	214
Other use sites	1,106	435	1,397	193
Non-use sites	666	446	1,061	178

The public has become increasingly interested in observing lesser prairie-chicken courtship behavior (**Figure 13**). This growing interest can be illustrated by the initiation of the first annual High Plains Prairie Chicken Festival in Milnesand, New Mexico in 2004 (http://www.birdingamerica.com/NewMexico/prairiechickenfestival.htm, March 3, 2005). The localized impact of bird watchers on courtship and breeding behavior at lek sites is unknown and may vary with factors such as degree of disturbance (number of times that leks are observed during the season), number of males attending the lek (U.S. Fish and Wildlife Service 2002), timing of observations, activity and behavior of observers, as well as other disturbances affecting a population. The disturbance threshold for lesser prairie-chickens may be difficult to quantify, but the cumulative impact of disturbance factors may be important, especially for small, isolated populations.

Tools and practices

Management approaches

Research and anecdotal observations of lesser prairie-chicken responses to management activities suggest that maintenance of viable populations is a critical component of any management plan. The following management elements should be considered in any plan (Bidwell 2003, Hagen et al. 2004):

- size of the management area

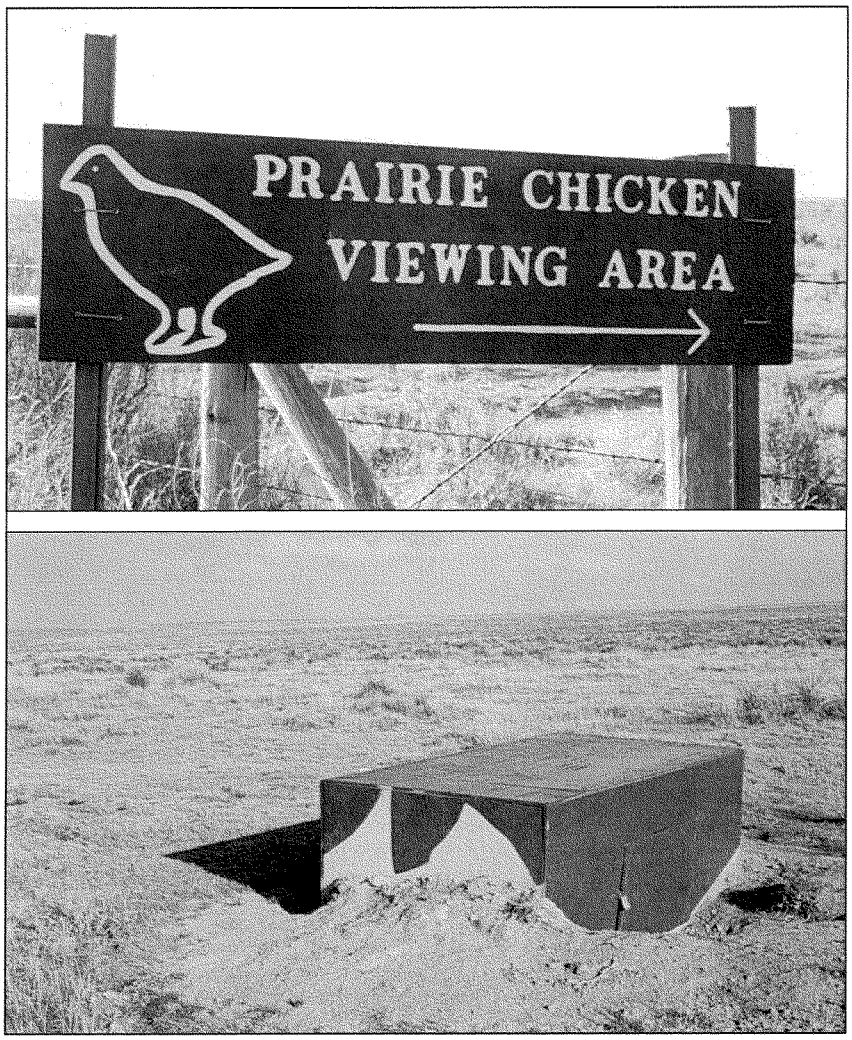

Figure 13. Sign and blind on lesser prairie-chicken lek on the Comanche National Grassland in southeastern Colorado. Photographs by Michael A. Schroeder.

- connection of adjacent sub-populations with suitable habitat
- incorporation of activities associated with livestock production and farming into the overall management scenario
- recommendations for land use activities that support seasonal and behavioral habitat requirements of lesser prairie-chickens
- consideration of the type and timing of potential disturbances, such as off-road vehicles, mineral extraction, wind turbines, and roads
- recommendations for harvest that consider timing, rate, production, and differential susceptibility by sex
- consideration of potential obstacles, including fences, power lines, towers, and guide wires
- development of scenarios for intervention, including habitat restoration and population introduction/augmentation
- consideration of management guidelines that will minimize the negative consequences of habitat degradation and fragmentation, including the increased risk of predation and nest parasitism
- development of research and adaptive management approaches to address questions pertaining to significant issues, such as survey protocol, habitat management and restoration, population viability, and accurate measures of population recruitment.

Hagen et al. (2004) also recommended development of a conservation plan for each state within the range of the lesser prairie-chicken.

In response to the petition for federal listing of the lesser prairie-chicken under the Endangered Species Act of 1973, federal, state, and private organizations united to form the Lesser Prairie-chicken Interstate Working Group (LPCIWG). The goal of this group is to work cooperatively to increase the range-wide distribution and abundance of lesser prairie-chickens so that federal listing would not be necessary. As a step toward achieving this goal, the LPCIWG published an "Assessment and Conservation Strategy for the Lesser Prairie-chicken (*Tympanuchus pallidicinctus*)" (Mote et al. 1998). This document was completed with cooperation from private landowners and other interest groups. It proposed to implement an adaptive management approach whereby recommendations are periodically modified to reflect increased understanding of lesser prairie-chicken biology.

Several management strategies were considered important by the LPCIWG (Mote et al. 1998). These focused on increasing our understanding of lesser prairie-chicken life history. Specific strategies include:

- determine current population status
- identify and evaluate historical and current status of habitat occupied by lesser prairie-chickens
- identify management practices that conserve habitat and are compatible with modern sustainable land use practices
- increase current knowledge of lesser prairie-chicken biology and management through research.

General habitat recommendations that were addressed by the LPCIWG (Mote et al. 1998) include:

- focus conservation efforts on currently occupied habitat
- manage rangeland for late seral stage vegetation to provide adequate nesting cover (i.e., utilize at most 25 to 35 percent of annual forage production)
- maintain large tracts of high quality nesting cover adjacent to lek sites and interspersed with adequate brood-rearing habitat
- conduct brush control in a manner not detrimental to lesser prairie chickens (i.e., maintain intermediate amounts of residual grass cover and avoid broad-scale control of large blocks of habitat; use localized spot treatment control measures only in areas where shrub canopy coverage is greater than 30 percent).

Management areas in sand sagebrush-dominated rangelands in Region 2 should be within or adjacent to currently occupied habitat, and they should be part of a

contiguous tract of habitat of at least 52 km^2. Specific features of the management area include a mean sand sagebrush density of 486 to 648 plants per ha and at least 10 percent of the area should have a Visual Obstruction Readings (VOR; Robel et al. 1970a) of at least 3.0 dm, with an average overall VOR of 1.0 dm (a minimum of 60 random VOR points should be used to determine the height density index; Mote et al. 1998).

Other plans exist within the range of the lesser prairie-chicken. Massey (2001) focuses on some of the generalities of management and, in particular, some of the socio-economic issues of lesser prairie-chicken management in New Mexico. Hunt (2004) recommended the elimination of overgrazing and a moratorium on petroleum development within areas occupied by lesser prairie-chickens in New Mexico. Bidwell (2003) suggested that 100 km^2 was the minimum land area needed to sustain a population in Oklahoma. Bidwell also has several other management recommendations, including:

- maintain grassland in a mosaic of successional stages using prescribed fire and livestock management
- eliminate widespread use of herbicides
- replace non-native plants in CRP lands with native plants
- consider food plots of 4 to 6 ha in size near protective cover
- remove trees from upland areas
- retain areas of dense grass within 1.6 km of historic lek sites.

In USFS Region 2, the Land and Resource Management Plan for the Pike and San Isabel National Forests, Comanche and Cimarron National Grasslands has guidelines for management of lesser prairie-chicken habitat (USDA Forest Service, Undated). Specific recommendations include:

- maintain plant species diversity of rangelands
- encourage native plant species
- protect leks from surface disturbance at all times
- protect nesting habitat from surface disturbance from 15 April to 30 June
- limit livestock/native herbivore forage use to 40 percent.

Declines in populations and genetic heterogeneity have been used as justification for efforts to augment and/or re-establish prairie-chicken populations. Between 1961 and 1994 transplant efforts involving the relocation of 245 lesser prairie-chickens were conducted both within and outside occupied range in Colorado; all transplant efforts failed to increase either the distribution or the number of birds in the state (Giesen 2000, Horton 2000). Failure in some cases resulted from too few birds released (many of these were males), as well as inadequate habitat to meet the seasonal requirements of lesser prairie-chickens (Toepfer et al. 1990, Giesen 2000). The failure of transplants in Colorado reflects the poor record of success for transplants of prairie grouse in general (Toepfer et al. 1990). Notable exceptions include translocations of greater prairie-chickens to help establish populations in formerly occupied range in northeastern Colorado and south-central Iowa, and augmentation to increase genetic heterogeneity of a small, isolated population of greater prairie-chickens in Illinois (Hoffman et al. 1992, Westemeier et al. 1998, Moe 1999).

Although most of these management activities and recommendations are reflected in the management recommendations of Hagen et al. (2004:77), there are some notable expansions. Hagen et al. (2004) recommends the identification of "Lesser Prairie-chicken Habitat Management Zones" of at least 4,096 km^2 throughout the range of lesser prairie-chickens. In an example of a potential management zone, Hagen et al. (2004) included the Cimarron National Grassland as a target area. They also recommended management of tracts of native habitat of at least 2,000 ha and within 30 km of adjacent tracts; smaller tracts with greater connectivity should also be managed (500 ha; Wildlife Habitat Management Institute 1999). Native grassland should comprise at least 63 percent of habitats managed for lesser prairie-chickens (Hagen et al. 2004). In addition, nesting habitat should be characterized by residual grasses greater than 40 cm tall that provide good vertical and horizontal protection, increased shrub cover in areas with reduced herbaceous cover, and a configuration with relatively open forb-rich brood habitats.

In recent years, considerable quantities of cropland in Region 2 have been enrolled in federal programs such as the CRP and the Environmental Quality Incentives Program (EQIP; Wildlife Habitat Management Institute 1999, Riley 2004). The restoration of prairie habitats with these incentives represents a broad-scale change in land use and has the potential to dramatically improve habitat and landscape conditions for lesser prairie-chickens.

Preferably, adaptive management can be applied to the needs of lesser prairie-chickens (Aldridge et al. 2004). Regardless of the quality of these plans, Robel (2004:122) noted "that any plan, no matter how well designed, that is not implemented aggressively is about as useful as wet toilet paper."

Inventory and monitoring

Monitoring of populations: Surveys to locate lesser prairie-chickens are conducted during the early spring when males are congregated on lek sites. Survey protocol generally follows the methodology outlined by Hamerstrom and Hamerstrom (1973); however, modifications by various state agencies have been made to accommodate funding and personnel available to complete the surveys. The work of Hamerstrom and Hamerstrom (1973) in Wisconsin summarizes findings of an extensive study of a marked population of greater prairie-chickens. This study has served as a valuable reference, in part, because many of the monitoring techniques used by the Hamerstroms became the foundation for surveys of other species of prairie grouse (i.e., greater prairie-chickens, sharp-tailed grouse, greater sage-grouse).

Survey efforts in the range of the lesser prairie-chicken generally last a month and overlap the peak in female lek attendance (Giesen 2000, Jensen et al. 2000). A higher proportion of leks are detected when surveys are conducted during the peak of female lek visitation. Surveys usually are conducted during the period when birds are most active, 45 minutes prior to sunrise and for 1 to 2 hours after sunrise (Copelin 1963, Crawford and Bolen 1975). Calm, clear mornings are best, as the "gobbling" sound produced by males can be audible for approximately 3 km. An observer determines the presence of active lek sites by listening at intervals along a predetermined survey route and recording all audible leks within a 1.6 km radius of the stop (Horton 2000). There has been increased effort to monitor number of leks within a determined area (Horton 2000, Sullivan et al. 2000), as lek density may also be a useful index of long-term population change (Cannon and Knopf 1981b). Survey routes through occupied lesser prairie-chicken range are monitored to determine an index of population abundance. Leks detected along the survey route and leks known to be active in previous years are visited one or two times per year, and the number of birds present is recorded (Giesen 2000, Horton 2000). In many cases, these surveys have been conducted for several years.

Cannon and Knopf (1981b) suggested that lek density (all leks within a given area), instead of the number of males on leks, could be used to derive a lek index that reflects population changes, and they recommended that surveys encompass an area of at least 2100 to 4200 ha. Although transect routes may be randomly selected, roads are not randomly distributed through lesser prairie-chicken habitat. Roads also may create edge habitats that influence lesser prairie-chicken behavior (Applegate 2000). It also is possible that permanent leks may be more detectable than temporary leks (Schroeder and Braun 1992, Haukos and Smith 1999). Consequently, annual surveys that determine the presence of satellite leks as well as known (i.e., permanent) leks are important for increasing the reliability of lek data as an index to long-term population change (Giesen 2000).

Various other factors such as weather, timing (time of year and day), predators, survey effort, and observer bias (Copelin 1963, Applegate 2000) may also influence detection of leks. Local changes in lek densities and male lek attendance are also assumed to represent changes at a broader scale, however, this may not be a valid assumption. For instance, fluctuations in lek visitation may be caused by local, rather than regional, changes in the pattern of male lek attendance (Schroeder and Braun 1992). Additionally, accuracy of male lek attendance data is influenced by numerous factors such as the methods used to determine the count (flushing vs. observation), lek stability, timing, and number of surveys conducted (Schroeder and Braun 1992, Applegate 2000). Furthermore, estimates of lek density are rarely determined with a corresponding estimate of precision (Schroeder and Braun 1992). For example, assumptions regarding sex ratios, proportion of males attending leks, sampling areas, and proportion of the population observable in the sampling area need to be verified (Applegate 2000); multiplying the number of birds per area by the area of total occupied habitat does not account for the effect of habitat fragmentation (Walsh 1995).

Despite the potential problems with lek surveys, they appear to offer the best opportunity to monitor

populations over the long-term (greater prairie-chickens, Schroeder and Braun 1992). Connelly et al. (2004) showed that data collected with counts of greater sage-grouse leks were defendable in long-term trend evaluations. It also is likely that monitoring sage-grouse leks is more problematic than monitoring greater prairie-chicken leks due to the higher variability and lower male visitation rates of sage-grouse (Jenni and Hartzler 1978, Emmons and Braun 1984, Schroeder and Braun 1992, Walsh et al. 2004). Even so, it is important to recognize the limits of lek survey data as a method of monitoring lesser prairie-chicken populations. Lek survey data can be used to determine the presence or absence of lesser prairie-chickens in potential habitat and provide indices of population change (Applegate 2000). Whether these indices represent local or broad-scale changes depends on the sampling design (i.e., stratification of the survey routes, number of transects, and/or areas surveyed). In addition to annual survey routes, efforts to locate and estimate the density of leks have been attempted with aircraft (Schroeder et al. 1992).

Breeding Bird Survey (BBS) data and Audubon Christmas Bird Counts (CBC) provide information regarding the regional distribution of lesser prairie-chickens. However, BBS routes are not distributed uniformly throughout Region 2, and CBCs are typically centered around developed areas (towns, cities) and are conducted during December when lesser prairie-chickens may be difficult to detect. In general, information gathered from various sources is used to evaluate and determine distributional changes for prairie grouse. This includes information collected from historical records, published literature, museum specimens, agency survey data, hunter surveys, miscellaneous observations, and presence of available, suitable habitat (see Schroeder et al. 2004 for greater sage-grouse example).

Monitoring of habitats: Important aspects of habitat monitoring are the measurements used and their scale and timing. Johnson (1980) described habitat selection as a hierarchical process and used different levels of selection to illustrate this process. First-order selection represents the geographic range, second-order the home range, third-order the use of the different habitat components in the home range, and fourth-order is use of specific resources in these habitats. The orders range from macro-scale to micro-scale components of habitat selection, and examination of both scales is important for understanding animal-habitat relationships (Litvaitis et al. 1994).

At the broadest scale, habitat data can be collected by maps, aerial photographs, and satellite imagery (Litvaitis et al. 1994, Samson et al. 2004). This scale of resolution provides general information regarding distribution of the major habitat types occupied or potentially occupied by lesser prairie-chickens. Satellite imagery can refine this picture further by discerning the degree of fragmentation within the general range. Satellite imagery also can indicate changes in habitat type over time; for example, conversion of native grassland habitat to cultivated agriculture or conversion of cropland to CRP. However, in some cases confusion may occur among land-cover classes with similar spectral characteristics (Washington Department of Fish and Wildlife 2000). General habitat surveys also tend to result in classification by vegetation type rather than by condition, even though condition of occupied and potential habitat plays a major role in the distribution and abundance of lesser prairie-chickens.

The next level of resolution is to examine lesser prairie-chicken habitat at a local scale, where birds occur. At the local scale, factors such as habitat patch size and configuration in the landscape, vegetation type and succession, cover density and height, and juxtaposition of habitats are important variables to monitor. Within lesser prairie-chicken home ranges, practices such as grazing, farming, mowing, burning, and spraying all influence the availability of resources and how birds use habitat. To monitor the effects of habitat at the local scale, sampling could be done through stratified sampling of areas of low, medium, and high lesser prairie-chicken densities. These areas and the habitats they encompass would be monitored simultaneously to evaluate population responses to various habitat variables. Numerous techniques have been employed to address specific features of lesser prairie-chicken habitat, such as species composition and cover and height of grasses, shrubs, forbs, and residual vegetation. These techniques include, but are not limited to, line intercept (Canfield 1941), point intercept (Evans and Love 1957), Daubenmire plot (Daubenmire 1959), ocular estimate (Daubenmire 1968), and point intercept frame (Floyd and Anderson 1982). There has not been a clear effort to standardize sampling techniques across the range (see Connelly et al. 2003 for greater sage-grouse example).

Information Needs

Although lesser prairie-chickens have been studied for several decades, many aspects of their basic

biology, ecology, and management, at broad and local scales, are poorly understood (Applegate et al. 2004). For example, we still lack critical information on dispersal, recruitment, and the importance of parasites and infectious diseases (Peterson 2004). This lack of research makes it challenging to address many of the issues important for the management of lesser prairie-chicken populations.

An accurate range-wide assessment of the distribution and abundance of lesser prairie-chickens and their habitats is critical for the implementation and evaluation of management or conservation plans. In particular, specific information on population size and connectivity is needed. This is important since populations may cross political boundaries and require cooperative management efforts among numerous agencies. Lek survey data are used as indices of population change; thus, the development and implementation of a standardized, statistically valid technique is needed to monitor population densities of lesser prairie-chickens (Giesen 1998, Mote et al. 1998, Hagen et al. 2004). Accurate estimates of lesser prairie-chicken populations are needed to evaluate and monitor management strategies at both the broad and local scales in Region 2. This necessitates accurate information regarding sex ratios, male and female lek attendance, and lek stability (Mote et al. 1998, Giesen 2000). Even more importantly, this necessitates the establishment of a relationship between survey results and actual long-term trends (Connelly et al. 2004, Walsh et al. 2004).

The metapopulation dynamics of lesser prairie-chicken populations need to be examined. This will require an improved understanding of the relationship between behavior (dispersal, migration, home range), seasonal habitat selection, and characteristics of the habitat (quality, quantity, and configuration). In addition, the genetic ramifications of population isolation need to be quantified so that the appropriate time and techniques for intervention (such as with population augmentations and predator controls) can be determined (Hagen et al. 2004).

At both the broad and local scale the relationship between lesser prairie-chickens and habitat needs further understanding, especially in sand sagebrush grasslands. Considerations of habitat quantity, quality, configuration, fragmentation, seasonal habitat needs and nutritional requirements, and limiting factors are all important. Habitat fragmentation is increasingly common, and accurate information is needed regarding aspects of habitat use (patterns of movement and patch size), nest/brood success, and recruitment rate in fragmented landscapes. The nest/brood period potentially is a demographic bottle-neck for lesser prairie-chickens, especially during drought. Consequently, it is important to understand how habitat can mitigate mortality factors during this period.

Although populations of lesser prairie-chickens in Kansas have responded positively to the CRP, long-term uncertainty in the future of the program needs to be considered in future management plans. In addition, it is important to evaluate the reasons why some CRP habitats are used by lesser prairie-chickens and others apparently are not.

Grazing of rangeland can impact lesser prairie-chicken populations significantly when grazing practices do not leave adequate residual vegetation to meet seasonal habitat requirements. Negative impacts attributed to grazing are exacerbated by drought conditions that periodically occur throughout the lesser prairie-chicken's range. Grazing practices that are economically feasible for livestock producers and beneficial for lesser prairie-chickens need to be determined.

Prairie systems have been largely converted for the production of row crops across the Great Plains, and the few remaining patches of prairie have been subdivided with fences into grazing allotments. Samson et al. (2004:11) suggested that "fences are the problem in, not the solution to, conservation of historically grazed ecosystems." In any case, research on the restoration of prairie ecosystems is desperately needed, not only for the lesser prairie-chicken, but for the many other species of wildlife that depend on grasslands for their survival (Rich et al. 2004, Samson et al. 2004).

DEFINITIONS

The terms "use", "selection", and "preference" generally are used when examining the relationship between a species and its habitat. "Use" indicates an association with a resource; "selection" implies actively choosing a particular resource from an available range of options (Johnson 1980, Litvaitis et al. 1994). Habitat selection occurs at a broad range of scales; macro-scale characteristics include biogeographic and home range, and micro-scale characteristics include specific features at use sites such as stem density, canopy cover height, and percent bare ground (Johnson 1980, Litvaitis et al. 1994). "Preference" for a particular resource is determined independent of its availability and usually is evaluated by experimental manipulation, such as with habitat exclosures (Litvaitis et al. 1994).

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