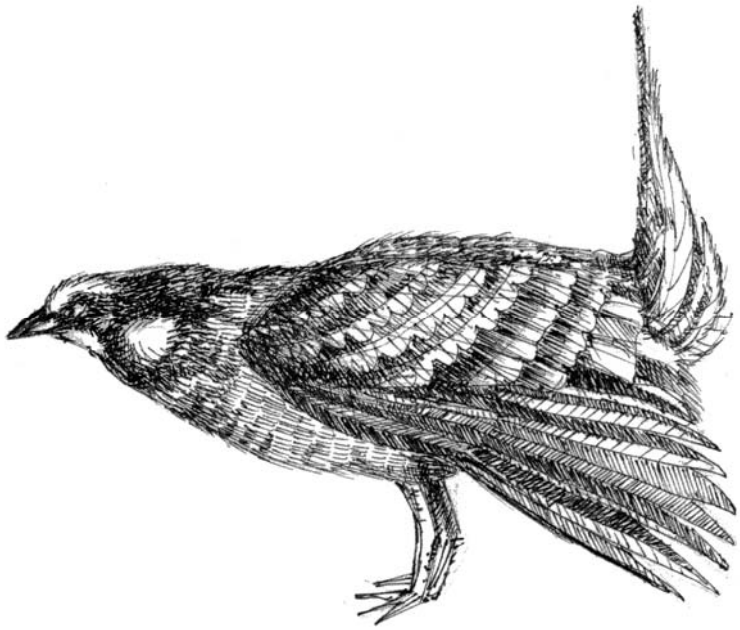
Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*)



In the Office of Endangered Species
U.S. Fish and Wildlife Service
United States Department of Interior

Petition to the U.S. Fish and Wildlife Service to List the Columbian Sharp-tailed Grouse as an Endangered or Threatened Species Under the Endangered Species Act, 16 U.S.C. § 1531 et Seq. (1973 as amended), and to Designate Critical Habitat

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SENT CERTIFIED U.S. POSTAL EXPRESS MAIL

October 14, 2004

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Department of the Interior
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U.S. Fish and Wildlife Service
1849 C Street NW, Room 3238
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Chris Warren
Upper Columbia River Basin Field Office
U.S. Fish and Wildlife Service
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Re: Petition to List Columbian sharp-tailed grouse Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) as threatened or endangered under the Endangered Species Act

The following petitioners hereby petition to list the Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) as "threatened" or "endangered" under the Endangered Species Act (ESA) (16 U.S.C § 1531 *et seq.*)

- **American Lands Alliance**
- **Biodiversity Conservation Alliance**
- **Center for Biological Diversity**
- **Center for Native Ecosystems**
- **Forest Guardians**
- **The Larch Company**
- **Northwest Ecosystem Alliance**
- **Oregon Natural Desert Association**
- **Western Watersheds Project**

Cover Illustration Credit: Susan Morgan

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I. Executive Summary

Petitioners are requesting listing of the Columbian sharp-tailed grouse under the Endangered Species Act as threatened or endangered and request the designation of critical habitat for this species. The best available information indicates both population and distribution declines. The current distribution of Columbian sharp-tailed grouse represents a decline of over 90% from the historical distribution.

Columbian sharp-tailed grouse are between 41.7 and 47 cm long. Adult males weigh between 660 and 760 grams, while females weigh between 595 and 710 grams. Their tail is wedge shaped. They are patterned with white, buffy, tawny brown and blackish barring and spotting on the upper body. Spotting is abundant on the wings. The breast and sides are white and buff, with several v-shaped markings that fade towards the abdomen, while the back is dark brown. Males have a pink or pale violet air sac on each side of the neck, as well as yellow superciliary combs, both of which enlarge during display.

The dance of the Columbian sharp-tailed grouse is one of the most awesome animal spectacles in the west, and was sacred to various native groups, who mimicked the dance in their rituals. Columbian sharp-tailed grouse congregate on leks in the spring to mate. Leks are ancestral strutting grounds used by the same population of Columbian sharp-tailed grouse year after year, and are found on flat, relatively clear areas. Males arrange themselves on the lek with a few central, dominant males, and concentric rings of peripheral males, both of whom dance to defend their territory and attract females. Males strut, push their tails upward, inflate their air sacs, strut, stamp their feet and "jump" into the air. Mating on the lek is non-random, with the most central, dominant males on the lek being responsible for the majority of copulations.

Columbian sharp-tailed grouse occupy shrub-steppe, mountain shrub, and riparian habitats in the western intermountain region of the United States and Canada. They move between different habitats at different times of the year, and habitat is selected primarily on the basis of structural characteristics such as height and density of vegetation, and secondarily on floristic characteristics such as species composition and diversity. They have recently been found to make use of lands enrolled in the Conservation Reserve Program in some states. Spring through fall activities are based around the lek site. After breeding, females build nests under shrubs or grasses, incubating eggs for 21-24 days. After hatching chicks eat mostly insects and remain with their mothers in broods for 6-8 weeks. Columbian sharp-tailed grouse remain in shrub steppe habitats until the onset of snow, when they form small flocks and move to either riparian or mountain shrub communities where vegetation remains above the snow line. Their average life-span is about three years.

Columbian sharp-tailed grouse were once considered the most abundant gallinaceous bird in the intermountain region. They were first described by Lewis and Clark on the plains of the Columbia River, and early pioneers described flocks of

thousands that "darkened the sky" when they flew.

Historically, the range of the Columbian sharp-tailed grouse included steppe and shrub steppe habitats of the Great Basin, from the Rocky Mountains to the Cascades and Sierra Nevada, including southeastern British Columbia, Northwestern California, western Colorado, much of southern and western Idaho, Montana west of the Continental Divide, eastern Oregon, central Utah, eastern Washington, northern and western Nevada and south-western and south-central Wyoming.

Currently, populations of Columbian sharp-tailed grouse exist in northern Washington, northeastern Nevada, western Idaho, south central Idaho, southeastern Idaho, northern Utah, south-central Wyoming, northwestern Colorado and central British Columbia. They are estimated to occupy less than 10% of their historic range.

There is no historic estimate of Columbian sharp-tailed grouse population numbers. However, they were described as the most abundant gallinaceous bird in the intermountain region, which would mean that populations were greater than that of the sage grouse, thought to once number ~2 million birds. Today, it is estimated that approximately 58,000 birds remain range-wide, with the vast majority residing in southeastern Idaho.

A combination of factors acting in concert are responsible for the declines in Columbian sharp-tailed grouse population and range. Hunting is reported to have contributed to early declines. Extensive agricultural cultivation, livestock grazing, herbicidal and mechanical treatments that remove deciduous shrubs and trees in riparian zones, pesticide usage on croplands, loss of riparian and mountain shrub habitats, rural development, dam construction, altered fire regimes, and forest encroachment of grasslands and shrublands as the result of fire suppression have all been cited as reasons for the decline of Columbian sharp-tailed grouse. Habitat loss and degradation due to extensive agricultural cultivation and livestock grazing are considered to have had the most deleterious effect.

Current threats to the subspecies include: Habitat conversion due to agriculture, intensive grazing, dependence on artificial habitats created by the Conservation Reserve Program, mechanical and chemical alteration of habitat, pesticide and insecticide application, loss of riparian areas, altered fire regimes, fire, rural development, invasion of non-native species, both legal hunting and accidental poaching, inbreeding/reduced genetic fitness, and road and power line construction all threaten the continued survival of Columbian sharp-tailed grouse. A disturbing new development is the discovery of West Nile Virus in sage grouse, causing a 25% reduction in survival of affected populations. While not yet detected in Columbian sharp-tailed grouse, this disease may have a dramatic deleterious effect on populations.

II. Petitioners

American Lands Alliance

American Lands works with grassroots groups and individuals to protect forest, grassland, desert and aquatic ecosystems; preserve biological diversity; restore landscape and watershed integrity; and promote environmental justice in connection with these goals.

American Lands Alliance
2224 W. Palomino Drive
Chandler, Arizona 85224
503-757-4221

Biodiversity Conservation Alliance

Biodiversity Conservation Alliance (BCA) is a Laramie, Wyoming based conservation organization dedicated to protecting and restoring native plants and animals in the Rocky Mountain Region and Northern Great Plains. Using outreach, education, science, comments, administrative appeals, and litigation, BCA works to protect and restore biodiversity, prevent the loss of native species and their habitat, and raise the threshold of public knowledge and appreciation of biodiversity and ecological health.

Biodiversity Conservation
Alliance P.O. Box 1512
Laramie, Wyoming 82073

Center for Biological Diversity

The Center for Biological Diversity is a national conservation organization based in Tucson, Arizona with over 7,500 members. Combining conservation biology with litigation, policy advocacy, and an innovative strategic vision, the Center for Biological Diversity is working to secure a future for animals and plants hovering on the brink of extinction, for the wilderness they need to survive, and by extension for the spiritual welfare of generations to come.

Center for Biological Diversity
P.O. Box 710
Tucson AZ 85702-0710

Center for Native Ecosystems

Center for Native Ecosystems (CNE) is an advocacy organization dedicated to conserving and recovering native and naturally functioning ecosystems in the Greater Southern Rockies and Plains. CNE values clean water, fresh air, healthy communities, sources of food and medicine, and recreational opportunities provided by native biological diversity. CNE uses the best available science to forward its mission through

participation in policy, administrative processes, legal action, public outreach and organizing, and education.

Center for Native Ecosystems
P.O Box 1365
Paonia, Colorado 81428

Forest Guardians

Forest Guardians seeks to preserve and restore native wildlands and wildlife in the American Southwest through fundamental reform of public policies and practices. Forest Guardians' endangered species campaign prioritizes the protection of focal species to maximize biodiversity protection. Forest Guardians has 1,250 members, who recreate, photograph wildlife, and support and benefit from environmental conservation throughout the western United States.

Forest Guardians
312 Montezuma Avenue, Suite A
Santa Fe, New Mexico 87501

The Larch Company

The Larch Company is a for-profit, non-membership conservation organization specializing in environmental policy, advocacy and litigation.

The Larch Company
1213 Iowa Street
Ashland, Oregon 97520

Northwest Ecosystem Alliance

Northwest Ecosystem Alliance (NWEA) and its 8,000 members are dedicated to the protection and restoration of biological diversity in the northern Pacific region. NWEA conducts research and advocacy to promote the conservation of sensitive and endangered wildlife and their habitat in the region.

Northwest Ecosystem Alliance
1208 Bay Street, Suite 201
Bellingham, Washington 98225

Oregon Natural Desert Association

Oregon Natural Desert Association is a public interest organization with approximately 1500 members. ONDA's mission is to promote the preservation, protection, and restoration of Oregon's deserts and the native fish and wildlife species that depend on those ecosystems, and to educate the general public on the values of preserving natural arid-land environments.

Oregon Natural Desert Association
16 NW Kansas Avenue
Bend, Oregon 97701

Western Watersheds Project

The mission of Western Watersheds Project (WWP) is to protect and restore western watersheds and wildlife through education, public policy initiatives and litigation. In 10 years, the progressive conservation group has greatly expanded the scope of its efforts and geographic range of its work, with offices in Idaho, Montana, Utah, and Wyoming, and activities in eight western states.

Western Watersheds Project
P.O. Box 1770
Hailey, Idaho 83333

III. Introduction

Forest Guardians and 8 co-petitioners hereby petition for a rule to list the Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) as threatened or endangered within its historic range in California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming, and British Columbia under the Endangered Species Act (ESA) as described in 16 U.S.C. § 1531 et seq. This petition is filed under 5 U.S.C. § 553(e), 16 U.S.C. § 1533(b)(3)(A) and 50 C.F.R. § 424.19 (1987) which give interested persons the right to petition for issuance of a rule.

Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) were once described as being the most abundant gallinaceous bird in the intermountain region, but since have suffered population and distribution declines, to the point that they now only occupy about 10% of their historic territory (Bart 2000a). They occupy shrub and shrub steppe habitats in the intermountain west and are the smallest and grayest subspecies of sharp-tailed grouse (Johnsgard 1973). Columbian sharp-tailed grouse populations are currently present in one Canadian province, British Columbia, and seven states: Colorado, Idaho, Nevada, Utah, Washington and Wyoming. They have been extirpated from Montana, California, and Oregon. The remaining populations are reproductively isolated from each other, and are increasingly dependent on artificial and temporary habitats created by the Conservation Reserve Program (CRP), mining and

farming. Columbian sharp-tailed grouse have continued to decline across much of their range.

This petition documents the sound scientific basis for proceeding with listing as an Endangered or Threatened species under the ESA.

IV. Endangered Species Act Implementing Regulations

Section 424 of the regulations implementing the Endangered Species Act (50 C.F.R. § 424) is applicable to this petition. Subsections that concern the formal listing of the Columbian sharp-tailed grouse as an Endangered or Threatened species are:

> 424.02(e) "Endangered species" means a species that is in danger of extinction throughout all or a significant portion of its range."…(k) "species" includes any species or subspecies that interbreeds when mature.
>
> "Threatened species" means a species that "is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (16 U.S.C § 1532(20)).
>
> 424.11(c) "A species shall be listed…because of any one or a combination of the following factors:
>
> 1. The present or threatened destruction, modification, or curtailment of habitat or range;
> 2. Overutilization for commercial, recreational, scientific, or educational purposes;
> 3. Disease or predation;
> 4. The inadequacy of existing regulatory mechanisms; and
> 5. Other natural or manmade factors affecting its continued existence."

All five of the factors set forth in 424.11(c) have resulted in the continued decline of the Columbian sharp-tailed grouse and are causing the subspecies to face endangerment and extinction.

V. Taxonomy

The Columbian sharp-tailed grouse belongs to the order Galliformes, family Phasianidae, genus *Tympanuchus*, species *phasianellus*, subspecies *columbianus* (WDFW 1995). The family Phasianidae includes turkeys, quail, partridge, pheasant, grouse, and ptarmigan. The genus *Tympanuchus* includes lesser and greater prairie-chickens, as well as sharp-tailed grouse (Ulliman 1995b). The species *phasianellus*, sharp-tailed grouse, has seven subspecies (six extant) in North America; Northern (*T.p. phasianellus*), Northwestern (*T.p. kennicotti*), Alaska (*T.p. caurus*), Prairie (*T.p. campestris*), Plains (*T.p. jamesi*), New Mexico (T.*p. hueyi*) (extinct) and Columbian (*T.p. columbianus*)

columbianus) (Aldrich 1963).

The species was originally described as *Tetrao phasianellus* by Linneaus in 1758. It was placed it in the monotypic genus *Pedioecetus* by Baird in 1858. A recent reclassification by the American Orinthologists' Union now classifies it as congeneric with prairie-chickens in the genus *Tympanuchus* (Connelly et al. 1998). Sharp-tailed grouse have been known to hybridize with prairie-chickens and sage grouse where ranges overlap (Connelly et al. 1998). The Columbian subspecies was first described by Lewis and Clark in 1805, who discovered them on the plains of the Columbia River (Schroeder et al. 1999).

VI. Subspecies Description

The following description of the Columbian subspecies of sharp-tailed grouse is based primarily on Johnsgard (1973): adults are between 41.7 and 47 cm long. The tail is wedge shaped, with a central pair of feathers extending far beyond the others. This central pair of feathers is patterned white brown and black, and the other feathers are mostly white. They have inconspicuous crests which grow larger when alarmed, and the upper parts of the body are extensively patterned with white, buffy, tawny brown, and blackish barring and spotting. White spotting is conspicuous on the wings, and the relative amount of white increases towards the breast and abdomen. The breast and sides are white and buff, with several V-shaped, brown markings that fade towards the abdomen, while the back is dark brown. Sharp-tailed grouse have dusty-brown legs with white feathers to the toes (WDFW 1995) These feathers and toe pectinations serve as a snowshoe, helping the bird walk on snow in winter (Evans 1968)

Male Columbian sharp-tailed grouse have a pink to pale violet air sac (cervical apterium) on each side of the neck, and yellow superciliary combs above each eye, both of which are both enlarged during display (WDFW 1995). Genders can be differentiated by comparing markings on the two central tail feathers: males have a longitudinal color pattern, whereas females have a crossbar pattern (Evans 1968). Weights for adult male Columbian sharp-tailed grouse range from 660 to 760g, while weights for adult females range from 595 to 710g (Oedekoven 1985, Boisvert 2002, Gardner 1997, Ulliman 1995b, Marks and Marks 1987). Weight also varies by season and geographic area (Ulliman 1995a).

VII. Geographic Distribution, Population Size, and General Ecology

Fossil History

A sharp-tailed grouse bone has been identified from a cave near Jemez Springs, New Mexico, dating to about 1300 A.D. (Evans 1968). Two extinct species of sharptails have been found in late (exact date unknown) Pleistocene fossil deposits in Fossil Lake, Oregon, and sharp-tailed grouse are believed to have occupied western and northern North America since that time (Connelly et al. 1998)

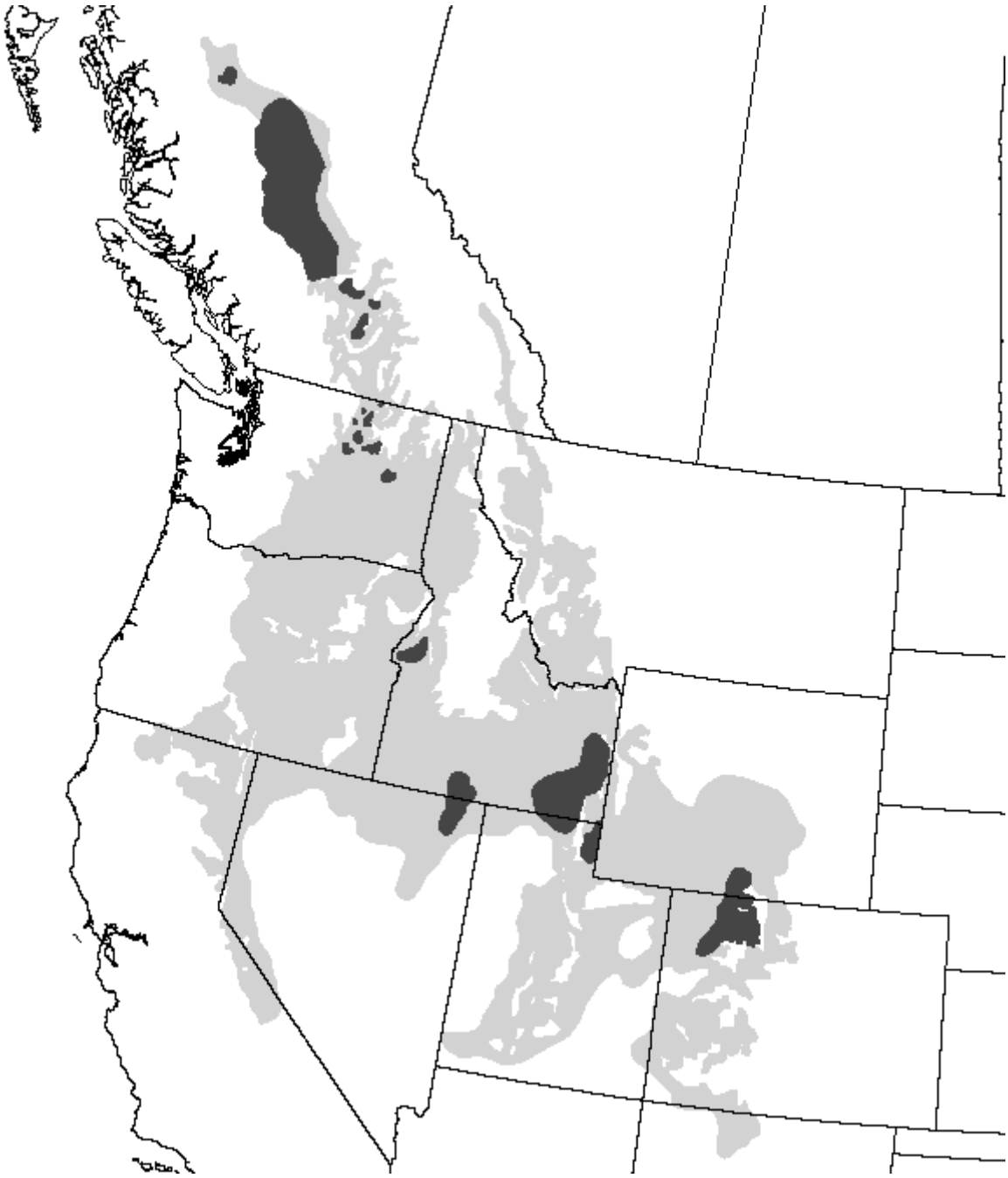

Figure 1. Historic (light) and Current (dark) Distribution of Columbian Sharp-tailed Grouse. (Schroeder 2003)

Historical Distribution

Historically, Columbian sharp-tailed grouse ranged from the steppe and shrub steppe habitats of the Great Basin, from the Rocky Mountains to the Cascades and Sierra Nevada, including southeastern British Columbia, northwestern California, western Colorado, much of southern and western Idaho, Montana west of the Continental Divide,

eastern Oregon, central Utah, eastern Washington, northern and western Nevada and south-western and south-central Wyoming (Figure 1) (Ulliman 1995a).

Current Distribution

Currently, populations of Columbian sharp-tailed grouse exist in northern Washington, northeastern Nevada, western Idaho, south central Idaho, southeastern Idaho, northern Utah, south-central Wyoming, northwestern Colorado and central British Columbia. There are two metapopulations in Utah/Idaho and in Colorado/Wyoming, All other populations are disjunct enough from each other as to be reproductively isolated. The subspecies is estimated to occupy less than 10% of its historic range (Figure 1)(Bart 2000b).

Current Population Size

Total population estimates for Columbian sharp-tailed grouse are speculative, as complete lek surveys have not been conducted in most states, but they have been estimated to number ~51,000 birds in the United States, and 58,000 birds range-wide, with approximately 80% of the U.S. population residing in southeastern Idaho (Bart 2000b). This represents a drastic decrease from 1983, when Johnsgard (1983) estimated Columbian sharp-tailed grouse to number up to 170,000 individuals.

Prevention of a catastrophic drop in population levels of Columbian sharp-tailed grouse is dependent on the continuation of the Conservation Reserve Program in a manner that remains beneficial to the subspecies. If the program is discontinued, or if it is altered (as it has been) so that lands enrolled in the program no longer provide beneficial habitat for Columbian sharp-tailed grouse, population numbers will decrease substantially. It is estimated that without the Conservation Reserve Program, or with it significantly altered, populations will decrease by two thirds (Clait Braun pers. comm.), reduced to less than 20,000 individuals in the U.S.

Reasons for Decline

A combination of factors acting in concert are responsible for the declines in Columbian sharp-tailed grouse population and range. Hunting is reported to have contributed to early declines (Hart et al. 1950, Buss and Dziedzic 1955). Extensive agricultural cultivation, livestock grazing, herbicidal and mechanical treatments that remove deciduous shrubs and trees in riparian zones, pesticide usage on croplands, loss of riparian and mountain shrub habitats, rural development, dam construction, altered fire regimes, and forest encroachment of grasslands and shrublands as the result of fire suppression have all been cited as reasons for the decline of Columbian sharp-tailed grouse. Habitat loss and degradation due to extensive agricultural cultivation and livestock grazing are considered to have had the most deleterious effect (Hart et al. 1950, Buss and Dzidzic 1955, Evans 1968, Oedekoven 1985, Lannoy 1987, Marks and Marks 1987, Giesen and Connelly 1993, Ritcey 1995, McDonald and Reese 1998, Hoffman 2001).

Habitats Used

Columbian sharp-tailed grouse occupy shrub-steppe, mountain shrub, and riparian habitats in the intermountain west of the United States and Canada. These areas are in the 30-50 cm precipitation zone (Hoffman 2001) and are dominated by perennial grasses and forbs, with a conspicuous but discontinuous layer of shrubs (Hays et al. 1998). Mean summer temperatures range from 10 to 34 degrees Celsius, while winter temperatures range from 8 to 14 degrees Celsius (Ulliman 1995a). Giesen and Connelly (1993) associated the following vegetative communities with Columbian sharp-tailed grouse: sagebrush steppe (*Artemisia-Agropyron*), mountain mahogany-oak scrub (*Cercocarpus-Quercus*), fescue-wheatgrass (*Festuca-Agropyron*), wheatgrass-bluegrass (*Agropyron-Poa*), riparian, and mountain shrub. Columbian sharp-tailed grouse are fairly plastic in terms of habitat used throughout the year (McDonald 1998), and occupy slightly different habitats in different portions of their range. Habitats are selected primarily on the basis of structural characteristics such as height and density of vegetation, and secondarily on floristic characteristics such as species composition and diversity (Ulliman 1995a). Good Columbian sharp-tailed grouse habitat has been described as providing adequate shrub and residual vegetation during spring, and optimal plant species diversity. During brooding and nesting seasons, good habitat contains >30% grass cover, >20% forb cover and more than 50 cm of vertical cover. (Boisvert 2002).

General Ecology

In spring, summer, and fall, Columbian sharp-tailed grouse occupy shrub steppe habitats, centered on a traditional dancing ground, or lek site. Males gather to display on lek sites in the spring. Males have been observed displaying on lek sites throughout the year, while females only visit lek sites in spring to mate. Males defend territories, with dominant males occupying central positions and peripheral rings of sub-dominant males, with centrally positioned males doing most of the breeding. After breeding, females build nests under shrubs or grasses, and incubate eggs for 21-24 days. After hatching chicks eat mostly insects and remain with their mothers in broods for 6-8 weeks. Columbian sharp-tailed grouse remain in shrub steppe habitats until snow cover causes them to move to winter habitat, where they utilize mountain shrub and riparian communities for food and cover (Ulliman 1995a).

There is no evidence that Columbian sharp-tailed grouse seek free water, and it is likely they are able to satisfy water requirements from their diet (Lannoy 1987, Saab and Marks 1992). Columbian sharp-tailed grouse tend to choose areas with more cover during midday and less cover in the morning and evening (Marks and Marks 1987). Boisvert (2002) found they appeared to select sites that provided cover from both terrestrial and aerial predators. They are found singly or in small groups during the summer and in large coveys from fall to spring (Hays et al. 1998). Columbian sharp-tailed grouse prefer to walk, but fly when disturbed, flapping their wings for 27-46 m, then gliding at heights of 2-15 m. They will fly 0.4 to 5 km at 48-56 km/h before landing (Hays et al. 1998). Marks and Marks (1987) reported that that Columbian sharp-tailed

grouse preferred northern slopes, while avoiding southern and western slopes, possibly because northern slopes had favorable microhabitats (less wind, higher humidity, and more vegetation). Columbian sharp-tailed grouse appear to prefer the edges of habitats, with one study finding >70% of all locations within 30 m of a habitat edge (McArdle 1977 *in* Giesen 1997). Columbian sharp-tailed grouse avoid deep canyons, even when they appear to contain suitable habitat (Ritcey 1995), and use areas characterized by slopes of 0-47%, with >95% of use occurring on slopes <30% (Saab and Marks 1992). There are some reports of mass emigrations of other subspecies of sharp-tailed grouse moving into unoccupied habitat in Ontario and Michigan (Evans 1968), but this behavior has not been observed in the Columbian subspecies.

Life Span and Mortality Rates

Columbian sharp-tailed grouse have high annual mortality rates, mostly from predation, and high annual production rates to compensate for the high annual mortality rates. The average age of plains sharp-tailed grouse in Colorado was found to be 22 months, while the average life span there was about 3 years (Evans 1968). Most individuals die as a result of depredation by either mammalian or avian predators. Hoffmann (2001) reported that predation removed about 50% of the population every year. Giesen (1999) estimated the annual mortality rate in Colorado to be 56%, while in Washington, McDonald (1998) found the annual mortality rate to be 45.4%. Columbian sharp-tailed grouse survival was found to be lowest during the breeding and nesting seasons (77 and 78%), and highest during the summer/brood rearing season (87% and 93%), fall (90 and 93%), and winter (82 and 87%) (Boisvert 2002). The tendency of Columbian sharp-tailed grouse to concentrate on lek sites may expose them to increased predation during the breeding season, while their ground nesting habits and large clutch size may make them especially vulnerable during the nesting season (Bergerud 1988 *in* Hays et al. 1998).

Severity of winter conditions may affect survival rates, with 86% of Columbian sharp-tailed grouse surviving a mild winter season, compared with only a 29% survival rate during a harsh winter (Ulliman 1995b). Use of non-native habitats such as CRP and mine reclamation lands may make them more vulnerable to predation, with one study finding an annual survival rate of only 20% for individuals associated with these habitats (Boisvert 2002). Male survival is also linked to a male's position on the lek site. Moyles and Boag (1981), in a study of sharp-tailed grouse (not the Columbian subspecies) found that 80% of central males survived the summer season, while only 53% of intermediate and 27% of peripheral males survived. Overall, they found that 56% of males died over the summer, leaving 44% to re-form the lek in autumn. McDonald (1998) found that hens involved in nesting and brood rearing had lower survival rates than hens that did not nest or raise broods, with 64% of all hen mortality occurring during the nesting and brood rearing period. Columbian sharp-tailed grouse chicks are also subject to heavy mortality. Brood mortality is often caused by the hen being depredated (McDonald 1998). Boisvert (2002) found that overall chick surival in Colorado was 48%.

Sex Ratios

Sex ratios for Columbian sharp-tailed grouse are approximately 50:50 (Parker 1970).

Juvenile/Adult Ratios

Juvenile to adult ratios are normally gathered from hunter data in the fall. Parker (1970) found juvenile to adult ratios of 1.32/1 and 0.76/1 in 1968 and 1969, respectively, and concluded the lower number of juveniles in 1969 was the result of low spring and summer precipitation causing decreased production and chick survival. Hoffman (2001) found juvenile/adult ratios of 1.4/1 for harvested birds in Colorado.

Population Density

Population density for Columbian sharp-tailed grouse varies with quality of habitat, summer production rates, and climatic conditions. In Colorado, lek sites were found approximately 1 km apart in quality habitat (Boisvert 2002). In winter in eastern Washington, Columbian sharp-tailed grouse density was approximately 3 ha/bird (Hoffman and Dobler 1988a), while winter population densities in two populations in southeastern Idaho were 67 and 77 ha/bird in 1992, and 186 and 128 ha/bird in 1993 (Ulliman 1995b). Overall, population density is estimated to be 33±4.9 ha/bird in high quality habitat and 115±62 ha/bird in low quality habitat (Giesen and Connelly 1993).

Population Cycling

There is some indication that populations of Columbian sharp-tailed grouse may formerly have been cyclic. Other species of grouse have been shown to rise and fall on a 7-10 year cycle (Amman 1963), and early settlers in Utah recalled that populations of Columbian sharp-tailed grouse used to fluctuate on an 8-10 year basis, but that they no longer do so (Hart et al. 1950). No current studies show that populations of Columbian sharp-tailed grouse are cyclic. However, if cycles are present, they may be masked the overall decline in Columbian sharp-tailed grouse populations, and local increases in numbers due to the Conservation Reserve Program. If populations of Columbian sharp-tailed grouse are cyclic, they may be subject to an increased risk of extirpation during cyclic lows, and managers may mistakenly assume that populations have recovered during cyclic highs when this is not in fact the case.

VIII. Seasonal Ecology and Habitat Requirements

Spring Through Fall

Columbian sharp-tailed grouse habitat use from spring through fall centers around lek sites, the areas where males gather to display, with one study finding >90% of all locations within 1.2 km of a lek site (Saab and Marks 1992). Columbian sharp-tailed

grouse begin to move onto their summer range when snow cover melts enough for vegetation to begin to be uncovered, usually by early April (Oedekoven 1985).

In Idaho, all sites that contained Columbian sharp-tailed grouse in summer were areas with grassy openings in shrubby habitat, and 30% brush cover seemed to provide the best habitat, with important grasses being Sandberg bluegrass (*Poa secunda*) and needle and thread grass (*Stipa comata*) (Parker 1970). Locations of males were closer to lek sites, habitat edges and riparian zones than random locations, and grass height was shorter at locations used by males than at locations for broods (Meints 1991). Chokecherry (*Prunus virginiana*) was used as escape cover, for shade, and for dusting and roosting (Parker 1970). In western Idaho, Columbian sharp-tailed grouse used big sagebrush (*Artemisia tridentata*) habitats in greater proportions than expected, low sagebrush (*Artemisia arbuscula*) in proportion to availability, and shrubby eriogonum (*Eriogonum spp.*) less than would be expected (Marks and Marks 1987). While they did not usually make use of mountain shrub and riparian habitats in the summer, those habitats were used as escape cover, with 77% of birds flushed moving to these cover types (Saab and Marks 1992). Grouse used intermediate wheatgrass (*Agropyron intermedium*) rarely, but were more likely to do so if there were high numbers of grasshoppers present (Saab and Marks 1992).

Columbian sharp-tailed grouse selected sites with greater vertical cover than at random sites (Saab and Marks 1992). Comparing a dry summer with a wet one, Marks and Marks (1987) found that, although there was less cover overall in the dry year, vertical cover where birds where found did not differ between years, suggesting that Columbian sharp-tailed grouse selected habitats that provided adequate cover. During the dry summer, the native perennials bluebunch wheatgrass (*Agropyron spicatum*) and arrowleaf balsamroot (*Balsamorhiza sagittata*), both important to Columbian sharp-tailed grouse, did not decrease in abundance. In contrast, introduced grasses and forbs decreased in abundance, suggesting that native species are able to provide quality habitat more consistently than introduced species. Columbian sharp-tailed grouse also showed a preference for sites close to riparian vegetation and mountain shrubs during the dryer summer (Saab and Marks 1992). Canopy coverage at bird locations in western Idaho were comprised of an average of: 9% shrub cover, 30% forb cover, and 28% to 32% grass cover, with the remainder being bare ground. Bird locations had less bare ground than at random sites. Columbian sharp-tailed grouse appeared to select for vegetative diversity relative to surrounding areas (Marks and Marks 1987).

There is some gender difference in habitat use. In Colorado, Giesen (1997) found both males and females located most often in mountain shrub habitats. However, males frequented hay pastures more often than females. As the summer progressed, both genders used mountain shrub habitats almost exclusively. The most important tall shrub in this habitat (in Colorado) was Saskatoon serviceberry (*Amelanchier alnifolia*), and the most important short shrub was snowberry (*Symphoricarpus spp.*). This habitat was characterized by ≥70% shrub cover. Wheat fields were used somewhat after harvest when waste grain was plentiful. Individuals captured on CRP lands preferentially used mine reclamation and shrub steppe habitats in the summer and fall, while those captured in

mine reclamation used habitats in proportion to availability (Boisvert 2002). They remained in summer habitats until about mid-November (Boisvert 2002).

In Utah, Columbian sharp-tailed grouse used alfalfa fields in late April, but used native habitats for mating (Marshall and Jenson 1937). In eastern Washington, females used CRP, grass/forb, and grass/shrub types more than expected, and sagebrush cover types less than expected in spring, while in summer, females used CRP and grass/forb more than expected, grass/shrub in expected proportions, and sagebrush less than expected. Males used CRP, grass/forb, and grass shrub more than expected, and sagebrush less than expected in both the spring and summer (McDonald 1998).

Columbian sharp-tailed grouse are found singly or in small groups during the summer (Hays et al. 1998). Beginning in fall, before moving onto winter range, birds begin to form flocks, with the largest flock size in autumn in Wyoming being about 30 birds (Oedekoven 1985). Historical reports, given when the populations of Columbian sharp-tailed grouse were much larger, mention flocks that contained thousands of birds (Hart et al. 1950).

Although instances of Columbian sharp-tailed grouse making use of agricultural fields are known, studies have shown they largely avoid agricultural fields (Marks and Marks 1987, Boisvert 2002). Any use of agricultural fields probably depends on time of year, and the suitability of the field (the amount of residual cover and other structural characteristics, distance to other habitats, etc.).

Lek Site Characteristics

Columbian sharp-tailed grouse lek sites are usually about 15 by 15 m in size (Oedekoven 1985) and are in relatively open areas. Most studies have reported them on knolls, ridges, and benches in the landscape (Rogers 1969, Boisvert 2002), although Oedekoven (1985) found most lek sites on flats or slight swales on plateaus and mesas. Lek site altitude varies in a negative relationship with latitude (Giesen and Connelly 1993). Lek sites are characterized by thin, rocky, easily eroded soils, or claypan that supports little vegetation (Rogers 1969). Ziegler (1979) (*in* Lannoy 1987) reported that the vegetative communities at lek sites in Washington were bunchgrass-forb, bunchgrass-sagebrush and sagebrush with *Poa sp*. understory. In recent years, Conservation Reserve Program fields have become important as lek sites in Colorado, Utah, and Idaho, with 80% of all new lek sites found in Idaho located in CRP fields (Hoffman 2001).

Shrub cover and shrub height were higher at random sites than at Columbian sharp-tailed grouse lek sites, although overall visibility was higher on lek sites than at random sites because forbs and grasses at lek sites had been trampled by the birds, affording greater visibility. Shrub density was reported to be the most important factor in lek site selection (Klott and Lindsey 1989). In Colorado, bare ground at lek sites was less than at random sites (Boisvert 2002). Areas of taller, denser shrubs and grasses next to lek sites are necessary for escape cover (Hoffman 2001). Both Klott and Lindsey (1989) and Boisvert (2002) concluded that lek site selection represented a balancing of the need

to have enough visibility for displaying males to be visible to other males and to females, with the need to have sufficient cover to hide from predators, which may focus their efforts on lek sites because of the concentration of prey there.

Breeding Ecology

Males begin to attend leks in early spring, soon after melting snow uncovers the dancing ground. In Wyoming, Columbian sharp-tailed grouse began arriving at lek sites in mid April, with most males arriving by late April to early May. Dancing activity peaked in mid May, and most activity had ceased by late May. Females begin attending leks in early May. Some hens began visiting lek sites when there was still 95% snow cover, however, more hens were present when snow cover was <10%. These dates varied with location and snow cover (Oedekoven 1985).

Males congregate on the lek site 0.5 to 1 hour(s) before sunrise and remain there for 2-3 hours (Marshall and Jenson 1937, Hart et al. 1950). Some males walk onto lek sites, while others fly in (Rogers 1969). While on the lek site, males display to defend their territories and to attract females. The following description of Columbian sharp-tailed grouse display is from Rogers (1969):

> Each period of dancing appears to start on signal, with all males moving at the same time, and all coming to a stop and freezing simultaneously. In dancing, the male extends his wings, raises his tail to vertical, and lowers his head until the entire body is horizontal to the ground. The feet are moved very rapidly, resulting in a forward movement, often culminating in a full circle. The tail feathers are moved, causing a clicking noise, while a hoarse caw or a series of chirps are given. Periods of active dancing and freezing in unison alternate with each period, and are of three to 20 seconds in duration….At irregular intervals, males tend to "jump" 0.9 to 1.2 meters in the air with rapid wing beats and loud cackles…[this is] often performed by a male in confrontation with an adjacent male. During times when no females are present, dancing periods are interspersed with periods of confrontation. Here, two birds with adjoining territories approach each other, and crouch with wings partially extended. This position may be held for seconds to minutes and may involve slow circling movements. A low, scolding noise may be made by one or both birds. At the initial approach, tails are raised to the vertical and both birds may make pecking movements of the head as if a fight is imminent. The confrontation generally ends with the birds about 13cm apart, flat on the ground, tail down, wings half extended, the leading edge on the ground, and with no sound or movement.

During displays, males stamp their feet 18 times per second (Spomer 1987). During courtship displays, males push their tails upward, inflate the pink to purple colored air sacs, that are about the size of walnuts on either sides of their necks, raise the feathers on their heads, and enlarge their superciliary combs (Rogers 1969, WDFW 1995). Males have occasionally been known to display perched atop shrubs (Giesen and Connelly 1993).

Mating on the lek is non-random, with a few, centrally positioned males doing most of the mating. Rippin (1970) recognized a central ring of dominant males in plains sharp-tailed grouse, surrounded by 3 outer rings of sub-dominant males. Dominant males tend to be the oldest. When a territorial male dies, other territorial males move inward

towards the central positions to fill gaps. The peripheral positions that are vacated are filled by either non-territorial adult males, or by juveniles. Moyles and Boag (1981) found that, of those males establishing new territories, 16 were adults and 12 were juveniles.

To establish a territory, a male remained on a lek site for several consecutive mornings, first watching displaying males, then beginning to occupy peripheral locations. After one or two days of occupying a spot, they begin to display and to drive other males from their territory (Moyles and Boag 1981). Newly recruited juveniles and adults on a lek site performed dances more clumsily than established males (Spomer 1987). Centrally located males performed 76% of all copulations (Hays et al. 1998), and were more likely to survive the summer period than peripheral males (Moyles and Boag 1981). Off-lek copulations are rare (Coates 2001).

Parker (1970) found an average number of 8.8 males per lek in Idaho, while males per lek averaged 10.6 in Washington (Schroeder et al. 1999), and Oedekoven (1985) found an average of 25 males per lek in Wyoming, although the usefulness of these numbers is limited, as the number of males per lek varies from year to year.

Territorial males show absolute fidelity to their lek site, returning year after year (Boisvert 2002). Yearling males, however usually visit several different lek sites before establishing a territory on one (Klott no date). Females also are known to visit different lek sites (Boisvert 2002), and may mate at more than one lek site. Females leave the lek site after mating (Hart et al. 1950).

In addition to the morning displays, males also visit lek sites in the hours before sundown, flying in to the lek site. Evening attendance is more erratic than morning attendance. Males visit the lek site sporadically throughout the summer, increasing attendance somewhat in the fall (Rogers 1969). Fall lek site attendance is important for recruiting new males, especially juveniles, with 68% of all recruitment onto leks occurring in the fall in one study (Moyles and Boag 1981). Males stop visiting dancing grounds as soon as they are covered with snow (Marks and Marks 1987).

Columbian sharp-tailed grouse may be more vulnerable to predators while on the lek site, because of their concentration there and the static positions of lek sites. There is anecdotal evidence showing that depredated individuals are found in more open areas of the lek site (Klott and Lindsey 1989). Rain has been known to inhibit display, as has a hawk flying overhead. In contrast, a dust storm did not stop displays (Marshall and Jenson 1937).

Human disturbance also has an adverse effect on breeding behavior. One study of sharp-tailed grouse (not the Columbian subspecies) found that male sharp-tailed grouse are disturbed by human presence at leks, causing them to flush and fly distances of 240-765 m but to return within 15 minutes of the end of the disturbance. Females are much more skittish, leaving the lek site in response to parked vehicles nearby, scarecrows, recorded voices and sounds, and a leashed dog. Continued disturbance of any nature at a

lek site could result in lek abandonment. This curtailment of breeding activity would ultimately result in population declines (Baydack and Hein 1987).

Nest Site Characteristics

Females select nest sites primarily for the cover that they provide (to hide the nest from predators), and only secondarily for species composition, building their nests under a variety of shrubs, forbs, and grasses. They select relatively dense cover for nesting (Meints 1991, Giesen 1997, McDonald 1998). Apa (1998) found the average nest site had a shrub canopy cover of 62% in southeast Idaho, while in western Idaho, Marks and Marks (1987) found an average canopy coverage of 15.5% shrub, 27.8% forb, 18.8% grass, and 39.3% bare ground/litter cover at nest sites. Densities of short (less than 1 m) shrubs were at least 5 times greater, and densities of tall (>1 m) shrubs were 50% greater, at nest sites than at random sites in Colorado (Giesen 1997). The level of visual obstruction appears to be the most important variable in the selection of nest sites (McDonald 1998). Nest sites in Colorado had higher mean canopy cover of residual vegetation and grass, greater visual obstruction and greater overstory cover than random sites (Boisvert 2002). Nest sites in Washington had less bare ground and greater litter cover than random sites (McDonald 1998). Apa (1998) found 53% of nest sites were under grasses or forbs in Idaho, and that 37% of nest sites were at or above the elevation of the nearest lek site, while 63% were below. Nest sites at that study site had more grass cover than at independent sites. Herbaceous plants under which Columbian sharp-tailed grouse nested averaged 53 cm in height vs. 40 cm for plants in the immediate vicinity.

Meints (1991) found that Columbian sharp-tailed grouse preferred nesting in areas with a higher percentage of antelope bitterbrush (*Purshia tridentata*) at one site in Idaho, and three-tip sagebrush (*Artemisia tripartita*) in another. Marks and Marks (1987) reported that most nests were under sagebrush, and next to either bluebunch wheatgrass or arrowleaf balsamroot. Out of 51 total nests, Apa (1998) found 25 nests under shrubs (16 of which were under sagebrush), 14 under grasses, and 12 underneath forbs. Snowberry and big sagebrush were the most popular cover types for nest sites in Colorado (Giesen 1997), while Boisvert (2002) found 43.7% of nests in mine reclamation lands, 39.4% in shrub steppe, 9.9% in CRP, 5.6% in grass, and 1.4% in aspen forest. Oedekoven (1985) found two nests in Wyoming, both of which were under snowberry shrubs.

In Idaho, successful nests (nest success is defined as the percentage of nests that produce at least one live offspring) had a higher density of shrubs >20 cm in height, and had greater grass heights than unsuccessful nests (Meints 1991). Successful nests had greater visual obstruction 5 m from the nest and more overhead canopy cover than unsuccessful nests. Boisvert (2002) found visual obstruction of 37 to 38% 1 m from the nest at successful nest sites, and 23 to 30% at unsuccessful sites. She suggested that nest success was dependent on nesting habitat type, vegetation diversity, and visual obstruction at heights >50 cm. In Idaho, Apa (1998), found that 100% (6/6) of Columbian sharp-tailed grouse that nested in native vegetation were successful, while only 45% (19/42) of those that nested in non-native vegetation were successful. In Colorado, the

highest nest success rate was in mine reclamation lands (68%), followed by shrub steppe (21%), grass (25%), and CRP (14%). The especially low nest success rate in CRP lands suggests that while Columbian sharp-tailed grouse may choose these sites for nesting because they seem to provide quality nesting habitat, some element of quality nesting habitat is missing from CRP lands, causing depredation and a lower success rate (Boisvert 2002).

Nesting Ecology

After mating, females leave the lek site to build their nest and lay and incubate eggs. Studies have found average distances from the lek site to the nest site of between 0.54 and 1.59 km (Oedekoven 1985, Marks and Marks 1987, Cope 1992, Giesen 1997, Apa 1998, Boisvert 2002). Giesen (1997) found that 92% of all nests were located <2 km from the lek site. However, there are reports of hens occasionally moving much farther: in Colorado, six hens were observed moving over 7 km from the lek site to their nesting site (Boisvert 2002). Hens tend to show fidelity to nest sites between years if the nest site had previously been successful (McDonald 1998, Boisvert 2002). Almost all hens (97-100%) nest (McDonald 1998, Boisvert 2002).

Nesting begins (in Washington) around the end of April (Lannoy 1987). Females build nests by making a shallow depression in the ground, then lining that depression with grass, plant stems, leaves, and feathers. Nests are 3 to 8 cm deep and 10 to 15 cm in diameter (WDFW 1995). Hens lay one egg per day (Hart et al. 1950). Hens lay between 8 and 14 eggs, with different studies finding mean clutch sizes ranging from 8.5 to 11.5 (Oedekoven 1985, Marks and Marks 1987, Cope 1992, McDonald 1998, Boisvert 2002). Columbian sharp-tailed grouse eggs measure 43 by 32 mm, and are elliptical, smooth, slightly glossy, and buff, olive/buff or pink in color (WDFW 1995). After laying a clutch, hens begin incubation of about 21-25 days (Hart et al. 1950). The peak of hatching was early to late June in Idaho (Marks and Marks 1987), but varies somewhat with latitude and climatic conditions.

Approximately 95% of eggs that survive the incubation period hatch (Mcdonald 1998, Boisvert 2002). Nest success ranges from 40 to 72%, with most studies finding success rates between 40 and 50% (Meints 1991, Cope 1992, Apa 1998, McDonald 1998, Coates 2001, Boisvert 2002). The primary cause of nest failure is predation by both mammalian and avian predators. One study found that 3.7% of nesting hens were predated while actually on the nest (McDonald 1998). Predators may prey on the eggs in a nest, the hen on the nest, or both. Common ravens were identified as the primary nest predator in Washington (McDonald 1998). Apa's (1998) study with artificial nests showed that nest predation rates increased the closer a nest was to the lek site. This result may be due to predators focusing their efforts on lek sites. Increases in predation can be expected with decreases in habitat quality, as decreases in traditional cover plants leave hens and nests more exposed to predation.

If a hen's nest is predated, but the hen survives, it may attempt to visit the lek to copulate again, and then lay a second clutch. Studies have found a wide range of

renesting rates, from 20 to 73% (McDonald 1998, Boisvert 2002).

Brood Site Characteristics

Columbian sharp-tailed grouse broods prefer sites with fairly high total cover. The most distinguishing characteristic of brood sites seems to be an abundance of forbs. Broods select high quality habitats for food and cover that they provide. In Colorado, brood sites had higher visual obstruction readings, overstory cover, and forb canopy than random sites (Boisvert 2002). Brood sites had less bare ground and higher overall cover than independent sites, significantly taller shrubs and grasses, and total shrub cover of 15 to 40% (Klott and Lindsey 1986, Meints 1991). Apa (1998) found broods in areas with twice as much forb cover as independent sites and an average of 44.5% litter cover. Klott and Lindsey (1990) reported brood selection of habitat was probably based on shrub height density and species composition, while Meints (1991) observed broods selected sites with a high density of grasses and forbs for their ability to provide food and cover. These sites were closer to habitat edges, lek sites, and riparian zones than independent sites. Klott and Lindsey (1990) found broods sometimes used large openings, but when they did, they only foraged on the edges and avoided the centers, while Meints (1991) found that broods used small open areas, but not larger ones.

Brood locations are relatively close to lek sites, usually within 1 km, and almost all brood sightings were within 1.6 km of the lek site (Klott and Lindsey 1986, Marks and Marks 1987). Meints (1991) reported that once Columbian sharp-tail broods hatched, they were an average of 580 m of the nest, and were an average of 50 m from habitat edges.

In Idaho broods frequented areas with an understory of hairy brome (*Bromus inermis*) and cheatgrass (*Bromus tectorum*), and used CRP and grass/forb habitats more than would be proportionally expected, grass/shrub habitats in proportion to availability, and sagebrush habitats less than would be proportionally expected. In Wyoming, Columbian sharp-tailed grouse broods used mostly mountain shrub and sagebrush/snowberry habitats, areas with oniongrass (*Melica spp.*), snowberry and sulphur buckwheat (*Eriogonum umbellatum*) cover of ≥5%, and areas that were less altered by grazing (Klott and Lindsey 1990). In Colorado, broods strongly preferred mine reclamation lands, and chick survival was highest in these areas, whereas chick survival was low in CRP and upland shrub habitats (Boisvert 2002). In Montanta, broods used native grasses and shrubs: rough fescue (*Festuca scabrella)*, bluebunch wheatgrass and bluegrass, snowberry and pearhip rose (*Rosa woodsii var. ultramontana*).

Brood Ecology

Columbian Sharp-tailed grouse chicks are precocial (WDFW 1995) and able to walk shortly after hatching. They are able to fly at 7-10 days of age. Chicks are one-fourth grown (as measured by body weight) at 4 weeks of age and able to fly 50 m, two-thirds grown at 8 weeks, and fully grown at 12 weeks. At 16 weeks of age, males join leks (Evans 1968). Although able to fly, chicks normally freeze or hide when disturbed

and, when faced with predators, hens will feign injury to distract predators from the brood (Hart et al. 1950). Broods show daily movements of about 90 m/day (Meints 1991, Apa 1998).

In Idaho, Parker (1970) found an average brood size of 5.1 chicks, in Colorado, Boisvert (2002) found a mean brood size of 9.2 at hatch, and 4.3 at 7 weeks of age. In Wyoming, Klott and Lindsey (1990) found an average brood size of 4, while Oedekoven (1985) found an average brood size of 3. Cope (1992) found an average brood size of 6.5 30 days after hatching and 5.5 at 60 days after hatching in Montana. In Utah, average brood size 60 days after hatch was 4.6 (Hart et al. 1950). Brood sizes in Washington were small, averaging 1.07 and 1.63 in two different areas (McDonald 1998).

Brood size decreases as the season progressed, with substantial losses in the first 45 days post hatch (McDonald 1998). Chicks were lost to predation and also to climatic factors. Weather conditions during early June are important to brood success, with torrential cloudbursts and long cold rainy spells reducing brood success. Brood mortality is often caused by the death of the hen, thus, predation of hens during the brood-rearing season can have multiplying effects on a population (McDonald 1998).

Spring Through Fall Movements and Home Ranges

From spring through fall, Columbian sharp-tailed grouse tend to stay within a relatively close distance of lek sites. They were closest to the lek site during the spring breeding season, and ranged farther from the lek site in the summer and fall. Males tended to remain closer to lek sites than females in spring and summer, but not in fall. Nielson and Yde (1982) reported that sharp-tailed grouse generally remain within 1.6 km of the lek site between spring and fall. From spring through fall in Idaho, Marks and Marks (1987) found 90% of use locations were within 1.2 km of the lek site, and McDonald found 94 to 99% of all locations were within 3.5 km of the lek site in Washington. In Colorado, Giesen (1997) found >90% of locations were within 2.5 km of the lek site, and >95% were within 3 km. In Colorado, Boisvert (2002) found median movements of 1.6 km from spring through fall. In Washington, females were an average of 1.1 to 2.0 km from the lek site in the spring at two sites, and 1.3 to 1.6 km from the lek site in summer. Males were an average of 0.62 to 0.68 km from the lek site in the spring, and 0.84 to 0.85 km in summer. The longer distances moved by females are indicative of males' greater fidelity to lek sites (McDonald 1998). Giesen (1997) reported that although males stayed closer to lek sites in the spring and summer, in autumn there was no difference between genders. Daily summer movements of Columbian sharp-tailed grouse range between 100 and 400 m (Hart et. al 1950, Meints 1991).

Giesen (1997) calculated an average spring to fall home range of 110±116 ha, and Boisvert (2002) found a median home range 86.3 ha in Colorado, while Marks and Marks (1987) found average spring to fall home ranges of 187±114 ha in Idaho. Hoffman and Dobler (1988b) found home ranges of 11.0 to 46.4 ha for three Columbian sharp-tailed grouse from April to June in Washington. Cope (1992) found nesting hens had a home range of 7 ha, while broods had a home range of 172 ha. Larger home ranges may be

indicative of poor habitat quality. Small home ranges may also indicate the birds exist in small isolated patches of useable habitat, resulting in the isolation of populations, which seems to be the case in Washington.

Spring Through Fall Food Habits

The spring through fall food habits of Columbian sharp-tailed grouse are not well known. Columbian sharp-tailed grouse eat mostly grasses, forbs, and seeds in the spring and summer, and supplement that diet with insects in fall. Columbian sharp-tailed grouse will occasionally feed in agricultural fields if they are available. Jones (1966) reported that grass blades comprised half the food of Columbian sharp-tailed grouse in spring and summer, with flowers (primarily buttercup [*Ranunculus* spp.] and dandelion [*Taraxacum officinale*]) comprising a quarter of the diet. Cheatgrass, a non-native species, was not eaten in significant amounts, although it was plentiful. In summer, 75% of food was Idaho fescue (*Festuca idahoensis*) and other grass blades. In fall, 36.8% of the diet was seeds, 23.2% grass, and 6.7% forbs. Insects comprised 3.6% of the spring diet, 3.8% of the summer diet, and 32.3% of the fall diet, with grasshoppers being the most prevalent insect. Marshall and Jenson (1937) noted that wheat, alfalfa, and unspecified native grasses grass were the most important foods for Columbian sharp-tailed grouse in spring in Utah. Giesen and Connelly (1993) noted that fall diets include higher proportions of insects and agricultural crops than spring or summer. Columbian sharp-tailed grouse ingest small stones (grit) and retain them in their gizzard to help with grinding of coarse or hard foods. There is no evidence they seek free water, instead likely meeting their water requirements from the food that they ingest (Saab and Marks 1992).

Chicks depend heavily on insects during their first few weeks of life, with insects comprising 80 to 100% of their food during their first three weeks (Hart et al. 1950). Their diet is similar to adult diets by the time they are 11 weeks of age (Parker 1970).

Winter Ecology and Habitat

The onset of snow cover signals a marked change in Columbian sharp-tailed grouse habitat use. They generally move from lower summer range to higher elevations, where they spend the winter in mountain shrub and riparian habitats. Columbian sharp-tailed grouse move from their summer habitat when it becomes covered in snow, making it unavailable. The shrubs and small trees in mountain shrub and riparian habitats extend above the snow and, thus, are available for food and cover.

Meints (1991) reported that the "quality and quantity of available winter habitat and its proximity to spring and summer use areas may play a key role in sharptail survival" and Marks and Marks (1987) reported that the availability of suitable winter habitat is probably most critical determinant of whether or not an area can support Columbian sharp-tailed grouse.

The timing of the move to winter habitat seems related to the onset of snow cover, with Boisvert (2002) finding that all individuals had reached winter areas by the 28th of

December. Before Columbian sharp-tailed grouse moved to winter habitat, they were seen using south facing slopes in shrub steppe habitat, which were the last to be covered with snow (Boisvert 2002). Ulliman (1995b) found that they remained in summer habitat until forced to higher elevation winter habitat by heavy snowfall and, that, while snow cover was a determinant of winter habitat use, all other weather factors were not. In Wyoming, when Columbian sharp-tailed grouse coveys moved from summer habitat, they first (in October and November) moved to areas such as ridges and hilltops where vegetation was still exposed, and then moved to winter habitats when these areas became unavailable due to snow cover (Oedekoven 1985).

In Washington, during a winter with a lack of snow cover and mild temperatures, Columbian sharp-tailed grouse did not necessarily move to mountain shrub and riparian areas, because they were able to use summer habitats further into the year. When snow cover caused other habitats to become unusable, birds moved to winter areas in birch habitats (Hoffman and Dobler 1988a). In a mild winter in Idaho, Columbian sharp-tailed grouse were able to use CRP fields throughout the winter because of low snow cover (Schneider 1994). Columbian sharp-tailed grouse in Washington used wheat fields until they were covered in snow (McDonald 1998).

When Columbian sharp-tailed grouse move into their winter habitats, they generally use deciduous trees or tall shrubs that extend above the snow for both feeding and cover. 88% of all locations were less than 50 m from mountain shrub or riparian habitats; individuals were not located more than 125 m from these habitats (Marks and Marks 1988). Columbian sharp-tailed grouse also flushed to mountain shrub and riparian habitats 74% of the time (Marks and Marks 1988). During winter in Idaho, individuals were found at higher elevations and closer to habitat edges than random sites and were an average of 90 m from riparian areas (Meints 1991). Ulliman (1995b), however, reported that topographic variables (slope, aspect and elevation) did not appear to influence site selection, and that Columbian sharp-tailed grouse selected sites with taller vegetation height and more canopy cover than random sites. They selected sites that were closer to lek sites, habitat edges, riparian habitats, and further from roads than random sites. In Wyoming, individuals were observed at the edges of large (>0.5 ha) patches and throughout small (< 0.5 ha) patches of winter habitat (Oedekoven 1985).

In Washington, Ziegler (1979) (*in* Lannoy 1987), McDonald (1998), and Hoffman and Dobler (1988a) reported that water birch (*Betula occidentalis*) was the most important species to Columbian sharp-tailed grouse in the winter. Ziegler indicated that availability of birch was the probably the limiting factor for Columbian sharp-tailed grouse, and Hoffman and Dobler noting that loss of water birch in an area caused Columbian sharp-tailed grouse to abandon it. Yocom (1952) reported that Columbian sharp-tailed grouse were most often found in shrubby bushes and draws associated with the following genera: *Albus, Betula, Amelanchier, Crataegus, Rosa, Symphoricarpos,* and *Salix*. In Wyoming, Oedekoven (1985) found Columbian sharp-tailed grouse in riparian areas that included narrowleaf cottonwoods (*Populus angustifolia*) intermixed with hawthorn (*Crataegus* spp*.)* and willow (*Salix* spp.) species and also in mountain shrub habitats dominated by Saskatoon serviceberry and common chokecherry. In Idaho,

Meints (1991) found Columbian sharp-tailed grouse most often in aspen (*Populus* spp.) and chokecherry stands and also in Utah Juniper (*Juniperus osteosperma)* patches. Marks and Marks (1987) located them in serviceberry and hawthorn in Idaho, noting the largest winter flocks in hawthorn, as it provided both dense escape cover and an abundance of food when berries were present. Schnieder (1994) found Columbian sharp-tailed grouse in riparian areas that included narrowleaf cottonwood intermixed with hawthorn and willow, while another group of birds used sagebrush and Russian olive (*Elaeagnus angustifolia*) habitats. In Utah, Columbian sharp-tailed grouse began using maple (*Acer spp.*) and chokecherry habitats in December, and used this habitat almost exclusively through January and early February (Marshall and Jenson 1937). In early winter in Colorado, Columbian sharp-tailed grouse preferred mountain shrub habitats dominated by Saskatoon serviceberry (Giesen 1997).

Columbian sharp-tailed grouse form small flocks in the winter. Flock sizes averaged 5.6 in Idaho and 4.18 in Washington (Hoffman and Dobler 1988a, Marks and Marks 1988). Average flock sizes were larger in December and January (7.2) than in February and March (4.6), and the largest flock (32 birds) was in a stand of hawthorn (Marks and Marks 1988). Hoffman and Dobler (1988a) found a mean flush distance of 37.7 m in Washington. Historical reports indicate that Columbian sharp-tailed grouse used to form much larger flocks, numbering thousands of birds; so large they "darkened the skies" (Hart et al. 1950).

In the winter, Columbian sharp-tailed grouse often burrow into the snow. Snow burrows are immediately adjacent to mountain shrub or riparian habitats, and are up to 1 m in length. It is suspected that individuals remain in their snow burrows for most of the day and the entire night, helping them conserve heat and hide from predators. Columbian sharp-tailed grouse are only able to create burrows when the snow is light and powdery. If the snow forms a crust, they are not able to burrow through it, and begin to use seeps where vegetation is exposed (Marks and Marks 1987).

Columbian sharp-tailed grouse remain on winter ranges until snow cover melts on their summer ranges; in Colorado this happened in early March, with all birds having returned to their breeding grounds by the middle of April. Males appeared on lek sites about 2 to 3 weeks earlier than females (Boisvert 2002).

Winter Movements and Home Ranges

Marks and Marks (1987) found that Columbian sharp-tailed grouse moved an average of 1.7 km from summer to winter habitat. Giesen (1997) found an average movement of 4.5 km, while Meints (1991) found 2 individuals that moved over 20 km to winter habitat. Giesen and Connelly (1993) observed that Columbian sharp-tailed grouse seem to move farther to winter habitat in regions lacking broad distribution of winter food resources. However, Boisvert (2002) found that Columbian sharp-tailed grouse moved long distances to winter habitat (an average of 20.2 and 22.3 km from lek sites with the longest movement being 41.5 km), even though suitable habitats were closer. She suggested the long distances moved were because there were a large number of

Columbian sharp-tailed grouse in the area, and migration to farther sites helped them avoid intra-specific competition.

In Washington, females moved an average of 5.5 km to winter habitat, while males moved an average of 1.0 km. Females made long distance movements even though suitable habitat appeared to be available a shorter distance from summer habitat. This long distance movement was also hypothesized as a means to avoid intra-specific competition, although Washington does not support as many Columbian sharp-tailed grouse as Colorado (McDonald 1998). Ulliman (1995b) also noted that females moved farther distances from lek sites than males, although he speculated that this behavior was for the purpose of avoiding male harassment.

In Colorado, the median winter home range was 214.4 ha (Boisvert 2002). Cope (1992) found a group of Columbian sharp-tailed grouse that used grassland habitats in winter (due to a lack of snow cover) had a mean home range of 638 ha. Ulliman (1995b) found median winter home ranges of 59 ha during a mild winter in Idaho, and 187 ha in a severe winter, also finding that male home ranges were larger than those for females' home ranges. Median daily movements in winter in Idaho were 252 and 286 m (mild vs. harsh winter) for females, and 160 and 309 m for males (Ulliman 1995b).

Winter Food Habits

In winter, Columbian sharp-tailed grouse feed on buds and berries of shrubs and trees. They also may make some use of agricultural fields when available. The catkins of water birch seemed to be the most important food in Washington and in British Columbia (Ritcey 1995, McDonald 1998), however, in British Columbia, paper birch (*Betula papyrifera*), scrub birch (*B. glandulosa*) and aspen and willow were also ingested (Ritcey 1995). In Idaho, shrubs comprised 87% of the total diet, of which 88% were buds, berries, and twigs of chokecherry and serviceberry. Some birds were found in CRP fields, and they ate mostly forbs such as alfalfa, yellow salsify (*Tragopogon dubius*), and *Draba* spp. (Schneider 1994). One group of four birds fed on Russian olive berries and midge galls (*Rhopaloymyia* spp.) that form on sagebrush. No nutritional difference was found between the diets of males and females (Schneider 1994). Ulliman (1995b) found alfalfa (*Medicago sativa*), goatsbeard (*Tragapogon dubius*), and serviceberry were the most important winter foods. Marks and Marks (1988) found that Columbian sharp-tailed grouse preferred eating hawthorn berries when available (but not hawthorn buds), and on mountain shrubs when they were not. They also feed on willow, chokecherry, bittercherry (*Prunus emarginata*), the fruits and foliage of juniper, thistle (*Cirsium* spp.) seeds, and grasses and forbs in seep areas.

IX. Land Ownership in Current Range

State	Population	Public Land[a]	Private Land[a]	Total[a]	% Public Land
Colorado	Northwest	2824	5890	8713	32
Idaho	South-central	1812	704	2516	72

	Southeast	6550	8247	14797	44
	West-central	350	1336	1687	21
	Totals	8712	10287	19000	46
Nevada	North	2197	619	2816	78
Utah	North	948	2618	3565	27
Washington	Dyre Hill	28	280	307	9
	Nespelem	21	492	513	4
	Okanogan	99	793	892	11
	Swanson Lakes	25	496	520	5
	Totals	173	2060	2233	8
Wyoming	Savery	1661	793	2454	68
US Range		16515	22267	38782	43

Table 1. [a]Numbers are given in km^2. Data from Bart (2000b)

Colorado

In Colorado, 68% of Columbian sharp-tailed grouse habitat is on private land, while only 32% is publicly owned (Table 1)(Bart 2000b). Of the 174 active lek sites, only 21 (12% of the total) are on public lands. Of these, 10 are on State Land Board Property, which permit little or no public access, 3 are on Colorado State Park lands, 4 are on Bureau of Land Management lands, and 4 on National Forest lands. The remaining 153 lek sites are on private property. Of the 153 lek sites on private land, 38 are on lands enrolled in the Conservation Reserve Program, and 24 are on mine reclamation lands. While Conservation Reserve Program and mine reclamation lands comprise only 4% of Columbian sharp-tailed grouse habitat, 36% of active lek sites are on those lands, underscoring their attractiveness to the subspecies in the state (Hoffman 2004).

Idaho

In Idaho, 46% of Columbian sharp-tailed grouse habitat occurs on public lands, mostly Bureau of Land Management lands, and a smaller amount of state owned lands (Table 1). Fifty-four percent of the habitat occurs on private lands, and this includes 2,284km^2 of lands enrolled in the Conservation Reserve Program in counties where Columbian sharp-tailed grouse are present (Bart 2000b, Meints 2001). In southeast Idaho, containing largest metapopulation of Columbian sharp-tailed grouse, 46% of land is publicly held, affording ample opportunities for proactive management of habitat on public lands. Columbian sharp-tailed grouse populations in Idaho are heavily dependent on Conservation Reserve Program lands, except for the small, introduced Shoshone Basin population (Bart 2000b).

Nevada

Most Columbian sharp-tailed grouse habitat in Nevada occurs on public lands (78%) (Table 1). The population there resulted from the release of birds transplanted from Idaho. The birds were released onto private land, but moved onto public land soon thereafter.

Utah

Most Columbian sharp-tailed grouse habitat in Utah (73%) is privately owned (Table 1), and public lands are represented by one large Bureau of Land Management managed area north of the Great Salt Lake, along with small patches of state land. Columbian sharp-tailed grouse mainly occupy small islands of native sagebrush steppe that are too steep or rocky to cultivate, surrounded by areas of dry-land farming (Bart 2000b).

Washington

Columbian sharp-tailed grouse habitat in Washington occurs largely on private land (Table 1). The Swanson Lakes population includes the Swanson Lakes Wildlife Area, managed by the Washington Department of Fish and Wildlife. This wildlife area, which covers four percent of the area of that population, with the remainder in private ownership. The Nespelum population occurs mainly on private lands, the vast majority belonging to the Colville Reservation, with 4% of the land in public ownership. The Dyre Hill population range includes 9% publicly owned lands, and 91% privately owned lands. The Okanogan River population range is 11% publicly owned (including two areas managed by the Washington Department of Fish and Wildlife which are administered largely for the benefit of Columbian sharp-tailed grouse) and 89% privately held. All populations in Washington depend heavily on private lands enrolled in the Conservation Reserve Program (Bart 2000a).

Wyoming

Sixty-eight percent of Columbian sharp-tailed grouse habitat in Wyoming is in public ownership (Table 1). Of this area, approximately 44% is managed by the U.S. Forest Service land, 44% is managed by the Bureau of Land Management, with the remaining portion controlled by the state. Thirty-two percent of habitat occurs on private lands. None of the private lands is enrolled in the Conservation Reserve Program (Bart 2000b).

X. Status Assessment by State

Washington

Historical Distribution

Columbian sharp-tailed grouse were historically distributed throughout most of the state east of the Cascade Mountains, especially on the plains of the Columbia River and across the Columbia Plateau. Buss and Dziedzic (1955) quote early settlers that, in winter, flocks of hundreds of birds descended on riparian areas to feed, with some flocks so large that they appeared to cover an acre of ground. Cawston (2000) reports that Columbian sharp-tailed grouse were historically abundant on the Colville Indian

Reservation.

Columbian sharp-tailed grouse declined in abundance in the early part of the 20th century. Buss and Dziedzic (1955) report that Columbian sharp-tailed grouse "declined from abundance to virtual annihilation in southeastern Washington in less than a half century", with most of the loss occurring in a single decade, 1910-1920. Yocom (1952) reported that by 1952, Columbian sharp-tailed grouse were limited to channeled scablands (an area in Eastern Washington characterized by basaltic columns and steep aspects) that were not able to be farmed. Extensive conversion of native grass and shrublands to agriculture has been given as the primary cause for their decline in Washington (Buss and Dziedzic 1955, McDonald and Reese 1998). Early farming may have increased their abundance, providing additional food sources, but as more native habitat was converted, Columbian sharp-tailed grouse rapidly declined. Birds began to nest in wheat stubble instead of native bunch grass. Farmers began to plow and burn wheat stubble during nesting season, destroying the nests (Buss and Dziedzic 1955). Farmers also removed vegetation from riparian areas, destroying winter habitat and, once populations were reduced to a low level, hunting and accidental poisoning (intended for rodents) may have had additional adverse effects (Buss and Dziedzic 1955).

Columbian sharp-tailed grouse populations on the Colville Indian Reservation began to decline in the 1940's, when the Grand Coulee dam was built on the Columbia River, resulting in an increased human presence in the area, which led to increases in agricultural and livestock development. The dam also directly inundated suitable habitat along the Columbia River. Increased invasion of foreign species, including cheatgrass, was also mentioned as a factor in the decline (Cawston 2000). Since the middle of the century, the number of Columbian sharp-tailed in Washington has declined by an average of 4.8% per year, with a 92% decline between 1954 and 1998. Hunting was allowed before 1933, and limited hunting was allowed between 1953 and 1987, with approximately 18% of the yearly population (almost certainly too high to maintain population levels [Dan Keppie, pers. comm.]) being harvested annually between 1974 and 1980 (Schroeder et al. 1999).

Current Status

Currently, four small, isolated populations of Columbian sharp-tailed grouse exist in Washington: Swanson Lakes, Nespelem, Dyre Hill, and Okanogan. About 51.1% of lek sites are on private land, 24.4% on state or federal, and 24.4% on the Colville Indian Reservation (Schroeder et al. 1999). The current distribution is estimated to be 2,234 km^2, or 2.8% of the historic distribution. Hunting of Columbian sharp-tailed grouse has not been allowed in Washington since 1988. The total state population was estimated to be 618 birds in 2002.

Columbian sharp-tailed grouse are highly imperiled in Washington. Grasslands, which covered 25% of their historic range in the state, have been reduced to only 1%, while sagebrush habitats have decreased from 44% to 16% of historic range. Wetlands, which once were home to a plethora of insects crucial to brood rearing, have almost

completely disappeared. Most of these losses were to agriculture. Columbian sharp-tailed grouse habitat has also grown patchier, and the mean patch size has decreased 36%, with patches of quality habitat becoming both smaller and more isolated. The remaining habitat of Columbian sharp-tailed grouse in Washington, however, is unsuitable for farming, and it is not likely that significant additional habitat will be lost in conversion to cropland (WDFW 1995). Currently, the mean distance between populations is 60.9 km, which is triple the mean dispersal distance of females in the state, reproductively isolating each population (McDonald and Reese 1998).

Populations of Columbian sharp-tailed grouse in Washington are heavily dependent on CRP fields, and if this program is discontinued, population declines are likely to accelerate (Bart 2000b). Hens in Washington select CRP lands for nesting, even though this results in lower rates of nest success. CRP lands may actually be an "ecological trap", as birds are drawn to nest in CRP habitats over other areas, even though nest success there is lower (McDonald 1998). Small population sizes (80 to 400 birds) make each population vulnerable to stochastic events and inbreeding depression (Bart 2000b). Rural development is considered to be a problem in some areas (Lannoy 1987). Grazing pressure is increasing within the current range of the Columbian sharp-tailed grouse in Washington (Hays et al. 1998), and the continuing loss of deciduous trees and shrubs by chemical control are associated with declining Columbian sharp-tailed grouse numbers. High winter mortality rates as a result of declining quality and quantity of winter habitat are considered to be the most important factor in the continuing decline of Columbian sharp-tailed grouse in Washington.

Oregon

Historical Distribution

Columbian sharp-tailed grouse were once widely distributed in grassland and sagebrush steppe of eastern Oregon. Birds were abundant around 1900, but by the 1940's only a few birds remained. Hunting was discontinued in 1929. A few Columbian sharp-tailed grouse were sighted during the 1940's and 1950's, and a small population persisted into the 1960's in Baker county (Woodruff 1982, Bart 2000a). The last individuals in the state were seen in the late 1960's (Woodruff 1982, Olson 1976). There was a reintroduction attempt in 1963, but it involved plains sharptails from South Dakota, and was unsuccessful (Olson 1976). The majority of quality habitat in Oregon was gone by 1915, populations having decreased with the advent of grazing, but experiencing massive declines only with the advent of extensive agricultural development (Olson 1976). Woodruff (1982) reported the most significant factor in the decline seems to have been the reduction of native, deciduous vegetation in riparian areas.

Current Status

Despite recent transplantation efforts, with multiple releases spanning 10 years, Columbian sharp-tailed grouse are likely extirpated (again) from the state of Oregon. Efforts were made to reintroduce the subspecies to Oregon, in Wallowa County, with

179 birds released between 1991 and 1997. However, only 9 birds were sighted at two leks in 2000. The population was heavily dependent on CRP lands. There have also been unconfirmed reports of birds in Baker County, adjacent to the west-central Idaho population (Bart 2000a). A supplemental release of 33 birds was conducted in the spring of 2001, with the total population estimated at around 80 birds after the release (ODFW 2001).

However, today it is likely that no birds from the transplant effort remain (Clait Braun, pers. comm.), rendering the efforts to reintroduce the subspecies to Oregon a failure. Barriers to reintroducing Columbian sharp-tailed grouse to Oregon have been habitat fragmentation and a decline in habitat quality, as well as inbreeding depression and accidental hunting of the transplanted birds (BLM 2000).

Idaho

Historical Distribution

Columbian sharp-tailed grouse were once distributed over much of Idaho, occurring in 35 of 44 counties (Schneider 1994), and were described as abundant until the early 1900's, when numbers began to decline. The major losses in distribution appear to have occurred between the 1950's and 1970's.

Current Status

There are currently three populations of Columbian sharp-tailed grouse in Idaho, one in the southeastern portion of the state, one in the west-central portion of the state, and one in the Shoshone Basin. Idaho contains approximately 80% of the remaining birds in the United States, and the viability of the subspecies may depend on its fate in Idaho (Ulliman et al. 1998)(Clait Braun, pers. comm.).

The west central population numbers between 200 to 300 birds, and is centered on the Hixon Columbian sharp-tailed grouse Habitat Management Area, in Washington County (Bart 2000b). This 11,226 ha area is owned by the Nature Conservancy, and managed by the BLM, Idaho Department of Fish and Game, and the Nature Conservancy. This area is being managed to provide quality habitat for Columbian sharp-tailed grouse, and habitat restoration is being conducted. Though the Columbian sharp-tailed grouse population seems secure in the area, its small size and isolation render it vulnerable. Hunting of this meta-population is not allowed (Mancuso and Moseley 1997), although accidental hunting probably occurs.

The Shoshone Basin population is the result of transplants of 358 birds captured in southeast Idaho and numbers between 200 to 400 birds. Two-thirds of its habitat occurs on BLM land, and grazing allotments have been reviewed and stocking numbers and times altered to provide better habitat for Columbian sharp-tailed grouse, and riparian areas are being restored (Bart 2000b). Hunting of this population is not allowed.

The metapopulation in southeastern Idaho contains most of the Columbian sharp-tailed grouse across their distribution. It may have increased in number during the last two decades, largely the result of an increase in available habitat provided by CRP fields. Meints (2001) estimated the spring breeding population to be between 38,000 and 65,000 birds in 2001. However, these estimates are highly speculative, and may significantly overestimate the population, as they extrapolate the total population based on surveys of only 273.5 mi^2 (only 4% of 5,713 mi^2 of available habitat). Survey efforts were focused on CRP lands that were known to have Columbian sharp-tailed grouse. It is very unlikely that all un-surveyed lands contain Columbian sharp-tailed grouse in densities similar to surveyed areas. Thus, Meints may greatly overestimate the number of Columbian sharp-tailed grouse present. Idaho is not currently able to produce a current population estimate (Tom Hemker pers. comm.).

Estimates of hunter harvest averaged about 10,000 birds per year from 1991 to 1996; however, revised methods of hunter surveys now estimate an annual harvest of around 3,000 birds. Hunting seasons range between 15 and 30 days, starting at the beginning of October, with daily/bag limits of 2/4 (Mallett 2000). This population is highly dependent on CRP land for survival, with 2284 km^2 enrolled in CRP within the range (15% of the total land area, and 28% of all private land), and 80% of all new leks found on CRP lands (Mallet 2000). This metapopulation will likely undergo significant declines if CRP is discontinued, if land in the area is withdrawn from the program, or if the program "goes belly-up with managed haying and grazing" (Clait Braun, pers. comm.). If this comes to pass, Columbian sharp-tailed grouse expert Clait Braun predicts that the population size will decrease by two thirds (Clait Braun, pers. comm.). Grazing by livestock and fire in winter habitats are the primary threats to Columbian sharp-tailed grouse in Idaho (Ulliman et al. 1998).

Lek surveys conducted by the state of Idaho suggest that Columbian sharp-tailed grouse populations are unstable, fluctuating greatly over short periods of time. The average number of males per lek peaked in 1999, reaching 15.5, then decreased every year until 2002, when the average was 8 males per lek, before recovering in 2003 (11.1) and 2004 (12.2) (IDFG 2004). This suggests that the number of Columbian sharp-tailed grouse in Idaho decreased by 50% between 1999 and 2002, before rebounding somewhat. The FWS relied on stable or increasing metapopulations as one of the primary reasons in denying listing of the Columbian sharp-tailed grouse (USFWS 2000b). However, lek survey results show no clear trend, and extreme year to year fluctuations in population. Given the year to year variability in population trends, it is clear that populations of the subspecies are not stable in Idaho.

Wyoming

Historical Distribution

Historically, Columbian sharp-tailed grouse were considered rare in WY (Facciani 1999) and were distributed discontinuously across the southwestern third of the state (Bart 2000a). The cause for the decline of Columbian sharp-tailed grouse in

Wyoming is not known, but fire suppression and grazing have contributed to ecosystem changes (Bennett 1999), and herbicide treatments of sagebrush/grass and mountain shrub have occurred in their habitat (Klott no date). Columbian sharp-tailed grouse were assumed to have been extirpated from the state until the discovery of the Savery population (Klott no date).

Current Status

The only known population in Wyoming occurs in south-central Wyoming, near Savery. This population was only recently discovered, first being documented in 1977, and is considered an extension of the larger Colorado meta-population. In 1999, there were 24 known or suspected lek sites, with more suspected. Columbian sharp-tailed grouse were hunted in Wyoming from 1989 to 1993, but the season was closed in 1994 due to low population numbers. Hunter harvest during that period ranged from 29 to 92 birds per year (Facciani 1999).

Survey efforts have increased since 2000 (Wooley 2003), and the Wyoming Game and Fish Department plans to continue monitoring leks, and increase searches for new lek sites (Facciani 1999). The population is considered stable in Wyoming (Wooley 2003). Little CRP lands are available to Columbian sharp-tailed grouse in Wyoming (USFWS 2000). Surveys have counted flushed birds, because of the difficulty in counting dancing birds, and may be conservative. The population was estimated to number between 600 and 700 birds in 2004 (Tim Wooley, pers. comm.). Sightings have increased north of the current range, suggesting the populations' distribution may be expanding (Wooley 2003).

Nevada

Historical Distribution

Columbian sharp-tailed grouse historically occurred in the high mountain valleys of northern and western Nevada (Bart 2000b). The last reported sighting of Columbian sharp-tailed grouse was in 1952 (Wick 1955).

Current Status

Only one confirmed population of Columbian sharp-tailed grouse exists in Nevada, in Elko County in the northeastern corner of the state. It was established by transplanting Columbian sharp-tailed grouse from Idaho into unoccupied habitat. In total, 196 birds were released into the area between 1999 and 2002 (Stiver et al. 2002). The spring breeding population was estimated to be between 20 and 40 birds in 2000 (Bart 2000b). Thirty nests have been documented, of which 12 (40%) produced young. Wildlife Services (APHIS) has conducted predator control in the release area, killing 1,294 ravens, 270 coyotes, and 3 badgers to enhance reintroduction success. The success of this predator control is unclear: in 2 of 3 years, nesting success of hens was higher outside the treated area than inside (NDOW 2002). At least one lek has been established,

which has resulted in lowered mortality and dispersal rates for subsequently transplanted birds (Stiver et al. 2002).

Columbian sharp-tailed grouse released into the Shoshone Basin in Idaho have been documented using Nevada habitats in the summer, and two nests were found in 1998 and 1999. However, this area burned in 2000 (Stiver et al. 2002). Increased fire frequency is a problem in Columbian sharp-tailed grouse range in Nevada, as fire frequencies have increased as a result of the invasion of non-native species, especially cheatgrass.

It is not clear that reintroduction attempts in Nevada have produced a self-sustaining population, and Columbian sharp-tailed grouse must be considered critically imperiled in the state.

Utah

Historical Distribution

The historic distribution of Columbian sharp-tailed grouse included northern Utah, and a corridor south along the foothills of the Wasatch Range (Bart 2000b). They were described as being plentiful in those areas where habitat conditions were favorable. They were so plentiful in early days that they "darkened the sky when they flew", with flocks of thousands of birds. Joel Ricks, an early pioneer of the Cache Valley, was quoted as saying birds were abundant in the valley until 1875, when they began to decline, and that scores of birds were killed by flying into the first telegraph line in the valley (Hart et al. 1950).

The population throughout Utah began to decline by the 1920's, and had been greatly reduced by 1935, with a concurrent decrease in distribution (UDWR 2002). Hart et al. (1950) estimated the population had decreased to 1,500 birds by 1948, and that the birds occupied the foothills and benches, which were usually the most heavily grazed lands, and that grazing had caused a reduction in desirable grasses and berry producing shrubs, while allowing invasive species to proliferate.

Intensive hunting was probably part of the reason for early declines. Hunting was banned in 1925, although illegal or accidental hunting probably still affected already reduced populations. Destruction of habitat due to cultivation, grazing, and burning was believed to be important in their decline (Hart et al. 1950). Columbian sharp-tailed grouse populations may have begun to increase in the 1970's, with anecdotal reports of significantly more birds being observed, although their distribution did not increase. The hunting season was briefly reopened from 1974 to 1979, with about 50 birds per year being harvested. Columbian sharp-tailed grouse distribution began to increase in Utah with the advent of the Conservation Reserve Program (UDWR 2002).

Current Status

Since 1987, the distribution of Columbian sharp-tailed grouse populations in Utah has increased by 400%, largely the result of increases in available habitat provided by the Conservation Reserve Program. Eighty percent of Columbian sharp-tailed grouse habitat is in Box Elder County, 15% in Cache County, and the rest in Weber and Morgan counties. The Utah population is contiguous with the larger southeastern Idaho population. Fifty-six percent of known lek sites are located in sagebrush, 36% in CRP field, and 8% in agricultural fields. The estimated spring breeding population was 5,134 birds in 2000, based on estimations from hunter harvest (Bart 2000b). Since 1998, the state has allowed hunting of Columbian sharp-tailed grouse, with up to 663 two-bird permits being issued per year. Actual harvest levels have ranged from 201 to 462 birds per year (UDWR 2002). Populations in Weber and Morgan counties have continued to decline, due to an increase in rural development. Fire is also a threat to Columbian sharp-tailed grouse populations, with 13% of the subspecies' range having burned between 1988 and 1999 (Bart 2000b).

Lek surveys in Utah suggest wide year to year population fluctuations, as evidenced by the average number of males per lek. The average number of males per lek peaked in 1998 (19.0 males per lek), and then decreased each year until 2001 (8.5 males per lek). Thus, population levels seem to have decreased by 50% over a four-year period.

The FWS relied on stable or increasing metapopulations as one of the primary reasons in denying listing of the Columbian sharp-tailed grouse (USFWS 2000b). However, lek survey data in Utah show no clear trend, and exhibit extreme year to year fluctuations. Given the year to year variability in population trends, it is clear that populations of the subspecies are not stable in Utah.

Colorado

Historical Distribution

Columbian sharp-tailed grouse were historically distributed across the western third of the state, and were described as abundant, especially on the Uncompahgre Plateau (Hoffman 2001). The causes of decline in Colorado include conversion of native rangelands to cropland, livestock grazing, and forest encroachment into grasslands (Giesen 1997). Declines were mentioned in the early 1900's. Browsing by deer herds from the 1950's to the 1970's may have been detrimental to the subspecies. Columbian sharp-tailed grouse were last seen in west-central Colorado (Mesa County) in 1985 (Hoffman 2001).

Current Status

Currently, there is one population of Columbian sharp-tailed grouse in Colorado in Moffat, Routt, and Rio Blanco counties, in the northwestern portion of the state, with

>90% of the population in Moffat and Routt counties. The spring breeding population is estimated to be about 6,080 birds with 148 known lek sites, and is based on surveys of ~90% of the available habitat, rendering it a fairly accurate estimate (Hoffman 2002). Almost all of the known leks are counted every year. Twenty-nine percent of lek sites are located in sagebrush, 27% in CRP, 20% in hay/pasture, 17% in mine reclamation, 3% in agriculture, 2% in native grass, 1% each in mountain shrub and mine spoil. While CRP and mine reclamation lands comprise only 4% of the Columbian sharp-tailed grouse range, 44% of all lek sites are there, underscoring their importance to the population in Colorado. Colorado allows hunting of Columbian sharp-tailed grouse, beginning on the first of September and lasting for 21 days, with annual harvest estimates ranging from 102 to 433 (Hoffman 2001). There is concern that this hunting season may start too early in the year (Clait Braun, pers. comm.).

Topographic constraints have limited the amount of agricultural development in northwestern Colorado. This is believed to be why Columbian sharp-tailed grouse still occupy the area. Much of land that has historically been cultivated is now enrolled in the CRP (Hoffman 2001).

Colorado has increased the amount of time dedicated to lek searches in recent years (Rick Hoffman, pers. comm.) and found a number of new leks in areas that had not previously been surveyed. Thus, the estimated population size has grown larger. However, data on the average number of males per lek show extreme instability, with dramatic year to year fluctuations, The average number of males per lek peaked in 2000 (19.3 males per lek), and then declined until 2003 (14.5 males per lek) (Hoffman 2003). For 2004, the number of males per lek increased again to 19.3. The increase seems to be due to increased rainfall before the 2004 breeding season (Hoffman 2004).

The FWS relied on stable or increasing metapopulations as one of the primary reasons in denying listing of the Columbian sharp-tailed grouse (USFWS 2000b). However, lek survey data in Colorado exhibit no clear trend, and are marked by extreme year to year fluctuations in population. Given the year to year variability in population trends, it is clear that populations of the subspecies are not stable in Colorado.

Montana

Historical Distribution

Historically, Columbian sharp-tailed grouse occupied most of the mountain valleys in the western part of the state. They were described as abundant in some areas. Populations began to decline during the 1920's, and by 1969, they were confined to three valleys (Bart 2000b).

Current Status

In all likelihood, Columbian sharp-tailed grouse are now extirpated from the state of Montana. In recent years, two populations of Columbian sharp-tailed grouse in Montana were identified, one in the Blackfoot Valley, and one at Tobacco Plains, on the

Dancing Prairie Preserve owned by the Nature Conservancy. No birds have been seen at Tobacco Plains since 2000 (Nature Conservancy 2003). Recent measurements of the Blackfoot Valley population show that their weights more closely resemble that of Plains sharp-tailed grouse, suggesting they may belong to that subspecies (Bart 2000b). McCarthy (2000) also concluded these populations may contain Plains sharptails, based on their habitat linkages with that subspecies. Whether the Blackfoot Valley population is Plains or Columbian sharp-tailed grouse may be a moot point, as this population is also believed to now be extirpated (Clait Braun, pers. comm.).

New Mexico

It has been reported that Columbian sharp-tailed grouse historically occurred in northwestern New Mexico, and they appear on various distribution maps. However, Dickerman and Hubbard (1994), compared the nine known specimens of sharp-tailed grouse from New Mexico with plains and Columbian sharp-tailed grouse, and found differences significant enough to recommend that they be categorized as a separate subspecies, *Tympanuchus phasianellus hueyi,* New Mexico sharp-tailed grouse. This subspecies was last seen in 1952, and is believed to be extinct.

California

Historical Distribution

The Columbian sharp-tailed grouse is extirpated from California. The historic range of Columbian sharp-tailed grouse in California was in the northeastern plateau region, and included southwest Modoc county, northwestern Lassen county into Shasta county (Grinnell and Miller 1944; to Mansfield no date). The Columbian subspecies was formerly abundant in those areas, until 1880, when numbers began to decline. There have been no confirmed sightings of Columbian sharp-tailed grouse since 1915 (Grinnell and Miller 1944).

Sites in California have been evaluated as potential Columbian sharp-tailed grouse transplant sites (Kessler and Bosch 1982), however, there is currently no indication that any transplants are planned.

British Columbia

Historical Distribution

Columbian sharp-tailed grouse were described as common in British Columbia during early years of European settlement. Populations occurred in the south-central area of the province, and also close to the American-Canadian border, north of populations in Washington (Ritcey 1995). While populations in the south-central portions of the province have remained stable, the southern populations have experienced heavy declines and may be extirpated (Ritcey 1995). Intensive agriculture, forest encroachment into grasslands, and housing and industrial development have destroyed much of the habitat.

Other factors cited in the decline are flooding of riparian areas by the building of Libby Reservoir in Montana, loss to predation, and illegal hunting.

Current Status

Population dynamics and trend information for Columbian sharp-tailed grouse in British Columbia is limited (Leupin 2003). In 1993, Columbian sharp-tailed grouse was designated by the British Columbia Wildlife Branch as a vulnerable subspecies, due to declining numbers and habitat. Most of the habitat of Columbian sharp-tailed grouse is crown (national government) land. Approximately 7000 ha of its range is protected in wildlife management areas, and a smaller amount in ecological reserves (Ritcey 1995). It is estimated that Columbian sharp-tailed grouse range in British Columbia totals 60,000 km^2 (Leupin 2003), which is 68% of their historic range in the province (87,647 km^2) (Bart 2000b).

Large scale surveys of Columbian sharp-tailed grouse are not conducted in British Columbia. However, extrapolations of estimated densities across potentially suitable habitats, gave a 2002 estimate of 10,100 birds for the spring breeding population (Leupin 2003). It is estimated that populations of Columbian sharp-tailed grouse in British Columbia have decreased by as much as 70% since the early 1900's (Leupin 2003). There are two metapopulations of Columbian sharp-tailed grouse in British Columbia. Populations in the south-central portion of the province inhabit climax grasslands, and have had great reductions, with many populations extirpated or nearly so. In contrast, populations in the north-central region inhabit forest openings created by logging, and are stable and perhaps increasing in number (Ritcey 1995).

Clear-cut logging in the Fraser Plateau has created suitable habitat conditions for Columbian sharp-tailed grouse in the north-central portion of the province (Ritcey 1995). While clear-cut logging creates excellent short-term habitat for Columbian sharp-tailed grouse, clear-cuts are often replanted with conifers, and become unsuitable habitat in a short amount of time. Clear-cut logging in the Fraser Plateau has occurred in response to beetle infestation of pine trees (Leupin 2003), and is thus likely a one time event. As a result, increases in northern populations are ephemeral, with populations decreasing as suitable habitat decreases. Leupin (2003) states "these populations are unlikely to persist since their existence depends on the distribution size and age of the harvested blocks. As forests regenerate and cutting intensity decreases, habitat suitability and availability, and populations of sharp-tailed grouse will also decrease" (Leupin 2003).

Populations in the south central region have suffered dramatic declines, and comprise only a small part of the total Canadian population. Columbian sharp-tailed grouse have been extirpated from the Okanogan region, and nearly so from the southern Rocky Mountain Trench, and have declined in all other locations as well. These populations have suffered from large scale conversion of native habitat to agriculture (Leupin 2003). In addition, grazing has resulted in lack of adequate nesting cover in BC, with a large percentage of the non-agricultural land in the south-central region being grazed. Intensively grazed range is the norm, not the exception in British Columbia

(Ritcey 1995).

The Columbian sharp-tailed grouse is in danger of extirpation in Canada, as the north-central populations are unlikely to persist as clearcut forests regenerate, and the south-central populations are already on their way to extirpation due to the lack of suitable native habitat.

Range-wide Summary of Status

The state summaries above paint a picture of a subspecies which has suffered extensive declines in both numbers and range during the past century. In each state, a pattern of both population and distribution declines from historic levels is evident. The Columbian sharp-tailed grouse has become extirpated from California, Oregon, and Montana, and were extirpated from Nevada before recent re-introductions there. The reintroduction in Nevada can not yet be called successful, and the small population there (20-40 birds) is highly susceptible to extirpation from stochastic events. Reintroduction attempts in Oregon have failed due to a lack of suitable habitat. Columbian sharp-tailed grouse became extirpated from Montana after 2000, also due to a lack of suitable habitat. The number of birds in Washington has continued to decline, despite proactive intervention by the state, and state threatened status.

The two large metapopulations in Idaho/Utah and Colorado/Wyoming are also in trouble. These populations face numerous and imminent threats, as outlined below. The populations in Wyoming and Utah are dependent on those in Colorado and Idaho (respectively) for their continued existence. Lek surveys in Colorado, Idaho and Utah show dramatic year to year fluctuations. While the use of lek surveys to determine absolute population size has been questioned, lek surveys can give an accurate indication of year to year population trends (Applegate 2000). In each of these states, numbers seem to have increased and decreased by 50% or more over periods of just 3 to 4 years. In the absence of surveys of all extant leks, population estimates of such wildly fluctuating populations are likely to be grossly inaccurate. These fluctuations seem to be linked to precipitation (Hoffman 2004), and thus an extended drought, such as that which many predict for the Western U.S., may cause the extinction of Columbian sharp-tailed grouse in a period as short as a decade (based on 50% decrease in three years).

XI. Identified Threats to the Petitioned Species (ESA Criteria)

A. Present and Threatened Destruction, Modification, or Curtailment of Habitat or Range

Quality habitat is crucial to continued existence of Columbian sharp-tailed grouse. Parker (1970) states that in Idaho, it is “only by preserving the present habitat can we hope to perpetuate sharptails”. Marks and Marks (1987) conclude that “habitat quality appears to be the key in determining whether or not an area is suitable for Columbian

sharp-tailed grouse". However, current management practices have proven insufficient in protecting habitat.

This is perhaps best illustrated in Montana, where the Columbian sharp-tailed grouse has been extirpated within the last decade, and in Oregon, site of recent failed transplant efforts. In Montana, habitat fragmentation and human encroachment reduced habitat quality in the Tobacco Plains, until the last population of Columbian sharp-tailed grouse in the state were extirpated. In Oregon, birds were released into Wallowa county, even though requisite amounts of quality habitat were not present in the area (Clait Braun, pers. comm.), and the reintroduction attempt failed, despite the release of hundreds of birds.

Giesen and Connelly (1993) reported that increasing human activities throughout the range of Columbian sharp-tailed grouse will likely exacerbate loss and adverse modification of habitat due to livestock grazing, conversion of rangeland to cropland, mineral exploitation, and expansion of residential developments. Only the stringent protections afforded habitat by the Endangered Species Act will provide the necessary measures for the continued existence of the Columbian sharp-tailed grouse.

Habitat Destruction Due to Conversion to Agriculture

The conversion of native habitats to extensive agricultural development has been cited as one of the primary reasons for the decline in abundance of Columbian sharp-tailed grouse. Monotypic agricultural stands do not provide the cover necessary to hide Columbian sharp-tailed grouse from predators, and if used, may result in populations suffering abnormally high rates of predation. Agricultural conversion has been extensive throughout most of the range of the Columbian sharp-tailed grouse and the evidence indicates that an area, once extensively cultivated, is abandoned by Columbian sharp-tailed grouse (Hart et al. 1950, Buss and Dzidzic 1955, Evans 1968, Giesen and Connelly 1993, Ritcey 1995, McDonald and Reese 1998).

In Colorado, Boisvert (2002) found that Columbian sharp-tailed grouse made no use of agricultural fields. In Montana and Idaho, Cope (1992) and Ulliman (1995b) found that Columbian sharp-tailed grouse used agricultural lands less than would be expected, indicating they do not provide quality habitat, with Ulliman suggesting that agricultural fields do not provide enough cover for Columbian sharp-tailed grouse. Hart et al. (1950) reported that the Columbian sharp-tailed grouse does not adapt well to intensive cultivation.

Hoffman (2001) reported that the only reason that Columbian sharp-tailed grouse still occupy northwestern Colorado is because the topographic constraints in the region have precluded extensive agricultural development. In Idaho, Marks and Marks (1987) compared two areas, Mann Creek, which supported a sizable Columbian sharp-tailed grouse population, and Hog Creek, an area which had historically contained Columbian sharp-tailed grouse, but no longer did. They found that Hog Creek was lacking in those features that made an area attractive to Columbian sharp-tailed grouse. They reported that

agricultural development was one of the two major causes of habitat degradation at Hog Creek (the other being livestock grazing), and called it a "worst case scenario" of what could happen to Mann Creek if it were cultivated and/or grazed. In Washington, 80% of the Palouse Prairie was under cultivation by 1920. Cultivation has resulted in range-wide decreases in native habitats, with grassland habitats decreasing in extent from 25% to 1% of the historical range, while sagebrush habitats were reduced from 44% to 16%, and cropland and hay pasture increased from 0 to 51.2% of the landscape (McDonald and Reese 1998).

The detrimental effects of extensive agricultural conversion can also be seen in the recent expansions of Columbian sharp-tailed grouse range into areas enrolled in the Conservation Reserve Program. Columbian sharp-tailed grouse had formerly been extirpated from these areas when they had been cultivated. Once habitat conditions improved (temporarily) with enrollment in the CRP, they have reestablished themselves (Ulliman 1995a, Bart 2000b, UDWR 2002).

Habitat Destruction Due to Rural Development

Rural development pressures have been increasing throughout the West. Giesen and Connelly (1993) reported that human activities in the range of Columbian sharp-tailed grouse are increasing. Rural development harms the Columbian sharp-tailed grouse not only through direct destruction of habitat, but also, the increased human presence in an area can directly disturb breeding habits (Baydack and Hein 1987), and can result in increased populations of predators (dogs and cats kept by humans, through the creation of extra food sources for native predators, and through the creation of additional perches for avian predators on artificial structures) (WDFW 1995). On the Colville Indian Reservation, increased rural development made possible by electricity from the Grand Coulee dam presaged the decline of Columbian sharp-tailed grouse in that area.

Rural development threatens Columbian sharp-tailed grouse habitat around Steamboat Springs, Colorado. Raccoons (*Procyon lotor*), red fox (*Vulpes vulpes*), and striped skunk (*Mephitis mephitis*) have increased in number in the area, due to greater food availability and wintering areas created by humans, while crows, ravens and great horned owls have more perch sites because of human activity. This, in conjunction with reduced cover due to grazing, may skew predator/prey relationships, resulting in increased predation (Hoffman 2001). In Utah, increased development along the Wasatch Front has caused the continued decline of Columbian sharp-tailed grouse populations in Weber and Morgan counties, even as populations in the northwest part of the state have increased (Bart 2000b).

Habitat Degradation as the Result of Grazing

Grazing is considered one of the primary causes for the decline in Columbian sharp-tailed grouse (Hart et al. 1950, Buss and Dzidzic 1955, Evans 1968, Oedekoven 1985, Marks and Marks 1987, Giesen and Connelly 1993, Ritcey 1995, McDonald and Reese 1998, Hoffman 2001). Kessler and Bosch (1982) state that:

> livestock grazing is a dominant use in the remaining habitat of Columbian and Plains sharp tailed grouse. Range management practices occurring within sharptail range include varying intensities and seasons of grazing, deferred and rotation grazing, prescribed burning, brush control by chemical and mechanical treatments, and reseeding to native and introduced foreign plants. These practices affect the mixture of grasses, forbs, and shrubs upon which sharptail populations are dependent.

They go on to report that the adverse effects of intensive livestock grazing on Columbian sharp-tailed grouse are the reduction of residual cover, trampling of crucial winter vegetation, and destruction of riparian vegetation. Giesen (1997) observed that not only does grazing destroy habitat directly, it also removes the fine fuels that are required to maintain fire regimes, often resulting in conifer invasion. Intensive grazing also precludes tree and seedling establishment and thus impacts critical winter habitat (Lannoy 1987). Grazing may increase the amount of bare ground, which may lead to increased predation by eagles (Nielson and Yde 1982). Brown (1968) (*in* Hays et al. 1998) reported that birds shifted use to ungrazed areas following livestock use of traditional sites. Matisse et al. (1982) found grazing to be especially detrimental in nesting and brood rearing habitat (in Hays et al. 1998). While intensive grazing has the most detrimental effects on Columbian sharp-tailed grouse, light or moderate grazing are also detrimental in areas with a history of intensive grazing (much of the intermountain west), because it may prevent recovery of the native vegetation (Hays et al. 1998), and because Columbian sharp-tailed grouse prefer ungrazed areas (Marks and Marks 1987).

Deferred and rest rotation grazing, thought to improve range conditions, may actually be inferior to season long grazing for providing acceptable sharp-tailed grouse habitat. Yde (1977) and Matisse (1982) studied season long vs. deferred (Yde) and rest rotation (Matisse) grazing and found that season long grazing resulted in a more patchy vegetation pattern that was more suitable to sharp-tailed grouse than either deferred or rest rotation grazing. However, it is important to note that while season long grazing may be superior to deferred and rest rotation grazing, not grazing the land at all provides the best quality habitat for Columbian sharp-tailed grouse (Marks and Marks 1987).

In Idaho, Parker (1970) noted that cattle “loafed” under chokecherry, completely destroying it as escape cover. Ulliman (1995b) noted that serviceberry and chokecherry, essential winter cover and food for Columbian sharp-tailed grouse, were “decreaser species” meaning they decrease in abundance with increased disturbance (e.g., grazing pressure). In their comparison of Hog Creek and Mann Creek, Marks and Marks (1987) noted that continued grazing at the Hog Creek site had resulted in less vertical and horizontal cover, a lower diversity of forbs and shrubs, lower canopy cover of decreaser forbs, and fewer and more severely damaged mountain shrub and riparian areas. The authors indicated these conditions are likely to persist as long as livestock grazing persists. Especially notable were the lack of arrowleaf balsamroot and bluebunch wheatgrass, two decreaser species important to Columbian sharp-tailed grouse that were particularly drought resistant. They also noted that, overall, Columbian sharp-tailed grouse seemed to select sites that were least affected by livestock grazing, probably because these sites had less bare ground and high species diversity. Serviceberry and

chokecherry, throughout their study area showed signs of damage by livestock.

Columbian sharp-tailed grouse in Idaho increased in number when the acreage per Animal Unit (AU) was increased from 2-3 ha/AU to 8 ha/AU (WDFW 1995). In Washington, grazing pressure in Columbian sharp-tailed grouse habitat is increasing (Hays et al. 1998). In Utah, Hart et al. (1950) reported that grazing there had resulted in the trampling of shrubs and trees that provide winter food and cover for Columbian sharp-tailed grouse, causing them to be snow covered in winter and unavailable for use. In British Columbia, grazing occurs over much of the southern range of the Columbian subspecies (Leupin 2003), and results in the lack of adequate nesting cover for the subspecies (Ritcey 1995). Grazing has also caused lek site abandonment, damage to important breeding areas, and nest damage in British Columbia (Leupin 2003). In Colorado, degradation of riparian areas is evident within Columbian sharp-tailed grouse range, due to livestock overuse (Hoffman 2001).

The physical presence of cattle can also have more direct effects on Columbian sharp-tailed grouse populations. Nielson and Yde (1982) found that sharp-tailed grouse appeared to avoid cattle, with only 3 of 1279 observations of sharp-tailed grouse within 150m of cattle. McDonald (1998) found two nests that had been trampled by cattle. Klott and Lindsey (1986) found the presence of livestock on the dancing ground appeared to disrupt normal dancing activity.

Chemical and Mechanical Treatment of Habitat

Chemical and mechanical treatment of vegetation can be detrimental to Columbian sharp-tailed grouse populations, especially when conducted over large areas. Kessler and Bosch (1982) surveyed biologists who reported that chemical brush control was harmful to Columbian sharp-tailed grouse. Klott and Lindsey (1989) suggested that treatments that reduce shrub total cover may be detrimental to Columbian sharp-tailed grouse because they select lek sites that are somewhat shrubby. They recommend that if treatments are to be applied, they should be conducted in small rather than large patches because areas with a high degree of patchiness may provide more ideal habitat.

Lannoy (1987) provided anecdotal evidence of Columbian sharp-tailed grouse abandoning a lek site after a prescribed fire to improve conditions for livestock in Washington. Hays et al. (1998) reported that the loss of deciduous trees and shrubs due to chemical brush control was associated with declining sharp-tail populations in Washington. Hoffman (2001) reported that spraying of herbicides to reduce shrub cover is detrimental to Columbian sharp-tailed grouse when conducted in large patches and that if treated areas are grazed too soon after treatment, shrubs do not recover, rendering the area unsuitable for Columbian sharp-tailed grouse. Giesen and Connelly (1993) suggest that recovery of an area sprayed with herbicide may depend on whether or not grazing is allowed after treatment, while Klott (no date) says that mechanical treatment is recommended over chemical treatment, and that all treatments should be avoided during breeding and nesting seasons. Klott and Lindsey (1986) found no birds in areas of Wyoming that had been sprayed with herbicides in the 1970's to early 1980's.

Oedekoven (1985) found that herbicidal treatments in Wyoming with 2,4-D reduced forb cover, and eliminated snowberry shrubs and were, thus, probably detrimental to Columbian sharp-tailed grouse.

Invasion of Non-native Species

Marks and Marks (1987) reported that Columbian sharp-tailed grouse appear to select native habitats. In Idaho, 100% (6/6) of individuals that nested in native vegetation were successful, while only 45% of nests in non-native habitats were successful (Apa 1998). The proliferation of invasive species in an area may be detrimental if it alters the structural composition of an area, as Columbian sharp-tailed grouse select habitats primarily on the basis of structural characteristics such as height and density of vegetation (Ulliman 1995a).

Cheatgrass is perhaps the non-native species that presents the largest threat in Columbian sharp-tailed grouse habitat. Cheatgrass is now the dominant species on more than 40.5 million hectares in the Intermountain West (Ypsilantis 2003), including 17% of all federal lands (Belnap et al. 2000). Cheatgrass is extremely flammable, and its presence alters fire regimes from historical intervals of 20 to 100 years in sagebrush steppe ecosystems, to only 3 to 5 years in cheatgrass dominated areas. This alteration further favors cheatgrass, which responds vigorously to fire, and often results in establishment of cheatgrass monocultures. Cheatgrass monocultures frequently lack a shrub overstory, as these shrubs are out-competed by cheatgrass (Ypsilantis 2003). Thus, these habitats do not provide the structural characteristics necessary for Columbian sharp-tailed grouse use.

B. Over Utilization for Commercial, Recreational, Scientific or Educational Purposes

Hunting

Mortality as the result of hunting has been cited as a cause of historic declines of Columbian sharp-tailed grouse, and they are still hunted in British Columbia, Idaho, Utah, and Colorado, despite their dramatic declines. Hunting is allowed based on the theory that fall hunting is compensatory, rather than additive, to natural mortality. However, this may not be true. Both Bergerud 1988 (*in* Hays et al. 1998) and Ellison (1991) found that hunting mortality may be additive to natural mortality, especially if hunting seasons occur later in the fall, rather than earlier, and if populations are exposed to heavy hunting.

Colorado has a hunting season for Columbian sharp-tailed grouse, beginning on the first of September and lasting for 21 days with daily bag and possession limits of 2 and 4, with annual harvest estimates ranging from 102 to 433. Over-harvest may be a significant issue on public lands, because most hunting is concentrated on those areas

(Hoffman 2001). Since 1998, Utah has allowed hunting of the Columbian sharp-tailed grouse population, with up to 663 two bird permits being issued per year. Actual harvest levels have ranged from 201 to 462 birds per year (UDWR 2002). Estimates of hunter harvest in Idaho averaged about 10,000 birds per year from 1991 to 1996, however, revised techniques for hunter surveys now estimate yearly harvest of about 3,000 birds. Hunting seasons range between 15 and 30 days, starting in early October, with daily bag and possession limits of 2 and 4 (Mallett 2000). In Washington, harvest data from 1974-1980 indicate that 18.4% of the spring population was taken by hunters every year, however, hunting is no longer allowed (Schroeder et al. 1999). In British Columbia, Ritcey (1995) reported that populations are stressed by hunting, especially because of their tendency to gather near lek sites in fall, and that hunting is partially responsible for the high mortality rate there. Even in areas where Columbian sharp-tailed grouse hunting is banned, illegal or accidental hunting may constitute a threat to populations, especially where remnant populations are small (WDFW 1995, Ulliman 1995b).

Scientific Research

Trapping and radio-marking may make Columbian sharp-tailed grouse more vulnerable to predation. Marks and Marks (1987) found that radio-marked birds had an annual mortality rate of 100%, with the primary predator being northern goshawks that appeared to feed extensively on radio-marked birds (Marks and Marks 1987).

C. Disease or Predation

Disease

A study of sharp-tailed grouse in Manitoba found the birds carried heavy ectoparasite loads, with a density of 37.5 ticks/host, and a preponderance of lice on adult hosts. Parasites were found to affect grouse, as evidenced by scratching and loss of feathers (Dick 1981). Hays et al. (1998) reported that parasites are seldom believed to cause direct mortality of Columbian sharp-tailed grouse, but that they could limit already stressed populations.

A new and potentially disastrous threat to Columbian sharp-tailed grouse is the emergence of West Nile Virus outbreaks among sage grouse. Naugle et al. (2004) documented a 25% reduction in late summer survival among adult female sage grouse at 4 sites in the U.S. and Canada. The authors concluded that infection with West Nile Virus was responsible for the reduction in survival rate among sage grouse. There is currently no data on the presence or absence of West Nile Virus among Columbian sharp-tailed grouse populations, however, given the similarities between sage and sharp-tailed grouse, it is likely that Columbian sharp-tailed grouse populations will soon begin to show reduced survival due to West Nile Virus infection. The authors state that “the impacts of West Nile Virus may be more severe for species already threatened by habitat loss, and for those in small isolated populations” (Naugle et al. 2004). The fragmented, isolated

nature of Columbian sharp-tailed grouse populations, combined with their drastically reduced numbers, make them especially vulnerable to the impacts of disease outbreaks. West Nile Virus is called a "pending crisis for sage grouse" (Naugle et al. 2004), and Columbian sharp-tailed grouse most likely face the same crisis.

Predation

Columbian sharp-tailed grouse have evolved with high rates of predation, as evidenced by their high annual productivity. However, this balance may now have been disturbed, with an increase in the number of predators caused by human expansion into Columbian sharp-tailed grouse habitat, and increased vulnerability to predators in degraded habitats that lack adequate cover for hiding (Hoffman 2001). Columbian sharp-tailed grouse may be especially vulnerable to predation while lekking, because of the concentration of birds there. Klott and Lindsey (1989) found evidence of predation at the lek site in Wyoming, with predated birds found in more open areas of the lek site. In British Columbia, bald eagles (*Haliaeetus leucocephalus*), northern harriers (*Circus cyaneus*) and coyotes (*Canis latrans*) commonly prey on displaying Columbian sharp-tailed grouse (Ritcey 1995).

In Washington, coyotes, crows and ravens (*Corvus spp*) have increased in number because of increased food sources as the result of human activities (garbage dumps, landfills, etc.) (WDFW 1995). In Colorado, raccoons, red fox, and striped skunk have increased in number, due to greater food availability in wintering areas created by humans, while crows, ravens and great horned owls (*Bubo virginianus*) have more perch sites to hunt from which were created by humans (Hoffman 2001). Bergerud (1988) (*in* Hays et al. 1998) reports sharp-tailed grouse are vulnerable to predation during nesting because of large clutch sizes and their ground nesting habits, finding that 37% of all nests fail due to predation. Predation was also the most important factor affecting chick survival.

D. Inadequacy of Existing Regulatory Mechanisms

The Service cited management progress among the states within the current range of the Columbian sharp-tailed grouse as partial justification for determining that the species does not warrant Endangered Species Act listing. However, several courts have held that future conservation efforts by federal and state agencies do not justify further delay in listing candidate species. First, district courts struck down FWS's reliance on possible future actions of the U.S. Forest Service as a basis for not warranted determinations for both the Alexander Archipelago wolf (Canis lupus ligoni) (Biodiversity Legal Foundation v. Babbitt, 943 F.Supp. 23 (D.D.C.1996) and the Queen Charlotte goshawk (Accipiter gentilis laingi) (Southwest Center for Biological Diversity v. Babbitt, 939 F.Supp. 49 (D.D.C.1996)). The U.S. District Court in Texas also rejected an FWS determination that listing was not warranted for the Barton Springs Salamander (Eurycea sosorum) because of a conservation agreement between FWS and Texas state

agencies (Save Our Springs Legal Defense Fund, Inc. v. Babbitt, Civ No. 96-168-CA (W.D.Tex., Mar 25, 1997)). The court held that the efficacy of the conservation agreement was speculative (Id. at 9).

In addition, the U.S. District Court in Oregon went one step further in 1998 by holding that the National Marine Fisheries Service could rely neither on future or voluntary conservation measures within the Oregon Coastal Salmon Restoration Initiative Plan to deny listing of the Oregon Coast evolutionarily significant unit of coho salmon (Oncorhynchus kisutch) (Oregon Natural Resources Council et al. v. Daley et al., 6 F.Supp.2d 1139 (D.Or.1998)). Because they are unenforceable, the court maintained that voluntary conservation measures, like future measures, "should be given no weight in the listing decision" (Id. at 1155).

Similarly, the Oregon district court rejected FWS's reliance on the Northwest Forest Plan as a justification for finding that the bull trout (Salvelinus confluentus) faced only a "moderate" threat and was therefore warranted but precluded (Friends of Wild Swan, Inc. v. U.S. Fish and Wildlife, 945 F.Supp. 1388 (D.Or.1996)). The court stated that FWS "cannot rely upon its own speculations as to the future effects of another agency's management plans to put off listing a species" (Id. at 1398). That is precisely the mistake FWS made in regards to Columbian sharp-tailed grouse.

In an effort to continue using conservation measures as a justification for further delay of listing species, FWS announced a policy to evaluate conservation measures when making listing decisions (USFWS 2003). This policy forebodes more delay of listing species and perpetuates the Service's reliance on voluntary measures to protect species in decline, rather than employing the array of statutory conservation tools the ESA provides to prevent extinction and achieve recovery.

The new FWS policy for evaluating conservation measures when making listing decisions entails consideration of two factors: 1) the certainty that the conservation measures will be implemented; and 2) the certainty that these measures will be effective (USFWS 2003) In the case of the Columbian sharp-tailed grouse, state management plans were hastily created to avoid listing under the ESA. These state management plans (in Colorado and Utah) both fail to meet both criteria. In addition, a state management plan in Washington was created for the Columbian sharp-tailed grouse in 1995, but this plan expired in 1998, and has not been updated. Idaho also created a draft management plan for the subspecies, but this plan was abandoned. Thus, only Colorado and Utah have extant management plans for the Columbian sharp-tailed grouse. Since the initial not warranted determination on the ESA petition for Columbian sharp-tailed grouse in 2000, these plans have been poorly implemented. Even if they were fully implemented, they are so minimal in scope so as to be ineffective at preventing the species from becoming threatened or endangered. The voluntary state conservation plans afford Columbian sharp-tailed grouse no additional mandatory protection. Even if all conservation plans were fully funded and implemented, the Columbian sharp-tailed grouse would still be absent from over 90% of its historic range (Bart 2000b).

Following is an analysis of the two Colorado and Utah conservation plans through the lens of the Service's new policy.

A. The certainty that the conservation effort will be implemented:

1. The conservation effort, the party(ies) to the agreement or plan that will implement the effort, and the staffing, funding level, funding source, and other resources necessary to implement the effort are identified.

Utah's conservation plan was created by the Utah Department of Natural Resources, Division of wildlife resources (UDWR). Although the plan speaks of providing federal and state natural resource management agencies and the USDA with maps delineating Columbian sharp-tailed grouse habitat, there is no mention of coordination with these agencies, and they are not identified as parties to the plan. No mention is made of staffing, funding levels, and funding sources necessary to implement the plan. It mentions coordination with private landowners, but they are not identified, nor is any indication of their supporting the plan provided (UDWR 2002).

Colorado's plan specifically includes the Colorado Division of Wildlife (CDOW), the BLM, the US Forest Service, the Natural Resources Conservation Service of the USDA, US Fish and Wildlife Service, and private citizens, as parties to the plan. However, no mention is made of staffing, funding levels or funding sources (Hoffman 2001).

2. The legal authority of the party(ies) to the agreement or plan to implement the formalized conservation effort, and the commitment to proceed with the conservation effort are described.

In Utah, the UDWR is in charge of managing the state's wildlife, and thus would have the authority to implement its conservation effort, although its efforts would be very limited without the cooperation of private landowners and state and federal resource management agencies. No other parties, governmental or private are shown to be committed to the plan (UDWR 2002).

Colorado's plan includes those state and federal resource management agencies necessary to implement the plan as signatories (Hoffman 2001).

3. The legal procedural requirements (e.g. environmental review) necessary to implement the effort are described, and information is provided indicating that fulfillment of these requirements does not preclude commitment to the effort.

Utah's plan makes no mention of environmental review being conducted (UDWR 2002).

Colorado's plan makes no mention of environmental review being conducted (Hoffman 2001).

4. Authorizations (e.g., permits, landowner permission) necessary to implement the conservation effort are identified, and a high level of certainty is provided that the

party(ies) to the agreement or plan that will implement the effort will obtain these authorizations.

Utah's plan relies on the cooperation of state and federal land management agencies and private landowners. There are no indications that any private landowners will give permission to conduct management on their lands, as no private landowners are signatories to the plan. There are no concrete objectives for obtaining this cooperation, and thus there is no certainty that the parties will obtain such authorization (UDWR 2002).

Colorado's plan identifies that the cooperation of private landowners, including farmers with land enrolled in CRP, is crucial to the success of the plan (Hoffman 2001).

5. The type and level of voluntary participation (e.g., number of landowners allowing entry to their land, or number of participants agreeing to change timber management practices and acreage involved) necessary to implement the conservation effort is identified, and a high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain that level of voluntary participation (e.g., an explanation of how incentives to be provided will result in the necessary level of voluntary participation).

Utah's plan does not delineate either the type or the level of voluntary participation (UDWR 2002).

Colorado's plan states that the cooperation of private landowners is essential to the success of the plan. While numerous private landowners signed on the plan, their participation since that time has been sorely lacking. Only one landowner has signed a conservation agreement to benefit Columbian sharp-tailed grouse (Rick Hoffman, pers. comm.). Since listing under the ESA has been denied, interest among private landowners to implement the plan has declined.

6. Regulatory mechanisms (e.g., laws, regulations, ordinances) necessary to implement the conservation effort are in place.

Utah's plan is completely voluntary, and thus no regulatory mechanisms are applicable (UDWR 2002).

Colorado's plan is also completely voluntary, and thus no regulatory mechanisms need to be put into place (Hoffman 2001).

7. A high level of certainty is provided that the party(ies) to the agreement or plan that will implement the conservation effort will obtain the necessary funding.

Because Utah's plan does not detail the amount of funding necessary for implementing the funds, this question is not applicable (UDWR 2002).

Colorado's plan does not reveal how the necessary funding for the plan will be obtained (Hoffman 2001).

8. An implementation schedule (including incremental completion dates) for the

conservation effort is provided.

Utah's plan provides no implementation schedule (UDWR 2002).

Colorado's plan includes starting dates for many of the steps outlined in the conservation plan, but no completion dates (Hoffman 2001).

9. The conservation agreement or plan that includes the conservation effort is approved by all parties to the agreement or plan.

Utah's plan was developed solely by UDWR, and there are no other parties involved (UDWR 2002).

Colorado's plan has been approved by all parties to the plan (Hoffman 2001).

B. The certainty that the conservation effort will be effective:

1. The nature and extent of threats being addressed by the conservation effort are described, and how the conservation effort reduces the threats is described.

Utah's conservation plan does an adequate job of identifying the nature and extent of threats to the subspecies, both across the state and in specific management regions (UDWR 2002).

Colorado's plan also does an adequate job of identifying threats (Hoffman 2001).

2. Explicit incremental objectives for the conservation effort and dates for achieving them are stated

Utah's conservation plan does not contain explicit incremental objectives for the conservation effort. Instead, the plan contains objectives that are so broad as to be essentially meaningless, such as "Protect existing Columbian sharp-tailed grouse populations" and "Increase public awareness of the status of Columbian Sharp-tailed Grouse and their biology and support for their conservation". There are no dates or specific goals outlined in these objectives. Without specific objectives, there can be no measure of the effectiveness of Utah's conservation efforts (UDWR 2002).

While Colorado's plan includes some specific objectives, including maintaining the current population level of 6,100 birds, there are no dates for achieving those goals in the plan (Hoffman 2001). Many of the other goals stated in the plan are far more general.

3. The steps necessary to implement the conservation effort are identified in detail.

Utah's conservation plan identifies many "conservation strategies" to implement the plan. While these actions are scientifically based and provide a good starting point for conservation of Columbian sharp-tailed grouse, they are not detailed. And because they are voluntary "strategies", there is no guarantee that they will be implemented.

Colorado's plan also identifies steps necessary to implement the plan, with a higher level of detail (Hoffman 2001).

4. Quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, and standards for these parameters by which progress will be measured, are identified.

Utah's conservation plan does not contain quantifiable, scientifically valid parameters that will demonstrate achievement of objectives, thus not allowing effectiveness to be measured.

The only quantifiable measurement included in Colorado's plan is the maintenance of population numbers at the 2001 level (Hoffman 2001).

5. Provisions for monitoring and reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort are provided.

Because Utah's conservation plan does not provide and implementation schedule and is completely voluntary, there are no provisions for monitoring and reporting progress (UDWR 2002).

Colorado's plan includes no mechanisms for monitoring and reporting progress on implementation. It includes no provisions for monitoring effectiveness, other than monitoring the overall population levels (Hoffman 2001).

6. Principles of adaptive management are incorporated.

Utah's conservation plan recognizes that there is a great deal still unknown about the Columbian sharp-tailed grouse in Utah, and seeks to incorporate future research findings (UDWR 2002).

Colorado's plan also incorporates principles of adaptive management (Hoffman 2001).

Utah's conservation plan is clearly deficient by the Service's own standards. It is far too general, includes no guarantees of funding, and does not include those parties necessary for effective implementation. UDWR is trying to create local working groups for the subspecies, but to date, they have not materialized (Dean Mitchell, pers. comm.).

While Colorado's plan is more comprehensive and detailed than Utah's, there is still no certainty that it will be implemented or that it will be effective. In fact, early evidence suggests that it has been poorly implemented, and thus ineffective at achieving even its modest goals. Since the Columbian sharp-tailed grouse was denied protection under the Endangered Species Act, interest in following the recommendations of the plan has declined drastically. The local working groups that created the plan are no longer interested in it, instead focusing on the greater sage grouse and Gunnisons' sage grouse, recently petitioned for ESA listing.

The Colorado Division of Wildlife has continued their surveys of Columbian sharp-tailed grouse habitat for new leks, as well as monitoring old leks, which will allow

an analysis of population levels and trends. Surveys will likely be discontinued in 2005, as Rick Hoffman, upland game coordinator, is retiring, and it is likely that no one will be assigned to Columbian sharp-tailed grouse work (Clait Braun, pers. comm.). The Division of Wildlife has been spending approximately $70,000-80,000 per year to improve the quality of seed planting for new CRP acreage, as well as enhancing older CRP acreage with a more diverse mixture of seed to benefit the Columbian sharp-tailed grouse (Rick Hoffman pers. comm.). Private sector involvement has not been lacking. While the plan recognizes that "participation by private landowners is essential to the successful implementation of the plan" (Hoffman 2001), to date only one landowner has signed a voluntary conservation agreement (Rick Hoffman pers. comm.).

Idaho began to create a conservation plan for Columbian sharp-tailed grouse after the subspecies was petitioned for listing, and a draft plan was completed in 1998. However, after the election of Governor Dick Kempthorne, work on the plan was discontinued, and the plan was abandoned (Tom Hemker pers. comm.). Thus, Idaho, which contains 78% of the U.S. population of Columbian sharp-tailed grouse, has no comprehensive plan to manage the subspecies. Idaho's efforts to manage Columbian sharp-tailed grouse have as a result been sporadic, unfocused and ineffective. Conservation Priority Areas under the CRP have been established in Columbian sharp-tailed grouse range. Some population surveying has occurred, and birds have been transplanted within the state into the Shoshone basin and the House Creek area. Idaho has also provided birds to other states for transplant efforts (Tom Hemker pers. comm.). However, there is no measure of the success of these management efforts. Upon request, the Idaho Department of Fish and Game could not even provide an estimate of the current population, or an estimate of how much money has been spent of Columbian sharp-tailed grouse management (Tom Hemker pers. comm.). The Service erroneously considered Idaho's draft, voluntary state management plan in denying listing for the subspecies

Perhaps the most extensive attempts at Columbian sharp-tailed grouse management have occurred in Washington, but even this level of effort has failed to help stabilize declining populations. The subspecies was listed as a state threatened species in 1998. This listing required the state to prepare a recovery plan, but to date, no such plan has even been begun. A conservation plan for the species was created in 1995, but expired in 1998. The Washington Department of Fish and Wildlife has been actively acquiring habitat for the benefit the Columbian sharp-tailed grouse (four separate habitat areas have been acquired) and is conducting habitat restoration in a number of other areas. WDFW also conducts comprehensive surveys of all Columbian sharp-tailed grouse leks in the state. Transplants have been conducted to enhance existing populations. However, despite this management effort, populations in Washington are still decreasing in number, indicating that management has been unsuccessful, and that further protection is necessary.

In Wyoming, there are currently no management actions occurring for the benefit of Columbian sharp-tailed grouse except for spring surveys of most populations (Tim Wooley pers. comm.). There is no conservation plan for the subspecies in the state.

Columbian sharp-tailed grouse are also considered a "BLM sensitive species" in Colorado, Idaho, and Wyoming. They are listed as a sensitive species in Region 4 of the Forest Service, and as a State Species of Special Concern in California (though extirpated from the state). None of these designations, however, afford the Columbian sharp-tailed grouse any enforceable protection from existing threats. Ulliman (1995a) reported that current federal and state regulations to protect Columbian sharp-tailed grouse are inadequate and/or poorly enforced.

E. Other Natural or Man Made Factors Affecting its Continued Existence

Columbian Sharp-tailed Grouse are Imperiled Over a Significant Portion of Their Range.

The U.S. Fish and Wildlife Service, in completing their review of the Columbian sharp-tailed grouse, solicited a status review from Jonathan Bart, of the U.S. Geological Survey, to identify over which portion of its range it was imperiled (Bart 2000b). Bart found that the Columbian sharp-tailed grouse was imperiled over 92-95% of its range. He defined the range of the subspecies as all public land within the historic range, in addition to all private land currently occupied by the subspecies (total of 433,100 km^2). He defined a population as secure if he felt that it had a 30% chance of persisting for the next 100 years in the absence of Endangered Species Act protection. While a population with only a 30% chance of surviving for 100 years can hardly be called secure, this analysis still showed that Columbian sharp-tailed grouse are highly imperiled over the vast majority of their range. Using an optimistic assumption of the security of the metapopulations, he found that populations covering 8% of the range were secure. Using a pessimistic assumption, he found that populations covering only 5% (the two metapopulations in Idaho/Utah and Colorado/Wyoming) were secure. Thus, Columbian sharp-tailed grouse are imperiled over 92-95 % of their range. The Endangered species Act indicates that listing is warranted if a species is threatened or endangered "throughout all or a significant portion of its range." 92-95% of the range is a significant portion. Thus the Columbian sharp-tailed grouse is deserving of protection under the Endangered Species Act.

Use of Insecticides in Columbian Sharp-tailed Grouse Habitat

Columbian sharp-tailed grouse are at risk from insecticides that are sprayed within their habitat. A study conducted of the effects of organophosphorus insecticides on sage grouse in southeastern Idaho (the area with the largest remaining population of Columbian sharp-tailed grouse) showed that sage grouse that occupied habitat that was sprayed with dimethoate or methamidophos were adversely affected. Some 63 of 200 sage grouse in a field sprayed with dimethoate were found dead. All brains that were subsequently examined showed damage (reduced activity)[1]. The probability of an individual in the study area dying as a result of organophosphorus insecticide application

[1] Brain damage could interfere with food gathering, and could render individuals more vulnerable to predation

during the 72-day study was 25%. This study also suggested that spraying may cause long term physiological effects. Columbian sharp-tailed grouse in southeastern Idaho are especially vulnerable, because spraying is conducted there on both alfalfa and potatoes (Blus et al. 1989).

McEwan and Brown (1966) studied the effects of malathion and dieldrin on sharp-tailed grouse and found the LD50 for dieldrin to be 6.9 mg/kg and between 200 and 240 mg/kg for malathion. Sub-lethally dosed birds exhibited abnormal behavior, losing their territories and leks, and may be have been more vulnerable to predators. They reported that sharp-tailed grouse are exposed to insecticides used for grasshopper control throughout their range. Post (1951) reported anecdotal evidence that toxaphene and chlordane were harmful to sharp-tailed grouse. Deeble (1996) also gives anecdotal evidence of sharptails being killed by insecticides sprayed for grasshoppers and states that in addition to direct poisoning effects, grasshopper control removes a valuable food source (especially for chicks, which rely almost solely on insects) (Hart et al. 1950, Jones 1966). Pesticides are used over much of Columbian sharp-tailed grouse range in Washington and are harming the subspecies there (WDFW 1995)

Reduced Genetic Fitness Due to Reproductive Isolation and Small Population Sizes

All populations of Columbian sharp-tailed grouse (excepting those populations contained with in the two metapopulations) are separated by large distances with no gene flow between them, and the two metapopulations are separated from each other and from the other populations. As a result, the smaller populations (and even possibly the metapopulations in southeastern Idaho/northern Utah and northwestern Colorado/southcentral Wyoming) are threatened with reduced genetic fitness due to their isolation and small population sizes.

Bouzat et al. (1998) studied four different populations of greater prairie-chickens, one of which, from Illinois, had been reduced from over 25,000 individuals to less than 50. The Illinois population had significantly reduced genetic diversity compared with other, larger populations and had significantly reduced rates of hatching (56% compared with 93%). This study, of a closely related species belonging to the same genus as Columbian sharp-tailed grouse, shows that population bottlenecks cause significantly reduced genetic and reproductive fitness. Small populations of Columbian sharp-tailed grouse will most likely have the same fate if they remain at their current levels. While populations may be able to withstand a moderate amount of inbreeding, there is a threshold beyond which populations may not be able to recover, even if environmental conditions are suitable (Frankham 1995).

Small populations of Columbian sharp-tailed grouse in several states may already be reaching this threshold. Genetic analysis of Columbian sharp-tailed grouse in Washington show significantly reduced genetic diversity (a sign of inbreeding) compared with the larger metapopulation in southeastern Idaho, and the Washington and Idaho populations are significantly differentiated genotypically, “which suggests that there is little or no gene flow between these two sites and the populations are currently on

different evolutionary trajectories" (Warheit and Schroeder 2001). Thus, even if habitat conditions improve in Washington (which is unlikely) the populations may be too inbred to be sustainable.

Columbian sharp-tailed grouse may be especially vulnerable to inbreeding in small populations because they have a smaller effective population size than population numbers may indicate, as only a few males on the lek are responsible for most of the mating (Deeble 1996).

Drought and climate change

Inclement weather conditions have the potential to affect adversely Columbian sharp-tailed grouse populations, especially those that are stressed by other factors. Some chicks may be lost due to wetting or chilling by heavy spring and summer rains. As long as Columbian sharp-tailed grouse get sufficient nourishment, they can survive cold winters by tunneling into snow (Hart et al. 1950). Evans (1968) reported that weather conditions during early June are important to brood success with torrential cloudbursts and long cold rainy spells reducing nesting and brood success rates.

Marks and Marks (1987) reported that Columbian sharp-tailed grouse relied heavily on native species that were not significantly affected by a lack of precipitation, so the loss of these species may be detrimental. In Colorado, the number of birds per lek (and presumably the population) decreased during years of drought (Hoffman 2001). Severity of winter conditions may affect Columbian sharp-tailed grouse survival, with 86% of Columbian sharp-tailed grouse surviving during a mild winter, compared with only 29% during a harsh winter (Ulliman 1995b).

There are indications that the Intermountain West region may be entering into a multi-decadal period of drought. Recent studies have shown that a combination of cool Tropical Pacific sea surface temperatures, combined with warm North Atlantic sea surface temperatures result in the persistence of multi-year drought. Such a combination of factors are believed to be responsible for the drought period in the 1950's. In 1995, the North Atlantic sea surface temperatures became warm, and in 1998, the Tropical Pacific sea surface temperatures became cool. Beginning in 1999, drought conditions (severe or extreme in many areas) have persisted over much of the Intermountain West. Shifts in sea surface temperatures from cool to warm and vice versa, tend to last for multi-decadal periods (Betancourt 2004). Based on these observations Betancourt (2004) believes the West will face drought conditions for years to come.

Drought has the potential to significantly affect Columbian sharp-tailed grouse populations. Hoffman (2004) believes that the decline in population numbers in Colorado as evidenced by the declining number of males per lek from 1999 to 2003 was caused by poor production of forage caused by drought conditions, and that the increase in 2004 was caused by an increase in rainfall. Marks and Marks (1987) reported that Columbian sharp-tailed grouse relied heavily on native species that were more drought tolerant than non-native species, but that those native species were also those most favored by cattle.

During years of low precipitation, cattle may compete with Columbian sharp-tailed grouse for forage. Cattle grazing alters species composition to favor less drought tolerant plants and, thus, in a drought year, a lower amount of total forage will be available. The prospect of a multi-decadal drought bodes ill for the persistence of Columbian sharp-tailed grouse.

There is now strong scientific evidence that anthropogenic releases of greenhouse gases are altering the global climate. Although prediction of specific regional effects is still in its infancy, the best available scientific data suggests dramatic changes in climate within the range of the Columbian sharp-tailed grouse, which will further stress populations already facing numerous threats to their existence. The US National Assessment of the Potential Consequences of Climate Variability and Change conducted regional assessments of the predicted impacts of climate change on various regions of the United States. In the Rocky Mountain/Great Basin region (which roughly parallels the range of the Columbian sharp-tailed grouse), significant changes are predicted in the climate (Wagner 2003). Temperature throughout the area could increase by 2.5-8.0 degrees Celsius. Increased temperature and precipitation in some areas would cause the invasion of pinyon-juniper forests into shrub steppe habitats, reducing the amount of habitat available to Columbian sharp-tailed grouse. There would be an increased frequency of both extreme rainfall events and drought, both of which may stress Columbian sharp-tailed grouse populations. There would be increased year to year variability in precipitation. As Columbian sharp-tailed grouse population numbers seem to vary wildly from year to year based on precipitation (see section IX, Status Review by State), increases in precipitation variability would likely cause even greater fluctuations in year to year numbers of the subspecies. Increases in temperature, coupled with altered precipitation regimes, would cause as yet unknown changes in both species composition and extent of various habitats utilized by Columbian sharp-tailed grouse (Wagner 2003). Although prediction of the exact effects of anthropogenic caused climate change are impossible, the alterations to Columbian sharp-tailed grouse habitats will likely further stress already threatened populations of the bird.

Fire

The relationship between Columbian sharp-tailed grouse and fire is complex, as fire can have both negative and beneficial effects on populations. If fire is used to thin overly dense stands of sagebrush and to halt forest encroachment, it may result in altered structural characteristics that improve the quality of the habitat for Columbian sharp-tailed grouse. However, it often takes a few years after a prescribed burn for structural characteristics to favor Columbian sharp-tailed grouse (Oedekoven 1985, Hays et al. 1998). Columbian sharp-tailed grouse have been known to move their lek sites as a response to fire having burned the lek site area (Marshall and Jenson 1937).

In contrast, in Colorado, fire suppression has caused pinon-juniper invasion of sagebrush and grasslands and may be keeping Columbian sharp-tailed grouse from expanding their range in the state (Hoffman 2001). Fire has also caused Columbian sharp-tailed grouse abandonment of lek sites (Hays et al. 1998). Prescribed fire on a large

scale may be detrimental to Columbian sharp-tailed grouse populations, since they do not use large, open areas. If prescribed fire is necessary for Columbian sharp-tailed grouse habitat improvement, it should be done in small patches, and reseeded with a quality mix of native shrubs, grasses and forbs, and not be grazed until these areas are fully re-vegetated.

Human and other Physical Disturbances

Columbian sharp-tailed grouse are vulnerable to disturbances that may negatively affect them. Baydack and Hein (1987) reported that a wide range of disturbances (parked vehicles, fencing, scarecrows, recorded voices and sounds, and a leashed dog) caused female sharp-tailed grouse to leave leks, while human presence caused males to abandon the lek site. The absence of females from the lek could alter breeding habits and patterns. They concluded that "continued disturbance at leks over several seasons could bring about population declines". Columbian sharp-tailed grouse also appear to avoid areas close to cattle; during the summer and fall, only 3 of 1279 observations of individuals were made within 150 m of cattle. Though little research has been done, oil and gas development is likely to negatively impact Columbian sharp-tailed grouse populations, due to increased access from roads, direct loss of habitat, and disruption of seasonal activities. Pump-jack noise may affect birds on dancing grounds (Klott and Lindsey 1986).

Dependence on Artificial Habitats

Although comprehensive population surveys are not available, there are some indications that Columbian sharp-tailed grouse numbers and range increased in recent years in certain areas, as the result of (temporary) new habitat created by the Conservation Reserve Program (Ulliman 1995b, Hoffman 2001, UDWR 2002) and reclaimed mine lands (Colorado only). Initiated in 1987, the CRP pays farmers with highly erodable land to retire these lands from production for up to 10 years, and to seed them with stabilizing cover. In the past, grazing or haying of CRP lands was not allowed, except during emergency conditions during times of drought. Increases in abundance and range due to the CRP were the primary reason cited by the U.S. Fish and Wildlife Service in determining Columbian sharp-tailed grouse did not warrant ESA listing (USFWS 2000b). This is both short-sighted and an invalid basis for not listing the subspecies. CRP is a voluntary, temporary program. There are no guarantees that farmers will re-enroll lands in the program when their 10-year leases expire. If economic conditions dictate that more money can be made by cultivating or grazing the enrolled land, it is unlikely that it will be re-enrolled (Hoffman 2001). In addition, CRP provides only limited benefit to Columbian sharp-tailed grouse, during certain parts of their life cycle, and only if suitable, diverse seed mixtures are used (Rodgers and Hoffman 2003).

In addition, the CRP program has only been authorized by Congress through 2007. At that time, if Congress chooses not to renew the program, almost of the land currently enrolled will revert back to cultivation or pasture, with a corresponding decrease in Columbian sharp-tailed grouse populations. A survey of farmers in Georgia

found that only 2% planned on maintaining cover crops planted under the CRP for wildlife and recreation when their contracts expire (Dangerfiled et al. 1998). In Colorado, Utah, and Idaho, Boisvert (2002), UDWR (2002), and Ulliman (1995b), all report that discontinuation of the CRP program would be detrimental to Columbian sharp-tailed grouse populations in those states. Clait Braun believes that without the CRP, Columbian sharp-tailed grouse numbers in the U.S. would decrease by two thirds (Clait Braun, pers. comm.).

In denying the petition to list the Columbian sharp-tailed grouse, the USFWS states that the large proportion of the current range that is enrolled in the Conservation Reserve Program is:

> Except under extraordinary circumstances…not subject to grazing and likely [to] have increased forb and insect abundance from spring to fall, which increases the value of these lands to Columbian sharp-tailed grouse females, who make substantial use of CRP areas during nesting and brood-rearing. CRP lands…are essentially free of pesticide and herbicide applications and grazing pressure. Accordingly, these CRP areas have become very important to Columbian sharp-tailed grouse large metapopulations in Colorado, Idaho, Utah, and Wyoming[2] (USFWS 2000b).

The FWS was incorrect in making these assumptions. CRP lands have been subject to grazing pressure under the so called "emergency" haying and grazing provisions of the CRP. Since 2000 (the earliest year for which data was available), CRP lands in the Columbian sharp-tailed grouse's range have been opened to "emergency" haying and grazing in every year (Table 2) (USDA 2002, USDA 2004b).

State	County	Enrolled CRP Acreage	2000	2001	2002	2003
Idaho	Bannock	84037.6	DNA[1]	7232.8	1665.7	1992.8
	Bear Lake	26237.4	DNA	3283.4	12751.8	3239.6
	Bingham	15128.1	DNA	2378.2	1887.6	2589.1
	Bonneville	89358.1	DNA	6262.8	3553	2198.1
	Caribou	68512.5	DNA	7119.3	6539	6831.4
	Clark	8096.9	DNA	1415.4	4140	2071.4
	Franklin	36676.6	DNA	1624.3	2778.8	1186.4
	Fremont	30942.4	DNA	825.1	288.3	414.4
	Jefferson	4183.6	DNA	803	0	0
	Madison	20240.1	DNA	1542.7	547.1	0
	Onieda	70623.5	DNA	12799.2	1140.3	6491.6
	Power	136375.1	DNA	4307.7	2498.6	2629.7
	Teton	11621.4	DNA	469.2	0	634.1
Washington	Douglas	118795.2	0	0	8561.2	0
	Lincoln	111389.1	0	0	644.9	0
	Okanogan	4108.4	0	0	85.1	0
Colorado	Moffat	33336.4	DNA	DNA	DNA	DNA

[2] This is partially incorrect. There are no CRP lands near Columbian sharp-tailed grouse populations in Wyoming, and thus they are not important to populations there (Bart 2000b, Rodgers and Hoffman 2003).

	Routt	16637.3	DNA	DNA	DNA	DNA
	Rio Blanco	2756	DNA	DNA	DNA	DNA
Oregon	Wallowa	20034.2	0	0	1332	734.7
Utah	Box Elder	91502.3	13839.8	17168.8	32623.5	11126.3
	Cache	19995	492.5	394.5	957.6	330.1
	Morgan	101.9	0	0	0	0
	Rich	8767.6	0	0	1215.9	265.3
	Summit	26.6	0	0	0	0
	Weber	0	0	0	0	0

Table 2. "Emergency" grazing and haying statistics in counties where CRP lands are of import to Columbian sharp-tailed Grouse.
[1]DNA = Data not available [2]NA = Not Authorized for Haying or Grazing

The value of CRP lands to the subspecies occurs because the undisturbed land can often provide adequate cover for nesting and brood rearing, as well as an abundance of food. Grazing of CRP lands decreases their value to Columbian sharp-tailed grouse through the removal of cover, while haying CRP lands completely destroys their benefit to the subspecies for several years afterwards. The Fish and Wildlife Service, in denying listing of the Columbian sharp-tailed grouse, relied on the assumption that CRP lands provided undisturbed (and thus high quality) habitat. However, as Table 2 shows, emergency haying and grazing has been widespread. Western governors and congressmen have applied political pressure to the Department of Agriculture to open CRP lands to "emergency" haying and grazing (Allard 2002, Moran 2002, Thomas 2002).

The timing of "emergency" haying and grazing of CRP lands is especially damaging to Columbian sharp-tailed grouse populations. Managers have indicated that populations of Columbian sharp-tailed grouse increase or decrease as a result of precipitation (Hoffman 2003), with greater precipitation leading to increased food and cover availability and thus higher population counts. During times of drought, population numbers naturally fall. It is exactly during these times of low precipitation that "emergency" haying and grazing provisions are enacted for the benefit of benefit of livestock producers. Thus, "emergency" haying and grazing occurs exactly at those times that populations are already low, and undisturbed CRP habitat would be most beneficial to the species. Responding to a proposal to institute emergency haying and grazing of CRP in Idaho in 2001, the Idaho Fish and Game Commission expressed numerous concerns as to the effects of emergency haying and grazing on wildlife, singling out Columbian sharp-tailed grouse as being especially negatively affected (Wood 2001). Because of the ubiquity of "emergency" haying and grazing, it is no longer possible to conclude that CRP lands provide a benefit to Columbian sharp-tailed grouse.

In addition to "emergency" haying and grazing, in 2003 the USDA made changes to the CRP program which now allow for "managed" haying and grazing of CRP lands that also impact the value of these lands for Columbian sharp-tailed grouse. As of May 2003, up to one third of all CRP land may be grazed or hayed in each year, and any particular area may be hayed or grazed every three years. This is in addition to the

"emergency" haying and grazing, so land that has been grazed or hayed under the "managed" provisions can still be grazed or hayed the very next year under the emergency provisions. Although grazing is supposedly not allowed during "nesting and brood rearing times", these dates are determined for all species for a state (USDA 2003) and thus do not necessarily coincide with the life-cycle requirements of Columbian sharp-tailed grouse (Table 3).

State	Nesting Season	Haying Period	Grazing Period
COLORADO	March 15 - July 15	July 16 - October 13	July 16 - November 12
IDAHO	April 15 - July 1	July 2 - September 30	July 2 - December 31
OREGON	April 1 - July 15	July 16 - October 13	August 1 - November 28
UTAH	April 1 - June 1	June 1 - August 29	Box Elder - September 1 - December 29 Cache - June 1 - September 28 Morgan - September 1 - December 29 Rich - August 1 - November 28
WASHINGTON	April 1 - June 1	July 1- September 30	June 2 - September 30

Table 3. Nesting Season and Haying and Grazing Dates in Counties of import to Columbian Sharp-tailed grouse. (USDA 2004b)

Opening dates for managed haying and grazing begin as early as the beginning of June in Utah and Idaho, July 2nd for Washington, and July 16th for Colorado and Oregon (USDA 2004b). In Idaho, the peak of hatching is usually from early to late June (Mark and Marks 1987), although births occur both earlier and later than this period. For all states except Colorado and Oregon, it is likely that grazing and haying will begin while hens are still nesting. Grazing during this period would reduce cover, leaving both hens and their nests more susceptible to predation. Haying during this period would likely destroy the nest and thus the entire clutch. In addition to the effects on hens and nests, haying and grazing are now also permitted during almost the entire crucial brood rearing period, affecting cover and insect production at a time when chicks need a high level of protection from predators, and eat almost exclusively insects (Hart et al. 1950, Marks and Marks 1987). The new managed haying and grazing provisions of the CRP will likely result in reduced chick survival, limiting recruitment into populations.

While the FWS relied on the benefit of CRP to the subspecies as one of its primary reasons for denying listing (USFWS 2000b), the utility of CRP fields to Columbian sharp-tailed grouse may also be more limited than has been previously reported. The CRP was not designed as a habitat enhancement program, but rather as an

erosion control program. As a result, plantings on CRP lands often do not provide quality habitat for Columbian sharp-tailed grouse. Only if CRP planting mixtures result in cover with adequate height, structural diversity and ground level openings will these lands provide a benefit to Columbian sharp-tailed grouse (Rodgers and Hoffman 2003).

In Washington, CRP lands were primarily planted to monocultures of crested wheatgrass or intermediate wheatgrass, non-native species of limited value to Columbian sharp-tailed grouse (McDonald 1998). In Colorado, Hoffman (2001) noted that CRP lands tend to lack a shrub component, when 10-20% shrub cover would be more beneficial to Columbian sharp-tailed grouse. Hays et al. (1998) reported that the quality of a CRP field for Columbian sharp-tailed grouse depends on type of vegetation planted, and length of time enrolled. McDonald (1998) suggests that CRP lands may be acting as an "ecological trap" in Washington, with birds selecting CRP lands for nesting because they appear to provide quality habitat, when they actually increase predation risk. CRP lands are not utilized during the winter months. Marks and Marks (1987) reported that the availability of suitable winter habitat is probably most critical determinant of whether or not an area can support Columbian sharp-tailed grouse, and thus the presence or absence of CRP may not be the limiting factor in determining Columbian sharp-tailed grouse population numbers.

In Colorado, Columbian sharp-tailed grouse have been observed using mine reclamation lands. Since the passage of the Surface Mining and Reclamation Act of 1977, mining companies have been required to post bonds that are released when they have reclaimed mine lands to their natural state. Although they only cover 1% of Columbian sharp-tailed grouse habitat, these lands have provided excellent habitat for Columbian sharp-tailed grouse, and support 18% of all known leks in Colorado. As with CRP lands, there are no assurances these lands will be maintained as quality habitat for Columbian sharp-tailed grouse after bond release. The possibility these lands will be converted to rangelands or placed under cultivation is real (Hoffman 2001).

Utility Lines and Roads

Utility lines and roads pose a threat to Columbian sharp-tailed grouse populations by causing direct mortality and abandonment of habitat. Ritcey (1995) quotes Buster Hamilton as believing that the Columbian sharp-tailed in Lac La Hache, British Columbia were mostly killed by flying into power lines. Borrell (1939) found three sage grouse that had been killed by flying into telephone wires that were between patches of habitat. Joel Ricks, an early pioneer of the Cache Valley in Utah, was quoted as saying that scores of birds were killed by flying into the first telegraph line in the valley (Hart et al. 1950). Sage grouse are also known to abandon lek sites after the construction of power lines (Hoffman 2001). In Colorado, only 2% of lek sites are within 100 m of power lines, while 8% are 100-300 m away, 28% 500-1000 m, and 58% >1000 m. As mentioned, power lines are used as perches by raptors, leading to increased predation.

The presence of heavily traveled roads may also threaten Columbian sharp-tailed grouse presence in an area. In Colorado, few lek sites are within 1 km of federal or state

highways, suggesting that birds avoid more heavily traveled roadways. It is also believed that there is some threshold of road density after which Columbian sharp-tailed grouse avoid or reduce their use of an area. (Hoffman 2001). Building roads into an area increases the number of artificial surfaces for Columbian sharp-tailed grouse predators to perch on. By providing increased access to an area, roads result in an increased human presence, increasing the risk of illegal hunting and other disturbance. Roads also provide vectors for noxious weed invasion, as the disturbed areas next to roads allow for the proliferation of invasive species.

XII. Conclusion

The Columbian sharp-tailed grouse needs the stringent protections afforded by the Endangered Species Act if it is to escape extinction. Once, this majestic bird ranged over much of the valleys and foothills of the Intermountain West. However, conversion of its native habitat to agriculture, habitat declines brought on by the grazing of its habitat by livestock, and hunting. These declines have been perpetuated by a lack of proactive management by state and federal agencies, who seem content to let the Columbian sharp-tailed grouse fade into to extinction.

The Columbian sharp-tailed grouse is not alone; its fate is unfortunately shared by other western grouse. The sage grouse, once thought to number in the millions, has been reduced to 140,000 birds, and it is now being petitioned for listing under the ESA. Listing of the Lesser Prairie Chicken as threatened or endangered has been found to be warranted, but precluded by other listing actions.

Today, the Columbian sharp-tailed grouse is absent from over 90% of its former range. There are no flocks of thousands, awing onlookers as they darken the sky with their flight. Population levels are a mere fraction of what they once were, and still declining in many areas. Though recent increases may have occurred in some parts of the range, these increases are temporary, and will disappear when the Conservation Reserve Program is discontinued. Increases in population due to this program only serve to mask the underlying reasons for the Columbian sharp-tailed grouse's decline, which are still very real, posing an imminent threat to its continued survival.

Saving the Columbian sharp-tailed grouse is a worthy goal in and of itself. However, protection for the Columbian sharp-tailed grouse will have beneficial effects on other species as well. It serves as an "umbrella species" of shrub steppe ecosystems. Listing Columbian sharp-tailed grouse will benefit other species that depend on shrub-steppe for survival, like the clay colored sparrow, the grasshopper sparrow, and the Idaho ground squirrel (ICBEMP 2000).

Forest Guardians and 8 co-petitioners hereby petition the U.S. Fish and Wildlife Service under the Department of Interior to list the Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) as an Endangered or Threatened species pursuant to the Endangered Species Act. This listing action is warranted, given historical and continued declines in populations as well as precipitous distribution declines. The

Columbian sharp-tailed grouse is threatened by all five of the factors which FWS must consider in assessing whether a species qualifies for listing under the Endangered Species Act. As such, we request expeditious listing of the Columbian sharp-tailed grouse as a Threatened or Endangered Species under the ESA.

Additionally, this petition requests that critical habitat be designated for the Columbian sharp-tailed grouse concurrent with final ESA listing.

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