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**THE NORTH AMERICAN  
GROUSE MANAGEMENT PLAN:  
a prospectus**

*The North American Grouse Management Plan is a cooperative effort among public agencies, private organizations and individuals to conserve, restore and enhance the habitats necessary to support self-sustaining and harvestable populations of grouse throughout North America.*

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## EXECUTIVE SUMMARY

Grouse, perhaps more than any other assemblage of birds, are icons of North America's wild and vast landscapes. They are part of the cultural heritage of Native Americans who emulated grouse breeding rituals in traditional dances and incorporated grouse feathers in clothing. These birds were an important food source for Native Americans as well as early pioneers and are still regarded as prized game birds by millions of hunters. In recent years, the public is increasingly interested in viewing the elaborate and spectacular courtship displays of the many species of native grouse.

One of the earliest laws to manage wildlife populations in North America was enacted in 1791 to protect the heath hen (an eastern prairie grouse) from excessive market hunting. However, efforts to save the heath hen ultimately failed in 1932 when the last bird disappeared from Martha's Vineyard, Massachusetts. Today, the Attwater's prairie-chicken in Texas is on the brink of extinction, a reminder of the fate of the heath hen. Other grouse species are experiencing significant declines and face an uncertain future. These declines are associated with numerous factors including the loss, degradation, and fragmentation of native habitats.

Grouse depend on high quality habitats distributed across broad landscapes. Because of the large areas required, they are dependent on both publicly- and privately-owned land in both the United States and Canada. Regardless of ownership, habitat quality largely is determined by privately driven activities including grazing, mining, logging, and recreation. Therefore, successful efforts to manage and conserve North American grouse must be integrated with the needs of individuals and groups that depend on the land's resources.

The North American Grouse Management Plan is a partnership among public agencies, private organizations, and individuals to conserve, restore and enhance the habitats necessary to support self-sustaining populations of grouse throughout North America. This plan establishes a vision for the future of grouse as well as a framework for conservation and management action. It is written to help focus resources on the habitats necessary for the survival and restoration of grouse populations. Because the landscapes used by grouse are among the most ecologically imperiled, addressing the management needs of grouse also will benefit assemblages of wildlife dependent on similar habitats.

The North American Grouse Management Plan represents the first effort to develop a cooperative management strategy for all grouse in North America. It is designed to aid local and/or species-specific planning efforts by providing a comprehensive framework for international and inter-agency cooperation. By providing a vision for grouse restoration, management, and research, we believe this effort will ensure that the remaining grouse in North America will not only survive but also will flourish in perpetuity.

## INTRODUCTION

Grouse are an important group of game birds found throughout the northern hemisphere, occurring in most terrestrial ecosystems. In North America, a long-standing relationship exists between humans and grouse. Before people of European descent reached our shores, grouse were a part of the culture of the endemic peoples. For example, displays of the sharp-tailed grouse were incorporated into dances of the Plains Indians tribes, and pottery of western tribes.

As Europeans explored the continent, a new recognition of grouse began to emerge. On June 5, 1805, near the confluence of the Marias and Missouri rivers in Montana, the explorer Meriwether Lewis wrote; “I saw a flock of the mountain cock [greater sage-grouse], or a large species of heath hen with a long pointed tail which the Indians informed us were common to the Rockey [Rocky] Mountains”.

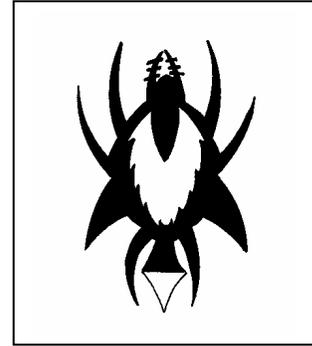


Figure 1. Sage grouse figure found on ancient Native American pottery

Today, North American grouse species continue to be valued by landowners, hunters, birders, native peoples, and others. Recreational interest in grouse generates millions of dollars to the North American economy annually.

Eleven species of grouse occur in North American prairies, shrublands, forests, and tundras. Because grouse are charismatic, prized for harvest, and occupy a majority of the terrestrial ecosystems in North America, they are ideal flagship species for ecosystem management. Further, the habitat scale and diversity required for grouse conservation exceeds that of most other birds, and rivals that of large carnivores such as bears, wolves, and mountain lion. Therefore, managing for grouse will result in significant benefits not only to other wildlife and plant species, but also to the ecosystems upon which they and humans depend. This Plan addresses land use, habitat management, and landscape connectivity affecting grouse and hundreds of associated species throughout North America.

While an abundance and diversity of habitats support these grouse species, local populations and some species and subspecies increasingly are affected by human land use. Resource managers are challenged to design recommendations that integrate the needs of grouse with expanding human demands. Because grouse require vast landscapes of suitable habitat, it is apparent that management on a local scale will not help grouse in the long-term unless local efforts are integrated across broader regions. Cooperative grouse management across state, provincial, and international borders is essential.

This Plan is designed to facilitate conservation efforts that transcend political and social boundaries. It will serve as a guide for the participation of diverse private organizations and public agencies in the conservation and management of North American grouse. These parties

necessarily include landowners, ranchers, farmers, hunters, naturalists, industrial users, and aboriginal peoples. Organizations must move forward in a coordinated, partnership approach that will bring together a synergy of creative ideas, approaches, strategies, and funding. Because individual geographical and political circumstances are affected by local realities, this Plan outlines the scope of work on a continental scale and provides broad strategies for habitat protection and management actions. Implementing this Plan depends on responsible expertise in each country, province, state, and region to formulate reasonable action plans for habitat conservation and management within their respective jurisdictions.

This document first describes a vision for the restoration and maintenance of self-sustaining and harvestable populations of North American grouse, followed by a description of grouse distribution, abundance, and status across North America. Next, because habitats are key to future success, a habitat vision is described that focuses on the principles and concepts of ecosystem management. An appraisal of challenges and opportunities for grouse management then is discussed, which builds upon the previous sections. The Plan concludes with a series of action-oriented recommendations that charge all agencies and individuals with tasks for achieving success. In short, the North American Grouse Management Plan will ensure that grouse populations will continue in perpetuity throughout the North American continent.

## VISION AND GOALS FOR GROUSE

Through the strength and resources of various grouse management partnerships throughout North America, ranging from conservation organizations to industry to private individuals and sportsmen, the North American Grouse Management Plan (Plan) will provide direction for ensuring healthy grouse populations in perpetuity. The primary goal of this plan is to restore, maintain, and enhance the habitats necessary for self-sustaining and harvestable populations of North American grouse. This goal will be addressed through the restoration and management of key habitats of suitable quantity, quality, and configuration. This Plan will establish habitat and land use guidance upon which partnerships can take action to benefit grouse as resources are allocated. The specific goals of the Plan are to support and facilitate:

1. the restoration and management of breeding populations that are both self-sustaining and harvestable throughout North America. The health of these populations should eliminate any need for federal, state, or provincial listing of species, subspecies, or populations as threatened or endangered.
2. the maintenance or enhancement of grouse species and subspecies diversity in every appropriate Bird Conservation Region (BCR) in North America by using habitat management and/or translocations to re-establish populations in portions of BCR's essential to their sustainability.
3. the development and adoption of ecosystem-based habitat benchmarks that ensure self-sustaining and harvestable populations of all grouse species. For some species, this necessarily may require habitat restoration and expansion; for others it may require simply enhancing current monitoring of existing populations.
4. the assurance of long-term genetic **health** of all grouse species, subspecies, and important populations by managing gene flow through augmentation or habitat connectivity.
5. the development and implementation of standardized protocols for comprehensive, range-wide monitoring of grouse populations and the habitats upon which they depend.
6. the development and implementation of species- and area-specific conservation, recovery, and management plans that will be integrated into an overarching North American Grouse Management Plan.
7. the consistent use of grouse as Flagship Species for the conservation of key habitats and landscapes on public and private lands, as a recognized component of 'all-bird' conservation, as prescribed by the North American Bird Conservation Initiative.
8. population and habitat research necessary to achieve the goals of this Plan.

## **DISTRIBUTION, ABUNDANCE, AND STATUS OF GROUSE**

### **GENERAL**

North America is home to 11 species of grouse that are categorized into three groups; ptarmigan, forest grouse, and prairie grouse. Ptarmigan depend on alpine and arctic tundra, forest grouse depend on forest-dominated or transitional habitats; and prairie grouse generally occupy prairie, shrublands, and/or transitional habitats between prairie and open woodlands. Grouse currently are, or historically were, found in almost all provinces, territories, and states (Table 1). Grouse now occur within 30 of the 37 BCRs in the United States and Canada (Table 2).

Chicken-like in appearance, grouse range in size from less than one to over six pounds. Together, grouse share several anatomical and behavioral features that make them unique in the bird world. All grouse have fowl-like beaks, four toes, 10 primary feathers, well-developed aftershafts on the contour feathers, large crops, feathered legs, and feathered nostrils. They nest on the ground, incubation of the eggs and rearing of the young is by the female alone (with one exception), and the young are fully-feathered and capable of obtaining their own food at the time of hatch.

Grouse legally are defined as non-migratory. However, grouse may move long distances between seasonally occupied habitats and require vast landscapes to support all aspects of their life cycles. Because seasonal movements of grouse generally are short, or at least localized within a single region, grouse can be considered year-round residents within most of their range. Nevertheless, research has shown that grouse require large areas for their annual habitat and breeding requirements. Furthermore, the areas of suitable and inter-connected habitats that are required to support self-sustaining populations are immense.

Current estimates of grouse in North America exceed 10,000,000 birds (Table 1), but many of these estimates (especially in northern regions) and distribution maps are supported with extremely little data. While current distribution maps depict contiguous populations throughout portions of their range, populations often are significantly more fragmented than they appear. Southern populations of grouse and those occupying prairie and steppe habitats appear to be smallest. These same populations also illustrate the most distinct population declines.

Table 1. Estimated spring populations of grouse in North America (most data published in 2000 by I. Storch, Grouse Specialist Group of the World Pheasant Association).

Grouse species	United States			Canada			North America	
	Estimate	Trend	Status	Estimate	Trend	Status	Estimate	Trend
<b>Prairie grouse</b>								
Lesser prairie-chicken	25,000	Declining	Candidate <sup>a</sup>	0	Absent	Not native	25,000	Declining
Greater prairie-chicken	600,000	Declining	Variable <sup>b</sup>	0	Absent	Extinct	600,000	Declining
Sharp-tailed grouse	>100,000	Declining	Variable <sup>c</sup>	>1,000,000	Declining	Variable <sup>c</sup>	>1,100,000	Declining
Greater sage-grouse	137,000	Declining	Variable <sup>d</sup>	<1,000	Declining	Endangered	138,000	Declining
Gunnison sage-grouse	3,000	Declining	Candidate <sup>a</sup>	0	Absent	Not native	3,000	Declining
<b>Forest grouse</b>								
Blue grouse	400,000	Declining	Harvestable	600,000	Declining	Harvestable	1,000,000	Declining
Ruffed grouse	>1,000,000	Not clear	Harvestable	>1,000,000	Not clear	Harvestable	>2,000,000	Not clear
Spruce grouse	>500,000	Declining	Harvestable	>1,000,000	Not clear	Harvestable	>1,500,000	Not clear
<b>Ptarmigan</b>								
White-tailed ptarmigan	>100,000	Not clear	Harvestable	>100,000	Not clear	Harvestable	>200,000	Not clear
Willow ptarmigan	>1,000,000	Not clear	Harvestable	>1,000,000	Not clear	Harvestable	>2,000,000	Not clear
Rock ptarmigan	>1,000,000	Not clear	Harvestable	>1,000,000	Not clear	Harvestable	>2,000,000	Not clear
<b>Total</b>	<b>&gt;4,865,000</b>	<b>Declining</b>		<b>&gt;5,701,000</b>	<b>Declining</b>		<b>&gt;10,566,000</b>	<b>Declining</b>

<sup>a</sup>Candidate for federal listing as either endangered or threatened. The lesser prairie-chicken is still hunted in some areas.

<sup>b</sup>The heath hen subspecies became extinct in 1932, the Attwater's prairie-chicken subspecies is federally listed as endangered (approximately 50 birds in two small and isolated populations, and the other subspecies is harvestable).

<sup>c</sup>The New Mexican subspecies is extinct, the Columbian subspecies is a subspecies of federal concern in the United States and Canada, and the other subspecies are harvestable.

<sup>d</sup>The population of greater sage-grouse in Washington and northern Oregon is a candidate for federal listing as either endangered or threatened and other greater sage-grouse are harvestable.

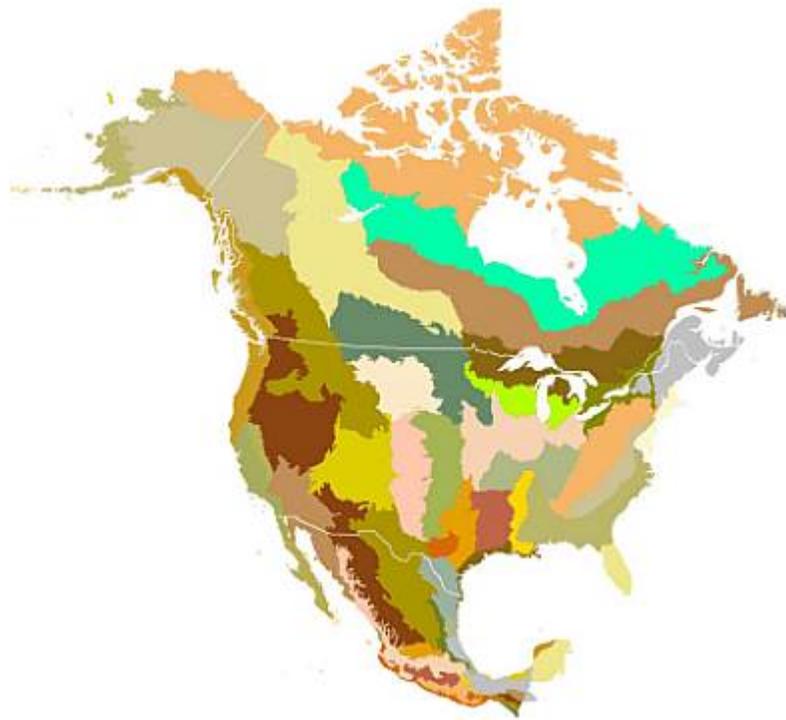


Table 3. Current and extirpated distribution of grouse in relation to Bird Conservation Regions.

Bird Conservation Region (region number)	Lesser prairie-chicken	Greater prairie-chicken	Sharp-tailed grouse	Greater sage-grouse	Gunnison sage grouse	Blue grouse	Ruffed grouse	Spruce grouse	White-tailed ptarmigan	Willow ptarmigan	Rock ptarmigan
	Core area of occupation	Marginal area of occupation	Core area where extinct	Marginal area where extinct							
Aleutian/Bering Sea Islands (1)											
Western Alaska (2)											
Arctic Plains and Mountains (3)											
Northwestern Interior Forest (4)											
Northern Pacific Rainforest (5)											
Boreal Taiga Plains (6)											
Taiga Shield and Hudson Plains (7)											
Boreal Softwood Shield (8)											
Great Basin (9)											
Northern Rockies (10)											
Prairie Potholes (11)											
Boreal Hardwood Transition (12)											
Lower Great Lakes/St. Lawrence Plain (13)											
Atlantic Northern Forest (14)											
Sierra Nevada (15)											
Southern Rockies/Colorado Plateau (16)											
Badlands and Prairies (17)											
Shortgrass Prairie (18)											
Central Mixed-grass Prairie (19)											
Edwards Plateau (20)											
Oaks and Prairies (21)											



## PRAIRIE GROUSE

Five species of grouse depend on prairie, steppe, or shrub-steppe habitats for all or most of their annual life cycle (Table 2). Although the most important component of these habitats, particularly for nesting and early brood-rearing, is herbaceous (grasses and forbs), some also depend on other habitat components. For example, both species of sage-grouse depend on the leaves of sagebrush as a food source and the cover of sagebrush for nesting and predator avoidance. Greater prairie-chickens depend on grain and sharp-tailed grouse depend on deciduous trees and shrubs for winter food in some regions.

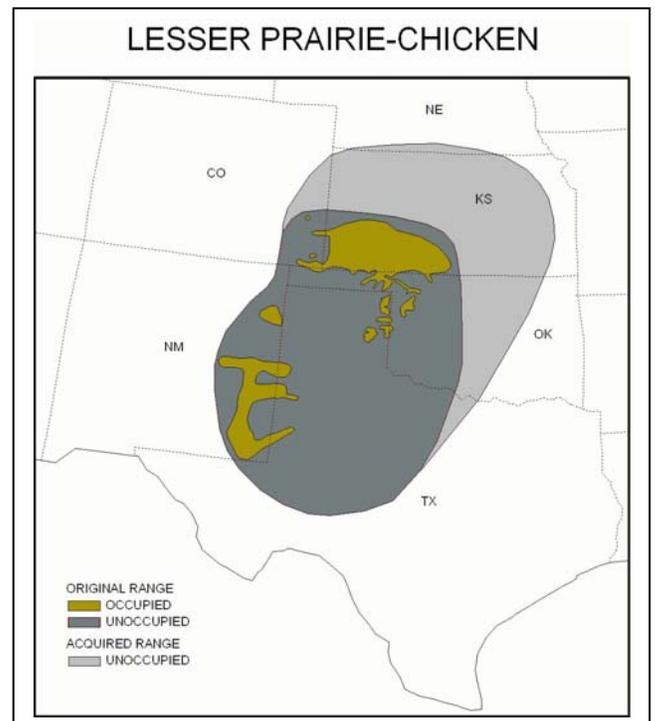
In most cases, prairie grouse are associated closely with the activities of man. In some situations, the relationship can be positive. For example, there is evidence that greater prairie-chickens expanded their range dramatically during the late 1800s as agriculture was increased in the Midwest. Nevertheless, intensive agriculture during the latter half of the 1900s largely has had a negative effect on prairie grouse (Table 2). There have been extinctions of subspecies and populations, federal listings as threatened or endangered, and many conservation concerns for all 5 species. The prairie grouse have been studied more than other species of grouse and all but the northern populations of sharp-tailed grouse are regularly monitored.

### Lesser prairie-chicken

*Trends: Distribution and abundance are declining in most portions of the range, except the areas dominated by Conservation Reserve Program habitat in southwestern Kansas. They have been extirpated from many portions of their original and acquired range.*

*Status: They are a federal candidate for range-wide listing as a threatened species in the United States. Legal harvest only remains in Kansas and Texas; populations in Oklahoma, New Mexico, and Colorado are not hunted.*

*Regions: They primarily are found in the sand sagebrush and shinnery oak grassland habitats of the Shortgrass Prairie and Central Mixed-grass Prairie.*

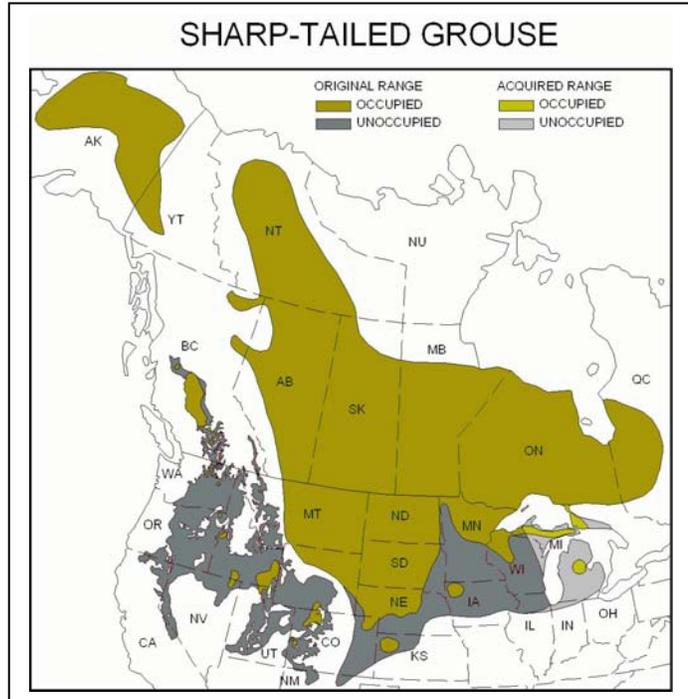




## Sharp-tailed grouse

*Trends: Sharp-tailed grouse are the most widely distributed and adaptable of all species of prairie grouse. Nevertheless, many populations in southern portions of the range (mostly in the U.S.) are extirpated or declining. Northern populations largely are unstudied.*

*Status: The New Mexican subspecies is extinct. The Columbian subspecies has been petitioned for listing as threatened or endangered in the U.S., but the Columbian, plains, and prairie subspecies are extirpated and/or declining in portions of their ranges. All subspecies are harvested legally in many states and provinces.*



*Regions: Remaining populations primarily are found in the shrub-steppe, mountain shrub, savannah, and mixed prairie habitats of the Northwestern Interior Forest, Boreal Taiga Plains, Taiga Shield and Hudson Plains, Boreal Softwood Shield, Great Basin, Northern Rockies, Prairie Potholes, Boreal Hardwood Transition, Badlands and Prairies, and Central Mixed-grass Prairie regions.*

## Greater sage-grouse

*Trends: Distribution and abundance are declining in most portions of the range. They have been extirpated from many peripheral and localized areas.*

*Status: They are considered threatened in Canada and are a federal candidate for listing as threatened in the United States.*

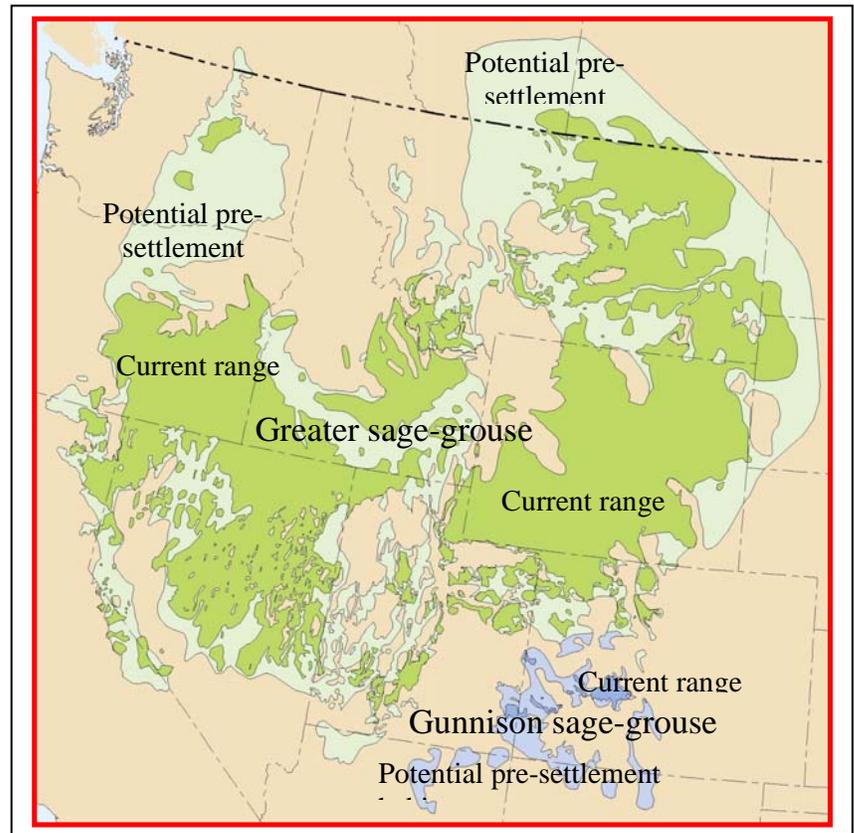
*Regions: They primarily are found in the sagebrush-dominated habitats of the Great Basin, Northern Rockies, Southern Rockies/Colorado Plateau, Prairie Potholes, and Badlands and Prairies.*

## Gunnison sage-grouse

*Trends: Distribution and abundance are declining in all portions of the range. They have been extirpated from most of their known historical distribution.*

*Status: They are a federal candidate for listing as a threatened species in the United States.*

*Regions: They are found in only one region, the Southern Rockies/Colorado Plateau.*



## **FOREST GROUSE**

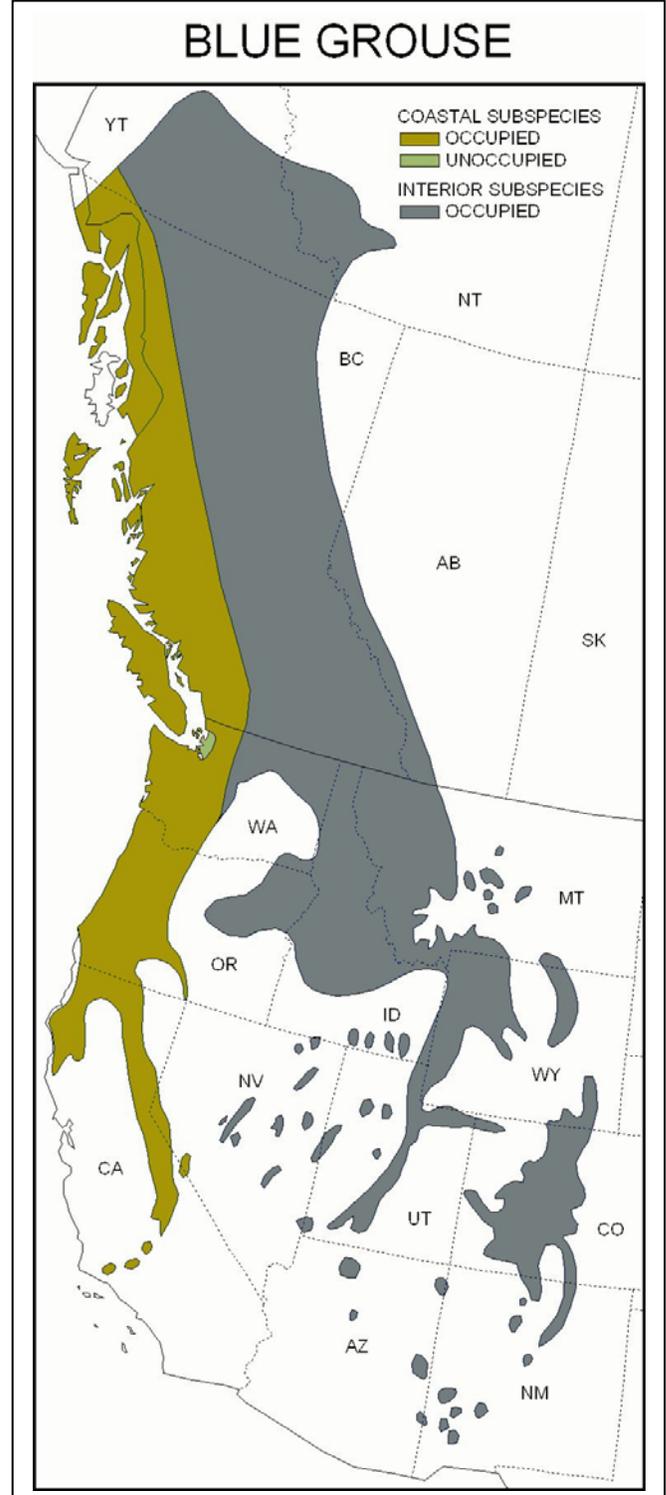
Three species of grouse that depend on forest habitats for all or most of their annual life cycle (Table 2). Spruce grouse largely are dependent on coniferous forest, ruffed grouse on mixed or deciduous forest, and blue grouse on alpine forests and shrublands. The largest impacts on forest grouse are with forest management. Because of their dependence on open habitats in portions of their range, blue grouse may be found nesting and brood rearing in the same habitats as prairie grouse (sage-grouse and sharp-tailed grouse), and even with ptarmigan in alpine tundra areas. Consequently, the same factors that influence these other species also can influence blue grouse. This is the primary reason why blue grouse have shown downward trends and why ruffed grouse and spruce grouse have been less influenced (Table 2). It is not unusual to have more than 1 species of forest grouse in the same general area, particularly in the mountains. All three species are insufficiently monitored, especially in northern portions of their ranges.

## Blue grouse

*Trends: Distribution appears to be relatively unchanged, except in areas of development (such as the Seattle-Tacoma area). Trends in abundance of coastal subspecies (Sierra, Sooty, and Sitkan) appear to fluctuate up and down depending on variation in forest structure, succession, and management. Trends in interior subspecies (Dusky, Oregon, Richardson, Mount Pinos, and Great Basin) appear to be relatively unchanged in the higher elevation habitats and somewhat downward in the lower elevation habitats.*

*Status: Blue grouse are not threatened or endangered in any portion of their range. There is a legal harvest in most portions of their range. Nevertheless, concerns exist for blue grouse that are in decline in localized areas.*

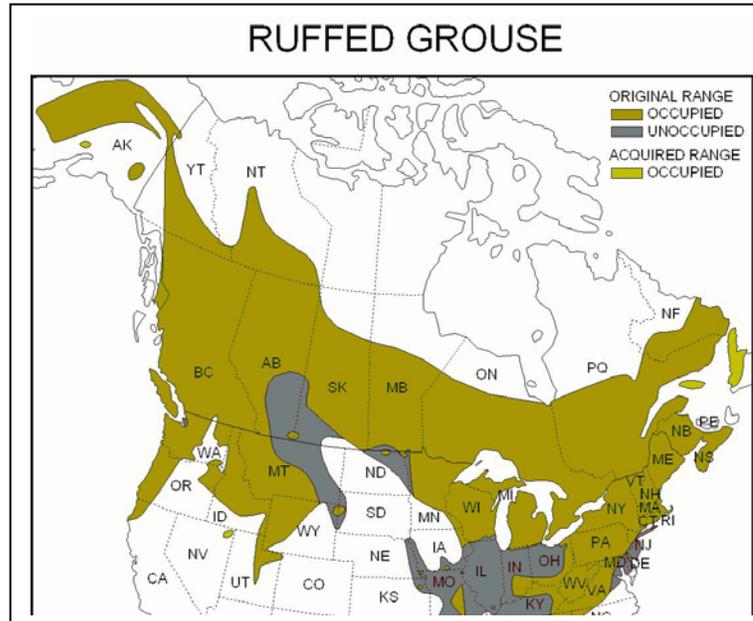
*Regions: Coastal blue grouse populations primarily are found in the forest habitats of the Northern Pacific Rainforest, Sierra Nevada, and Coastal California regions. Because interior blue grouse appear to migrate between open habitats during the breeding season and forested habitats during winter, they are found in a broad range of habitat types including shrub-steppe, mountain shrub, forests, and alpine. The primary regions of occupation include the Northwestern Interior Forest, Boreal Taiga Plains, Great Basin, Northern Rockies, Southern Rockies/Colorado Plateau, and Sierra Madre Occidental.*



## Ruffed grouse

*Trends: Ruffed grouse distribution has declined in peripheral and marginal habitats adjacent to grasslands and in areas with substantial development. Trends in many portions of their range, particularly in the north, are unknown.*

*Status: Ruffed grouse are not threatened or endangered in any substantial portions of their range. They also are hunted throughout most of their range.*

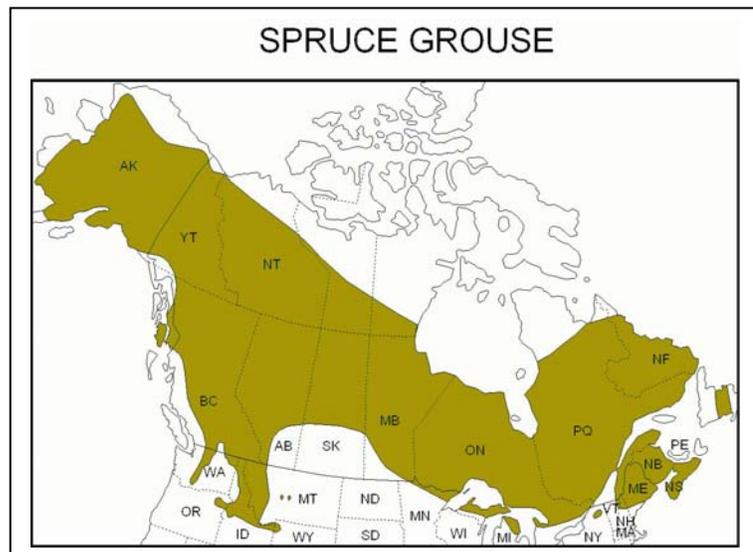


*Regions: The primary regions of occupation are mixed and deciduous forests of the Northwestern Interior Forest, Northern Pacific Rainforest, Boreal Taiga Plains, Boreal Softwood Shield, Great Basin, Northern Rockies, Prairie Potholes, Boreal Hardwood Transition, Lower Great Lakes/St. Lawrence Plain, and Atlantic Northern Forest.*

## Spruce grouse

*Trends: Distribution and abundance appear to be unchanged, except in areas where altered forest management may have an impact. Trends in most areas are unknown.*

*Status: Spruce grouse are not listed federally, but are considered endangered in Vermont and New York, threatened in Wisconsin, and a species of special concern in Michigan and New Hampshire. They are hunted in most intact portions of their range.*



*Regions: The primary regions of occupation are coniferous forests of the Arctic Plains and Mountains, Western Alaska, Northwestern Interior Forest, Northern Pacific Rainforest, Boreal Taiga Plains, Taiga Shield and Hudson Plains, Boreal Softwood Shield, Great Basin, Northern Rockies, Boreal Hardwood Transition, and Atlantic Northern Forest.*

## PTARMIGAN

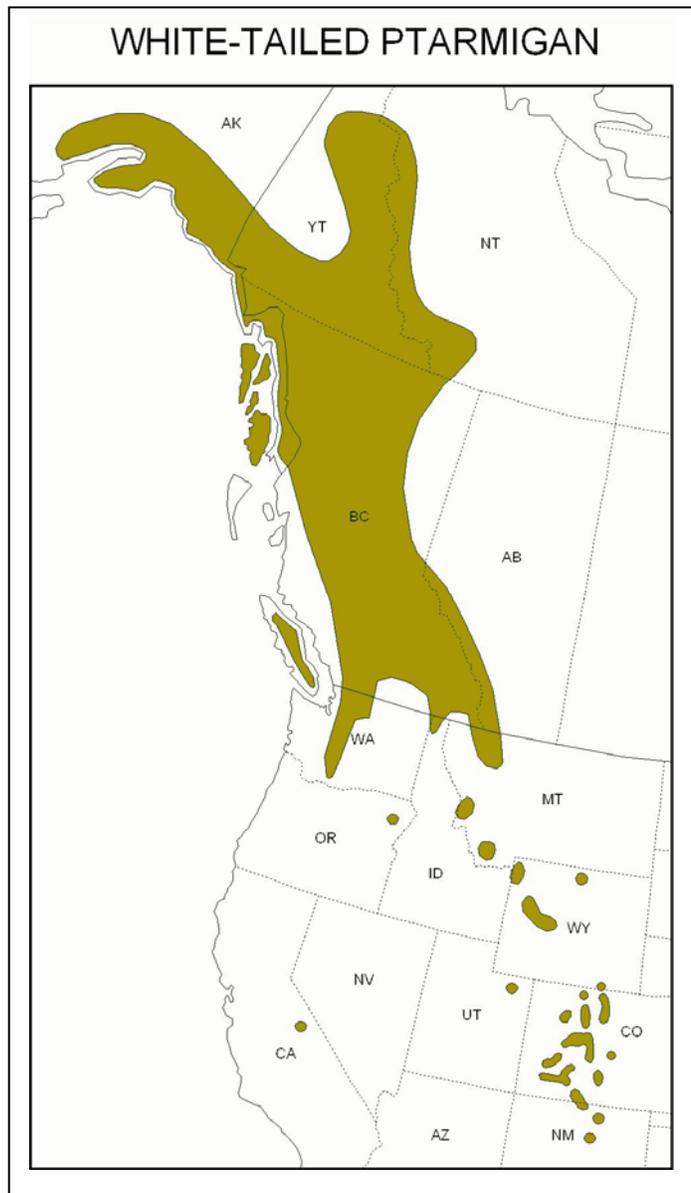
There are 3 species of ptarmigan that depend on alpine or arctic tundra for all or most of their annual life cycle (Table 2). Rock ptarmigan largely depend on relatively barren tundra habitats while willow ptarmigan tend to use relatively lush tundra habitats. White-tailed ptarmigan use a mix of tundra habitats and rocky sites, but only when they are found in alpine areas. Because willow and rock ptarmigan can use alpine tundra in addition to arctic tundra, some mountainous areas may be inhabited by all 3 species. In general, these species are inadequately monitored.

### White-tailed ptarmigan

*Trends: Distribution and abundance appear to be unchanged, except in a few areas where translocation efforts may have expanded the distribution (such as California, Oregon, Utah, and New Mexico). Trends in most areas, particularly the north, are unknown.*

*Status: White-tailed ptarmigan are not threatened or endangered in any portions of their range. Nevertheless, because they occupy small 'islands' of suitable habitat in some mountainous areas, they are believed to be susceptible to disturbance and/or development. They are hunted in Colorado, Wyoming, Alaska, British Columbia, Alberta, Yukon Territory, and Northwest Territories.*

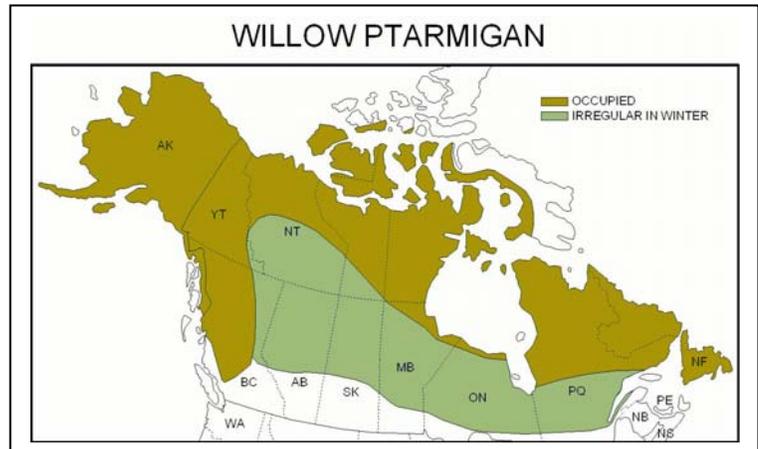
*Regions: The primary regions of white-tailed ptarmigan occupation are alpine tundra of the Northwestern Interior Forest, Northern Pacific Rainforest, Great Basin, Northern Rockies, Sierra Nevada, and Southern Rockies/Colorado Plateau.*



## Willow ptarmigan

*Trends: Distribution and abundance of willow ptarmigan appear to be either unchanged or poorly documented.*

*Status: Willow ptarmigan are hunted legally in most areas where they occur and they are not listed as either threatened or endangered.*

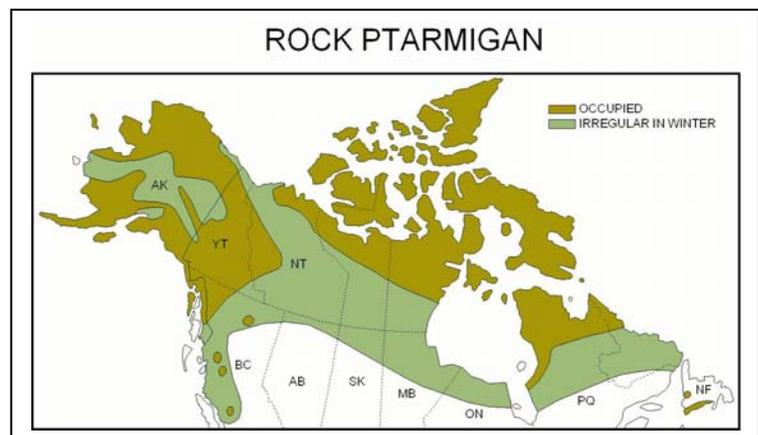


*Regions: The primary regions of occupation are arctic and alpine tundra of the Aleutian/Bering Sea Islands, Western Alaska, Arctic Plains and Mountains, Northwestern Interior Forest, Northern Pacific Rainforest, Boreal Taiga Plains, Taiga Shield and Hudson Plains, Boreal Softwood Shield, and Northern Rockies.*

## Rock ptarmigan

*Trends: Distribution and abundance of rock ptarmigan appear to be either unchanged or poorly documented.*

*Status: Rock ptarmigan are hunted legally in most areas where they occur and are not listed federally as either threatened or endangered.*



*Regions: The primary regions of occupation are arctic and alpine tundra of the Aleutian/Bering Sea Islands, Western Alaska, Arctic Plains and Mountains, Northwestern Interior Forest, Northern Pacific Rainforest, Boreal Taiga Plains, Taiga Shield and Hudson Plains, and Boreal Softwood Shield.*

## Strategy for Habitat Conservation

**Habitat: Area that provides the necessary food, cover, water, space, and other criteria for a species to occur.**

**Landscape: a vast area containing numerous ecological communities.**

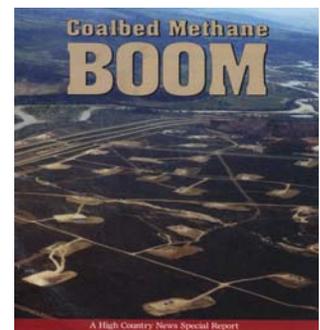
**Ecological community: an association of interacting soils, hydrology, plants and animals that occur repeatedly within a landscape.**

The primary conservation objective of this Plan is to maintain, restore, and enhance **habitat**. To accomplish this objective, an **ecosystem management approach** is required because grouse require a mosaic of several specific **ecological communities** across a **landscape** to provide for their habitat needs. Using an ecosystem management approach within BCRs to address grouse habitat needs also will provide quality habitat for most other terrestrial species within the BCR. Because of their breadth of occurrence across terrestrial ecosystems and their complexity of habitat requirements, grouse are excellent Flagship Species for conservation planning.

Grouse adapted to the diversity of ecological communities that historically occurred within a BCR. The diversity of ecological communities within a BCR resulted from both the complexity of abiotic factors and the historical disturbance regimes within each BCR. Grouse habitat needs can best be met by providing appropriate amounts and distributions of the specific types of ecological communities that occurred historically within a BCR. Where complete ecosystem restoration is not feasible or desirable, grouse habitat needs can be met by providing those needs within human-modified ecosystems. For example, conservation planning teams may adopt clumped, low-profile coalbed methane extraction methods over traditional methods that fragment grouse habitat to a greater degree (See photos below).



VS



Photos courtesy of Fidelity Development and Production Company, and High Country News.

**Ecosystem management approach: a conservation planning approach that considers the composition, structure, functions, and processes of ecological communities occurring within a landscape. It uses a reference to the characteristics of ecological communities that occurred in an area historically, and strives to provide representation of these ecological communities while integrating human economic and social demands.**

its historical scope and diversity of ecological communities, and the how grouse historically used these communities. Then, the current health of remaining ecological communities should then be assessed. Comparison of historical amounts to current amounts of each specific community and its corresponding grouse population will identify the most critical habitat shortages. Conservation goals can then be easily identified, by the desired amount, scale, composition, and distribution of specific ecological communities that grouse need to thrive. Conservation planning must also include an assessment of habitat fragmentation within each BCR. Isolated patches of habitat can be identified, as well as incentives to create linkage zones. Understanding and quantifying the desired ecological communities within each BCR will establish conservation goals that all partners can work toward in their own ways.

Incentive programs such as Conservation Programs within the US Farm Bill can be prioritized to assist private landowners in contributing to these goals. Compatible grazing, forestry, energy production, or other uses can be described and used as appropriate management tools in conservation actions.

The ecosystem management approach recommended here will be a primary conservation focus of this Plan, and will allow for quantified performance measures at landscape, ecological community, and species levels. Monitoring, maintenance, or restoration of habitat and grouse population responses can provide an adaptive management framework to continually assess and refine conservation actions. Lands devoted to other land uses within each BCR can still provide important or essential conservation benefits to grouse populations. These areas should incorporate the management considerations discussed in the next section.

## **CHALLENGES TO GROUSE CONSERVATION**

## GENERAL

While the primary needs of grouse are high quality habitats that provide the various conditions that each species has evolved to utilize, grouse also can obtain many of their habitat needs in human-altered areas. Many resource use and management activities can impact the quality of grouse habitat. The results of these interactions (Table 4) can produce positive effects if grouse needs are recognized and incorporated into plans. In contrast, many resource uses and management activities can have detrimental effects on grouse habitat if the needs of grouse are not known to, or are ignored by, resource managers. The cumulative impact of individually minor activities can be overwhelming to grouse populations. This section strives to provide an overview of the types of management activities that can interact with grouse habitat. Partnerships that allow for the infusion of grouse needs into resource management plans can provide tremendous benefits to grouse.

Table 4. Potential interactions between grouse and various management activities can vary dramatically in both positive and negative ways. In addition management activities often are not mutually exclusive and may have cumulative impacts.

		Lesser prairie-chicken	Greater prairie-chicken	Sharp-tailed grouse	Greater sage-grouse	Gunnison sage grouse	Blue grouse	Ruffed grouse	Spruce grouse	White-tailed ptarmigan	Willow ptarmigan	Rock ptarmigan								
<table border="1"> <tr> <td style="background-color: #0056b3; width: 20px; height: 15px;"></td> <td>Strong interaction</td> </tr> <tr> <td style="background-color: #66b3ff; width: 20px; height: 15px;"></td> <td>Moderate interaction</td> </tr> <tr> <td style="background-color: #cce5ff; width: 20px; height: 15px;"></td> <td>Minimal interaction</td> </tr> <tr> <td style="background-color: #ffffff; width: 20px; height: 15px;"></td> <td>No interaction</td> </tr> </table>		Strong interaction		Moderate interaction		Minimal interaction		No interaction	General management activity											
		Strong interaction																		
		Moderate interaction																		
		Minimal interaction																		
	No interaction																			
Specific management activity																				
Livestock and farming activities																				
Grazing timing and intensity																				
Fences																				
Prescribed fires																				
Planting of non-native vegetation																				
Herbicides and pesticides																				
Direct disturbance by livestock																				
Cultivation of native habitat																				
Mowing																				
Stubble retention in crop fields																				
Crop selection																				



## **LIVESTOCK MANAGEMENT**

Livestock grazing is one of the dominant land uses on public and private lands throughout the range of North American grouse. Along with associated activities, it affects more than a billion acres of occupied or historically occupied grouse habitats as well as a western lifestyle recognized throughout the world as an integral part of American heritage. The interactions between livestock grazing and habitats vary from region to region, and even from ranch to ranch. Grazing is essential to maintain the health of native grasslands, and it can be used as a management tool in grasslands as well as to enhance desirable plant communities in other habitats. As with so many other types of land use, grazing is a double-edged sword, and when over-utilized, can severely degrade the habitats upon which grouse depend for survival and reproduction. In addition to the direct impacts of grazing, other associated factors, to include fencing, herbicides and pesticides, reduction of wetlands, and extensive alteration of native vegetation may negatively impact survival and production of grouse.

## **FARMING ACTIVITIES**

As American pioneers moved westward, agricultural conversion moved across the plains with them. The original distribution of prairie grouse such as greater and lesser prairie-chickens, sharp-tailed grouse, and even sage-grouse species expanded considerably as these early agricultural efforts resulted in additional food sources for the birds. However, such initial farming efforts were limited to what could be tilled by horses, mules, or oxen. Thus, the ratio of healthy native rangelands to tilled plots was never threatened. While prairie grouse survive in areas with a mixture of healthy native rangelands and shrublands with agricultural practices committed to corn, milo, and other head grains, grouse populations generally cannot thrive when agricultural landscapes predominate. Healthy native rangelands are needed for native food sources, breeding display (lekking) grounds, nesting and brood rearing habitat, loafing areas, predator escape areas, and roosting areas.

Agricultural lands are used seasonally by prairie grouse. During fall and winter, greater and lesser prairie-chickens, and sharp-tailed grouse as well, often fly in and feed in harvested head grain fields for perhaps a half hour after sunrise, return to native vegetation during the day, and again return to feed on waste grain during the late afternoon prior to sunset. During spring and summer, all of these birds tend to occupy native habitat foraging on insects and native vegetation, including a variety of native forbs.

Spraying of alfalfa fields with specific chemicals has been documented to be deadly to sage grouse broods in certain instances, and spraying for both forb (weed) control and insects such as grasshoppers can also have negative indirect effects. Grouse utilize forbs and grasshoppers as a very significant part of their diet with the former being important for healthy egg production and the latter essential as a protein source for juveniles and adults alike.

While agricultural fields, should in no way be deemed a substitute for extensive tracts of healthy and diverse native rangelands in the proportions described above, several aspects of agricultural operations are important with regards to encouraging grouse survival. Modern "clean

farming" methods are detrimental to grouse. Leaving stubble that is 12 inches or taller provides cover for grouse feeding on waste grain in the fields.

Agricultural fields often are surrounded by fences, as are grazing lands. Whether barbed wire or single-strand electric, such fences can be deadly for grouse. During normal situations, grouse fly unharmed over these wires daily. However, when pursued by raptors or other perceived threats, grouse fly low to the ground in panicked flight while seeking escape cover. While birds are attempting to evade capture, they often collide at high speeds with top fence strands. Studies indicate such collisions result in enough additional mortality that weak populations may be extirpated over time.

## **FORESTRY PRACTICES**

Forest grouse depend upon a range of successional conditions. Early successional conditions can be created by either natural disturbances or through silvicultural treatments. Grouse habitat can be benefited in many areas by the application of appropriate silvicultural practices. However, silvicultural practices also have the potential to negatively affect grouse habitat. Through partnerships, grouse habitat needs can be identified and communicated to forest practitioners to maintain and restore grouse habitat.

## **RESOURCE EXTRACTION**

Energy exploration and development occur on private and public surface lands throughout the western range of North American grouse. Although the effects of oil and gas developments on grouse are poorly understood, recent studies suggest that active mineral resource development negatively impacts prairie grouse, particularly during the breeding season. The cumulative impacts of roads, increased traffic, well pads, pipelines, overhead transmission lines, compressor stations, and production facilities not only result in direct habitat loss but fragment the remaining suitable habitat, deterring use by grouse.

Presently little is known on how wind power developments affect grouse. Human disturbance, turbine noise, and physical movement of turbines during operation have the potential to disturb nesting grouse. The effects of habitat fragmentation may indirectly affect local grouse populations by decreasing the area of habitat available for nesting and brood-rearing. In addition to the effects of habitat fragmentation, the avoidance of vertical structures and man-made infrastructures by grouse may further impact grouse movements and habitat use.

## **RECREATION**

### **Harvest**

Historically, hunting was the primary recreation activity associated with grouse populations but its effects were poorly documented. Although there is little evidence that hunting negatively impacts grouse populations, potential exists for hunting mortality to be additive in years of poor chick production. Additionally, hunting may be additive to over-winter mortality for many grouse species. Because grouse typically occupy large expanses of habitat, the potential for overexploitation is minimal. However, where populations occur in a more fragmented landscape there is greater potential for localized over-harvest. If hunting seasons are set too early, chicks and brood hens may be more susceptible to harvest than other cohorts in the population, which could affect the population adversely. However, hunting can provide information on populations not available through other means. Wings collected from hunters can provide valuable population information on reproductive effort and recruitment into the population. Thus hunting seasons and regulations can be established to optimize the information gathered by state agencies.

### **Dog trials**

Little is known about the effects of dog trials and dog-induced disturbances on grouse; however, dog training activities may have a negative impact on grouse productivity if trainers work their dogs on broods and then communicate the location of broods to other trainers.

### **Down-hill skiing**

There are no data demonstrating the impacts of down-hill skiing on grouse populations in North America (typically the species impacted would be limited to forest grouse and possibly ptarmigan). However, substantial mortality has been documented in European grouse associated with bird collisions with ski-lift cables. The linear trails created by ski resorts also provide a potential for increasing predator corridors in the forest. The noise and disturbance of ski resorts may deter grouse from using habitats adjacent to ski trails and facilities. Trails for skiing may serve as lush alpine meadows during early summer and serve as brood habitat for forest grouse.

### **Snowmobiling, All Terrain Vehicles (motorized and nonmotorized)**

The noise and human disturbance associated with snowmobiles and all terrain vehicles (ATVs) likely is detrimental to grouse species and their usage of various habitats. However, there are no data indicating these potential effects. Similar to down-hill skiing, the trails associated with snowmobiling likely will serve as a mechanism for habitat fragmentation and may create predator corridors. ATV trails can exacerbate habitat degradation through soil erosion and incursion of invasive plant species. However, designating areas specifically for

these recreational activities will minimize the disturbances and potential habitat degradation by confining the disturbance to a relatively small area on the landscape.

### **Birdwatching and photography**

Non-consumptive uses of wildlife are thought to have the least impact on species. When conducted properly, these activities perhaps are the most benign, but clearly are negative when such activities disrupt reproductive performance. Potential exists for this conflict to occur because grouse are most conspicuous during the breeding season, which coincides with the majority of non-consumptive activities. Photography and bird watching at the peak of female visitation to breeding territories can have negative affects, as sustained disturbance over years has led to abandonment of breeding areas. Many opportunities exist for non-consumptive uses of grouse that, in turn, increase outreach and education for the species. These activities should be fostered when possible.

## **MISCELLANEOUS**

### **Transportation infrastructure**

The construction of paved highways and the subsequent flow of traffic are a mechanism for habitat fragmentation. The disturbance to the soil during construction may make areas susceptible to invasive plant species and noxious weeds. The travel lane itself can be a direct cause of bird mortality through vehicle collisions. Such fragmentation may increase the amount of edge habitat preferred by ring-necked pheasants and in small isolated prairie grouse populations pheasants may out-compete grouse. Once a road is in place, other utility right-of-ways usually are installed. Although clustering of human development may minimize the disturbance to grouse, if not properly placed in the landscape, direct mortality may occur (i.e., power line or fence collisions) more frequently when grouse are proximate to roads. Nest site selection and patch occupancy of sage-grouse species appears to be correlated negatively with distance to the nearest road.

### **Power lines/Fences**

Vertical structures often are negative for non-forest grouse, where such features (e.g., powerlines, fences) serve as perceived or actual raptor perches. Direct mortality due to power line collision has been documented in North American and European grouse. The proportion of grouse that strike wires and die later from injuries sustained at impact is not known. In treeless landscapes such vertical features are thought to act as a fragmenting mechanism whereby grouse avoid such features because they are associated with obstructing their view of potential predators. Nesting prairie chickens have been documented to nest further from power lines and other vertical structures than would be expected at random. Power line collisions may be reduced for some avian species by reduction in overhead wire levels and by wire-marking. However, these mitigation measures only reduce collision mortality and do not solve it, thus adequate route

planning is necessary. Collisions with fences may be a significant mortality factor for prairie grouse, and is likely related to the density of fence within an area.

### **Other development**

The construction of golf courses, track housing, electric generating power plants, and wind farms (this list is not meant to be exhaustive) result directly in habitat loss. However, the ecological footprint of such human disturbance potentially can be much larger, because the traffic and maintenance associated with such facilities provides continuous disturbance that may impact the surrounding area. Prairie chickens in Kansas were found to avoid otherwise suitable habitats within 1.5 km of a coal-fired electric generating power plant, housing developments, and a golf-course. Opportunities exist to mitigate these impacts on grouse habitat by clustering developments, conducting land swaps, and/or funding habitat restoration work in nearby areas.

### **Wild ungulates**

Over-utilization of browse and herbaceous forage by wild ungulates has the potential to negatively impact both the breeding cycle as well as winter survival of many grouse species. Wild ungulate foraging that reduces the shrub or grass composition (as in the case of domestic livestock, see previous section) and may cause a reduction in nesting success. Additionally the overexploitation of willow by elk could be detrimental to winter habitats of ptarmigan and sharp-tailed grouse. Opportunities exist to manage ungulate harvests, thereby increasing the forage quality for grouse.

## ACTIONS

### RECOMMENDATIONS

#### General recommendations

- Achieving the recommendations in the NAGMP depends on the shared responsibilities and efforts of state, provincial and federal governments and nongovernmental organizations in Canada and the United States. The funding to implement and achieve the goals in this plan likely exceed those currently allocated by various levels of government in both countries. Nonetheless, future funding should be secured through novel and innovative conservation and management strategies, such as legislation (i.e., 2007 US Farm Bill, Canada's ALU Strategy), cost-share programs, partnerships, and private initiatives.
- Education and extension services are imperative to enhancing the public's knowledge of grouse ecology and management. Because some grouse species' habitat is almost entirely dependent upon private land, the cooperation and support of the public is critical, especially in farming and ranching communities.
- Financial incentives will be necessary to encourage farmers and ranchers to manage lands for grouse production and maintenance—nesting and brood rearing are critical to all species, but winter habitat is limiting to some species (e.g., sage grouse, ptarmigan).
- Land management agencies should be encouraged to regulate land use practices such that they do not destroy or degrade grouse habitats. In many instances, this can be done through enhanced regional planning, which often results in low or no-cost initiatives and management strategies.
- The logistical and financial support of private conservation organizations such as the North American Grouse Partnership, Prairie Grouse Technical Council and Ruffed Grouse Society are critical to the implementation of the NAGMP.
- Public lands and public and private projects should be managed to increase the sustainability of grouse populations, and in particular, planning should include the prevention or mitigation of destruction or degradation of grouse habitats as a necessary and required environmental component in environmental regulations, guidelines, and licensing.
- Grouse Management Partnerships, modeled after the NAWMP Joint Ventures, should serve as the delivery mechanism for NAGMP programs. GMP's will be comprised of representative from government, non-government organizations.
- Private and government entities should cooperate with legislators to establish new sources of funding for state and provincial agencies to utilize in implementing this Plan. Because the habitat benefits of the Plan's prescriptions extend to many game and

nongame species, this should be a priority of the International Association of Fish and Wildlife Agencies.

### **Habitat recommendations**

- Restoration, enhancement, conservation and, where possible, protection of habitat are the most important factors that will ensure viable grouse populations called for in the NAGMP vision and goals. Such actions should include an ecosystem management approach, to ensure patch connectivity at the landscape scale and plant species composition or structure at the community scale, with the understanding that management at either scale may have an effect on the other.
- Because many grouse populations are isolated as a result of fragmented habitat, a process needs to be initiated in which fragments are reconnected via habitat corridors. These corridors might include restoration of native habitat or a mix of CRP and native lands. Reconnecting populations likely will result in their ability to withstand the vagaries of stochastic events and increase gene flow among them. This is a long-term process and priority areas and species should be identified immediately.
- An improvement in the inventory and monitoring of grouse habitat in North America, at the landscape, community, and species levels is essential. An action plan should be developed to establish the sequence of critical areas that require priority in inventory.
- Understanding the relationship between grouse numbers and their habitats is critical to the evaluation process of the NAGMP. These improvements will facilitate the prioritizing of habitats to be managed for a given species, and should provide more efficient management in a region. Review and evaluation of achieving goals in the plan should occur at 5 yr intervals. A science-based, adaptive management strategy is essential in this area, and will need to be developed and implemented by a NA Grouse Research Advisory Committee.
- Assessing grouse habitat conditions on a yearly basis and modifying certain programs under federal farm conservation programs may be essential in certain critical situations. Haying and grazing of CRP, for example, should not be allowed in important portions of prairie grouse range during drought years. A standard protocol for making these determinations should be developed and implemented. A similar provision should be in place to govern grazing of federal lands and extraction of mineral and forest resources.

- Much research is needed to increase our understanding of the effects of land use practices on breeding success and (in some species) winter survival. In conjunction with conservation organizations, methods for integrating sustainable grazing and agricultural practices and natural resource extraction methods should be demonstrated to the appropriate land use group.

### **Population recommendations**

- A need exists to standardize spring population surveys for each grouse species so that local, regional and national population estimates are directly comparable and population goals can be evaluated. Standardized methods should improve accuracy and precision of current methods. Methods for assessing yearly production need to be identified for many species of grouse. Much research is needed to identify the best monitoring methods for each species.
- A need exists to monitor harvests and other population information through a series of standardized “Wing-bees” at local, regional, and national levels. These may be based on BCRs or other relevant biological boundaries. Such monitoring also could provide tissue samples important to genetic information not otherwise available. This may require changes in hunting regulations to ensure that the appropriate information can be gained from wings.
- The effects of hunting mortality on grouse are poorly understood and future research efforts should evaluate the effects of season opening dates, season lengths, and bag-limits on recruitment into the spring populations. It is recommended that regulations should remain fixed for a minimum of 5-yrs to evaluate the impacts of such on population parameters of interest.
- The effects of disease and parasites on grouse populations are poorly documented in most species. Further work should be conducted to identify if these organisms are limiting to grouse populations.
- Linkages between population and habitat variables need to be established, and research projects to enable these cause-effect relationships should be developed by the NA Grouse Research Advisory Committee. In particular, the management variables described in Table 4 of the NAGMP should be assessed and updated as a top priority for all species.

### **NAGMP ADMINISTRATION**

The North American Grouse Management Plan is a comprehensive and forward-looking document that has identified an approach for ensuring the restoration and maintenance of self-sustaining and harvestable levels of populations of North American grouse at levels desired by the people who use and enjoy them. In order to ensure that the NAGMP remains innovative and successful, its administration will become the responsibility of a cadre of biologists, managers,

ecologists, landowners, and many others. Planning for the future will continue to be an important necessity to enable the Plan to achieve the vision described herein. Through an adaptive approach, the NAGMP will enable grouse management agencies and interested individuals to coordinate and better establish their short and long-term interests and needs and develop and implement projects that will address the maintenance of all grouse species on the North American continent.

In order to achieve these needs, a series of NAGMP committees should be established to monitor and update the Plan, coordinate current work, facilitate development of Grouse Management Partnerships, and allow for sharing of important information to enhance management and program delivery. Federal, state, provincial, territorial, nongovernment, and private agencies that have a responsibility or interest in grouse management should provide representation to the Committees of the Plan. Committees and subcommittees would suggest recommendations for actions within the scope of the Plan and their respective mandates.

- The NAGMP will be developed by a diverse group of key partners under the guidance of the International Association of Fish and Wildlife Agencies. This work group will:
  1. develop its mandate and create its bylaws and operating procedures for conducting business, as a necessary first step. Robert's Rules of Order would apply unless otherwise altered.
  2. create various Subcommittees (i.e., NA Grouse Management Partnerships Implementation Subcommittee, NA Grouse Research Advisory Subcommittee, NA Grouse Management Plan Review Subcommittee, etc.) in order to ensure that the charge provided to the Committee is efficiently and effectively achieved.
  3. serve as a forum for discussion of long-term international grouse issues, and translate those into recommendations for consideration of the cooperating countries.
  4. update the NAGMP generally every five years, while also allowing for annual revisions through an adaptive management process where situations arise that require this to be done.
  5. review the scientific and technical data on the status and dynamics of grouse populations and their habitats as they relate to the vision of this Plan.
  6. review and monitor progress toward achieving the vision of the Plan.
  7. serve as a clearinghouse and information source for management plans developed by and for state, provincial, regional, federal, nongovernment, and private organizations.
  8. provide recommendations to the respective government agencies of both countries respecting actions to be taken to restore and maintain viable and harvestable levels of populations of North American grouse at levels desired by the people who use and enjoy them.
  9. conduct such other business as may from time to time become appropriate.
- Membership of the Committee will consist of:
  1. one person from each provincial and state agency that maintains grouse populations within their jurisdiction.

2. one person from each Canadian and US federal agency region that maintains grouse populations within their jurisdiction.
  3. one person from each nongovernment agency that manages grouse, and regional or species or subspecies representatives of the same agency, as appropriate.
  4. one private landowner or corporate representative from each state or province that maintain grouse populations
- Members of the Committee would be appointed by their agency, serve 3-year terms, and be eligible for reappointment. The Committee would meet at least three times annually, at the Fall Annual Meeting of the International Association of Fish and Wildlife Agencies, at the Spring Annual North American Wildlife and Natural Resources Conference, and at the Annual Meeting of the North American Grouse Partnership. Other meetings may be set with 30-day notice provided to all members.
  - The Committee will elect a Chair at its first meeting.

## **IMPLEMENTATION SCHEDULE**

The NAGMP is a broad framework that describes the overall scope of requirements for management of grouse populations throughout Canada and the United States. To implement this important Agreement, the two nations, through the International Association of Fish and Wildlife Agencies, should move to complete the following Steps to Success, in the time frame described.

1. By October 2004, the NAGMP will be finalized and presented at the Annual Meeting of the International Association of Fish and Wildlife Agencies. Formal creation of a NAGMP working group of the International should be completed.
2. By March 2005, all agencies responsible for or interested in management of grouse in their respective jurisdictions should be signatories to the Plan. The official unveiling and announcement of the NAGMP should coincide with the 70<sup>th</sup> North American Wildlife and Natural Resources Conference to be held in Arlington, Virginia. An additional official announcement and unveiling should occur at the 2005 Annual Meeting of the North American Grouse Partnership.
3. By October 2005, the NAGMP Committee should hold its inaugural meeting, establish its terms of reference and bylaws, and elect its Chair. Subcommittees of the NAGMP Committee should be established as required, and terms of reference for Grouse Management Partnership Agreements should be released.
4. By March 2006, the NAGMP Committee, Subcommittees, and Grouse Management Partnerships will meet to assess their progress and develop further actions at the North American Wildlife and Natural Resources Conference (and/or at the Annual Meeting of the NA Grouse Partnership).
5. By October 2006, at least one Grouse Management Partnership Agreement will have been implemented for every North American grouse species. Reports of these successes will be presented to the International Association of Fish and Wildlife Agencies.
6. By March 2007, a full-day event at the North American Wildlife and Natural Resources

Conference will be planned (or a full Conference for the NA Grouse Partnership).

## **REVIEW AND UPDATE PROCESS**

The NAGMP is a novel and innovative initiative that has been developed through the cooperative efforts of a diverse array of land managers, ecologists and biologists, researchers, management planners, landowners, and other interests. It is a comprehensive document that needs periodic review and update to remain viable and to effectively deal with the dynamic nature of wildlife management and conservation policies. As more current and reliable data and information about grouse habitats and population dynamics become available, based on sound, scientific research, that information needs to be incorporated into the plan. In short, the NAGMP will serve as a foundation to future grouse management in North America. It is not an endpoint, but rather a dynamic and adaptive 'living' document, that will be updated and revised regularly as new and innovative data and information become available.

In view of these needs, a North American Grouse Management Plan Committee should be established to monitor and update the plan, coordinate current work and review new project proposals. Federal, state, and non-governmental organizations should have representation on this committee. The committee would be responsible for keeping the plan focused and to ensure the plan is funded and implemented in a timely manner.

The process for reviewing and updating the components of the Plan will be developed by a NAGMP Committee, that will need to build upon the research of the past, connected to the work of today, and extrapolated to the realms of the future. Details of their exciting and innovative approach will be developed further once the committee is established. Within the review and update process, there is an additional need for continuity and coordination to allow federal and state agencies, along with other partners to initiate short- and long-term projects that are consistent with the overall goals of the plan. It is recommended that the North American Grouse Management Plan be reviewed and updated at approximately 5-year intervals, to be consistent with other national bird plans, such as the North American Waterfowl Management Plan and the Northern Bobwhite Conservation Initiative.

## **LITERATURE CITED**

NABCI. 2000. North American Bird Conservation Initiative. Bird Conservation Regions. U.S. NABCI Committee, U.S. Fish and Wildlife Service, Arlington, VA.

Storch, I. (Compiler). 2000. Grouse status survey and conservation action plan 2000-2004. WPA/Birdlife/SSC Grouse Specialist Group. IUCN, Switzerland and Cambridge, UK and the World Pheasant Association, Reading, UK.

## **APPENDICES**