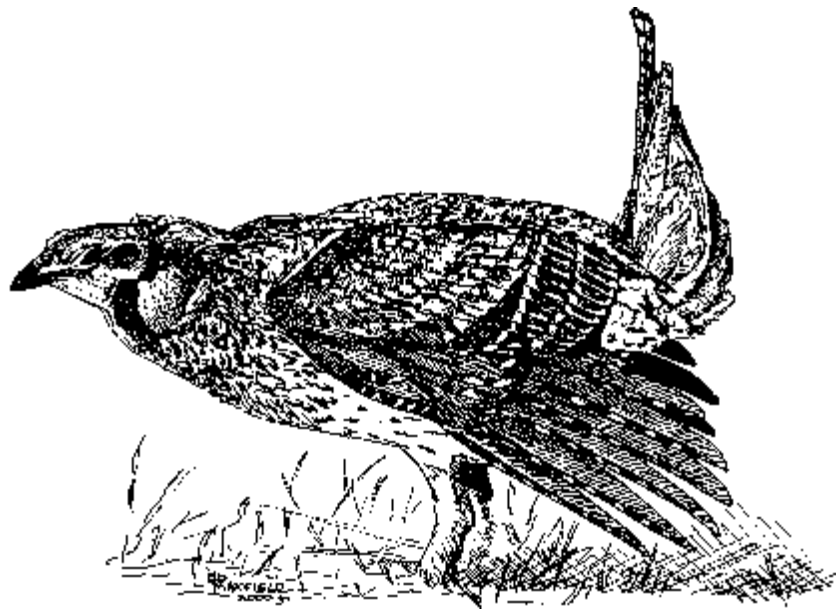


**STRATEGIC MANAGEMENT PLAN
FOR
COLUMBIAN SHARP-TAILED GROUSE
2002**



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Department of Natural Resources
Division of Wildlife Resources
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Introduction

The Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*) is one of seven subspecies of Sharp-tailed Grouse. Historically, Columbian Sharp-tailed Grouse occurred within sagebrush-native bunch grass habitat throughout the intermountain region, extending from British Columbia, Washington, Idaho and Montana south through portions of Oregon, California, Nevada, Utah, Wyoming, Colorado and New Mexico. Sharp-tailed Grouse populations range-wide began declining during 1880-1920 (Bart 2000). By 1936, the range of distribution had been reduced by two-thirds (Hart et al. 1950). Currently, Columbian Sharp-tailed Grouse occur in only 5 % of their historic range-wide distribution and 4% of their distribution in Utah (Bart 2000). Within the United States, the largest remaining populations occur in southeastern Idaho, northern Utah, and northern Colorado.

Although Sharp-tailed Grouse were never widely distributed throughout Utah, they were very abundant where they occurred (Figure 1). Since the early 1900s, agricultural developments, over grazing by livestock and big game animals and human population growth significantly reduced the quantity and quality of native grassland and shrub-grassland vegetation types used by Sharp-tailed Grouse. By 1975, isolated populations remained only in east Box Elder, Cache, Morgan, Summit, and Weber Counties in northern Utah. However, implementation of the federal Conservation Reserve Program (CRP) in 1987 benefited Sharp-tailed Grouse substantially and increased their distribution by approximately 400 percent by 2000 (Figure 1). Elimination or reduction in the acreage of CRP would result in population declines.

Conservation Plan Goal

Maintaining existing populations of Columbian Sharp-tailed Grouse in Utah and ensuring their persistence will depend on continuation of CRP and implementation of an effective conservation effort directed at protecting and restoring remaining habitat and expanding populations into secure habitat within former range.

The goal of this conservation plan is to: maintain and increase Columbian Sharp-tailed Grouse population levels within each management area, and reintroduce and establish and maintain populations within suitable habitats.

The success of this plan depends upon the commitment, cooperation and coordination of private landowners, federal and state resource management agencies, private organizations and individuals.

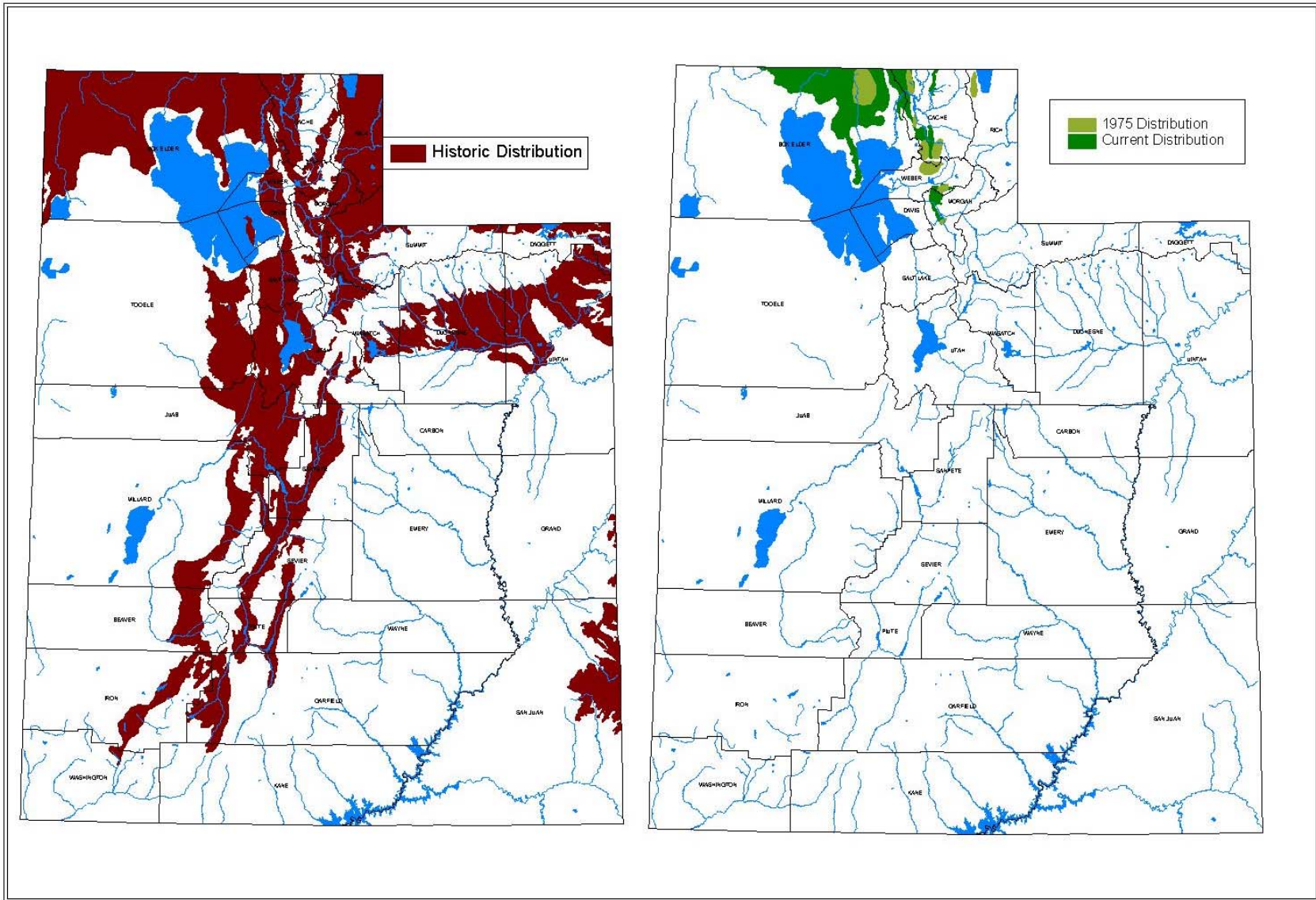


Figure 1. Historic and current distribution of Columbian Sharp-tailed Grouse in Utah.

COLUMBIAN SHARP-TAILED GROUSE BIOLOGY/ECOLOGY

Sharp-tailed Grouse Biology/Ecology

Physical Description

Columbian Sharp-tailed Grouse are one of five species of grouse within Utah. They are smaller than Sage and Blue Grouse and larger than Ruffed Grouse. They look very much like a hen pheasant, except for a short, pointed tail and v-shaped brown markings on cream-colored breast feathers. Both sexes are similar in appearance. Early Utah settlers referred to Sharp-tailed Grouse as prairie chickens and prairie hens as compared to Sage-Grouse which were referred to as sage chickens and sage hens.

General Life History

The breeding season for Sharp-tailed Grouse begins in March when males start congregating on breeding grounds, referred to as “leks” or “dancing grounds.” The elaborate displays of males dancing attract females to lek sites to mate. Females leave following breeding to select a nest site. Provided suitable nesting habitat is available, most female Sharp-tailed Grouse nest within 2 km (1.2 mi) of the lek site. An average clutch of 12 eggs is laid over 12 days and incubated for 24 days. Approximately 50-55% of the nests successfully hatch (Bergerud and Gratson 1988). Renesting can occur if the first nest is depredated, however, a hen will only raise one brood annually (Johnsgard 1973). Chicks remain relatively close to the nesting area throughout the summer (Meits 1991). CRP fields, which include alfalfa, are often used as brood habitat for 2-3 weeks after hatching, chicks feed primarily on insects, with grasshoppers being the most common (Parker 1970). The summer diet of juveniles consists of both insects and succulent plant material, whereas adults eat primarily succulent plant material. Throughout the fall, birds use open grassy areas with scattered shrubs until snow forces them to shift to heavier shrub cover (Evans 1968). Birds typically winter in maple-chokecherry habitat and along riparian areas. The typical winter diet includes the fruits, berries and buds of chokecherry, serviceberry, hawthorn, wild rose, aspen, willow and birch (Hart et al. 1950). In Utah, Sharp-tailed Grouse are associated with vegetative communities which include sagebrush, mountain shrub (deciduous shrubs including chokecherry, serviceberry and snowberry) and riparian zones (with deciduous shrubs including willow and hawthorn).

Reproduction

Bergerud and Gratson (1988) reviewed eight studies on Sharp-tailed Grouse and calculated an average chick mortality of 40.5% between hatching and fall. Giessen (1987) and Marks and Marks (1987) reported chick mortality rates of 44 and 50%. Annual brood surveys conducted in Utah during 1972-1976 and 1992-2000 have shown average brood sizes varied from 2.5-6.0 chicks/brood. The long-term average is 4.5 chicks/brood. The percentage of juveniles and the ratio of juveniles/adult in the harvest provides an index to nest success and chick survival. Long-term data for Colorado indicated an average of 56.3% juveniles and 1.3 chicks/adult in the fall harvest (Giesen 1999). Harvest data for Utah (1998-2000) averaged 49.5% juveniles and 0.98 juveniles/adult (George Wilson 2000).

Mortality

Annual survival rates reported for hunted populations have ranged from 17% to 43% (Tirhi 1995). Schroeder (1994) reported an annual survival rate of 53% for an unhunted population in Washington. In Colorado, Braun (1975) reported annual mortality rates of 50-70%.

Excluding hunting, predation accounted for 85% of the range-wide reported mortality rates (Bergerud and Gratson 1988). Primary predators in Idaho and Utah include coyotes and raptors (Hart et al. 1950, Marks and Marks 1987). In Idaho, winter mortality increased with winter severity (Ulliman 1995a). Most winter mortality is likely due to avian predation (Connelly et al. 1998).

Connelly et al. (1998) found little empirical evidence throughout most of the species' range that harvest negatively affects populations. However, spring breeding populations may be replenished by restricting hunting of small, isolated or declining populations (Ammann 1963, Marks and Marks 1987). Currently, Columbian Sharp-tailed Grouse are hunted in Idaho, Colorado and Utah. Harvest estimates indicated hunting removed <5% of the estimated fall population in Colorado and Utah (Giessen 1999, Utah Division of Wildlife Resources 2000). In Idaho, hunting removed 3-10% of the fall population (Connelly et al. 1998). Giessen (1999) speculated a harvest level of 28% of the fall population could be achieved without impacting subsequent breeding densities.

Home Ranges

Home range size may depend on habitat quality, topography, vegetative cover, season and availability of food (Tirhi 1995, Giessen 1987). Nesting and brood rearing usually occurs within 3.2 km (2 mi) of the lek (Meints 1991). Spring and summer home range sizes varied from 100ha (247 ac) in Colorado (Giessen 1987) to 190 ha (469 ac) in Idaho (Marks and Marks 1987). Winter home ranges in Idaho varied from 59-187 ha (146-462 ac) (Ulliman 1995a).

Population Density

The density of Sharp-tailed Grouse spring populations has been estimated for several states, with values ranging from 34.3-135.2 ha/bird (85-334 ac/bird) in Utah (Wilson 2000), to 42.8-76.5 ha/bird (106-189 ac/bird) in Colorado (Rogers 1969) and 38.9-100 ha/bird (96-247 ac/bird) for southeast Idaho (Meints 1991, Ulliman 1995b). In Utah, the density of leks (mi^2/lek) varied with the percent composition of sagebrush, CRP and agricultural lands within 25 mi^2 (65 km^2) sample areas. Values ranged from 4.6 mi^2/lek (11.9 km^2/lek) for areas comprised predominately sagebrush and CRP to 12.0 mi^2/lek (31.1 km^2/lek) for areas intensively cultivated or with limited sagebrush steppe (Wilson 2000). Meints (1991) reported a lek density of 1.6 mi^2/lek (4.1 km^2/lek) for CRP lands in southeastern Idaho.

COLUMBIAN SHARP-TAILED GROUSE POPULATION DISTRIBUTION AND TRENDS

Sharp-tailed Grouse Distribution

Historical distribution of Sharp-tailed Grouse occurred within the sagebrush-steppe and foothill benches from Nevada east along the Utah-Idaho border to Wyoming. They extended south along the length of the Wasatch Mountain Range to Garfield County and extended east from Utah County through the Uintah Basin to Colorado (Figure 1). This distribution was maintained until the early 1900s, at which time sharp-tails were reported to still be numerous in Cache, Davis, eastern Juab, Morgan, Rich, Salt Lake, Sanpete, Summit, Utah, Wasatch, and Weber counties (Hart et al. 1950). By 1935, large-scale conversion of sagebrush-steppe to cropland and overgrazing by domestic livestock had significantly reduced habitat, and the distribution of Sharp-tailed Grouse declined. Populations survived in only a few areas in the north central portion of Utah. Within these areas, birds were restricted to remaining islands of sagebrush-steppe within dry-farmland and foothill bench pastures which had not been severely overgrazed. Scattered or isolated populations remained only in Box Elder, Cache, Morgan, Rich, and Weber counties. Bunnell (1977) evaluated population abundance and distribution during 1975-1977 and reported little change in the distribution reported by Hall et al. (1950). A Sharp-tailed Grouse was illegally harvested near Echo, Utah (Summit County) in 1976 (Wilson 2000).

Implementation of the federal Conservation Reserve Program (CRP) in 1987 provided a continuum of habitat, which interconnected existing isolated core areas and allowed populations of Sharp-tailed Grouse to expand west and south in Box Elder County and south in Cache County. As a result, overall distribution increased by approximately 400 % from the known distribution in 1975 (Figure 1). The distribution of Sharp-tailed Grouse in Morgan and Weber counties appears to have declined from 1975-1977.

Relative Abundance of Columbian Sharp-tailed Grouse

Historically, populations of Sharp-tailed Grouse were often very abundant where habitat conditions were favorable. Hart et al. (1950) reported Joel Ricks, an early pioneer of Cache Valley indicated that, "In 1872-3 when the telegraph wire was put through Cache valley, scores of wild chickens were killed by flying in to it. There were thousands of these chickens until about 1875 when they began to dwindle." Hart et al. (1950) interviewed Dr. W. W. Henderson of the Utah State Agricultural College in Logan who reported that in the 1890s, "it was not uncommon to see flocks of several hundred sharp-tails in northern Cache Valley." He believed it would have been possible to see "ten thousand" in one day of riding the range. Hart et al. (1950) reported sharp-tails were abundant as late as 1919 when William Anderson saw approximately 500 birds on a 3 or 4 acre alfalfa field northeast of Ogden.

By 1935, sharp-tail populations had plummeted. The total fall-winter population was estimated to be approximately 1,500 birds. Subsequent surveys in 1939 and 1948 estimated the total population at 1,155 and 1,515, respectively (Hart et al. 1950). Populations remained low until the mid-1970s when hunters, landowners and Utah Division of Wildlife Resources (UDWR)

personnel began sighting more birds. Distribution was still about the same as in 1948 (Bunnell 1976).

Since 1979, lek counts have been used as an index of Sharp-tailed Grouse population size (Figure 2, Appendix 1). The results indicate that population trend remained stable until the late 1980s after which population trend increased. The most complete data set is for the White's Valley study area in eastern Box Elder County (Figure 3). Lek counts since 1979 show the total number of males has increased noticeably since implementation of the CRP in 1987. A severe winter during 1992-1993 and an extensive wildfire in 1994 reduced populations through 1997.

The most graphic indication of increases in abundance since the 1970s (when hunters in Box Elder County reported occasional observations) are data from the 1999 harvest questionnaire in which 288 hunters reported seeing 6,597 Sharp-tailed Grouse, an average of 20 Sharp-tailed Grouse/hunter day (Appendix 2). Surveys conducted during 1998-1999 estimated a 1999 statewide fall population of 10,782 birds (Appendix 3).

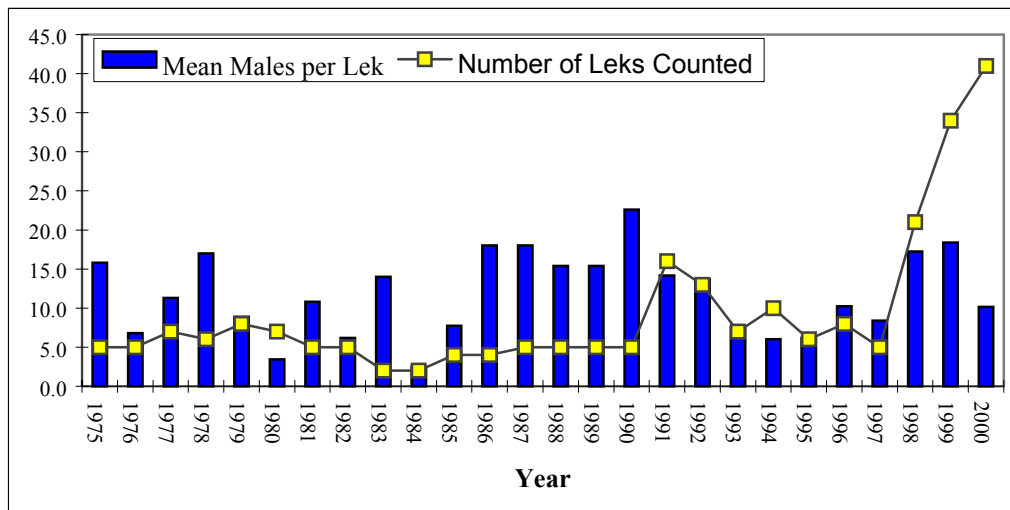


Figure 2. Mean number of males per lek, 1975-2000.

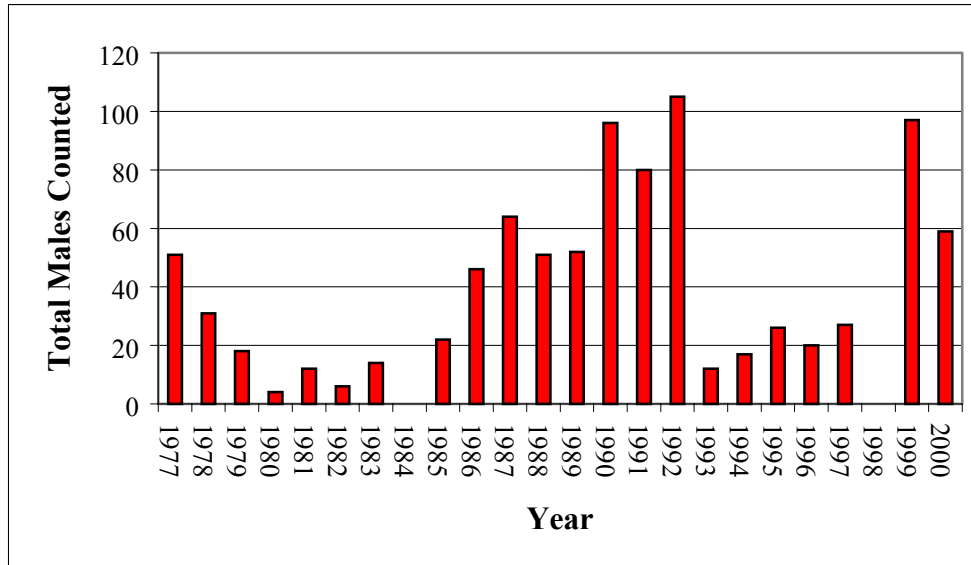


Figure 3. Total males counted, White's Valley, 1977-2000.

Columbian Sharp-tailed Grouse Harvest Data

Columbian Sharp-tailed Grouse were not hunted in Utah from 1925-1973. By 1970-1972, reported observations by the public and UDWR personnel indicated that populations were increasing. A limited hunt was initiated in 1974 during which no attention was directed to the reopening. It was legal to harvest one Sharp-tailed Grouse per day (possession limit 2) during a seven-day season that ran concurrently with the sage-grouse season. Bunnell (letter dated April 3, 1975 to W.J. Lynott) stated that, "few hunted primarily for sharptails and most birds were harvested incidental to hunting for sage-grouse and Hungarian Partridge." The total harvest probably did not exceed 50 birds.

In 1979, all Sharp-tailed Grouse hunters were required to obtain a free permit. The questionnaire results projected a harvest of 76 birds (Figure 4). Due to a decline in observations during the spring-summer inventory period, hunting was discontinued in 1980 and remained closed through 1997.

Figure 4. Summary of hunting seasons and bag limits of Columbian Sharp-tailed Grouse in Utah, 1925-2000.

Year	Season Length and Dates	Bag/Possession Limits	Total Harvest
1925-1973	Closed		
1974-1978	7 Days-3 rd Week of September	1 Bag/2 Poss.	50 birds/year
1979	7 Days-3 rd Week of September	1 Bag/2 Poss.	76 birds
1980-1997	Closed		
1998	7 Days-2 nd Week of November	663 2-bird Permits	172
1999	9 Days-2 nd Week of November	663 2-bird Permits	413
2000	9 Days-2 nd Week of November	663 2-bird Permits	204

During 1998-2000, a limited-entry hunt was authorized within a 1,541 km² (595 mi²) hunt unit (Appendix 4) in eastern Box Elder County. Fall populations within the unit were estimated at 5,757 grouse in 1998 and 7,196 in 1999. A harvest quota of 663, 2-bird permits (a maximum potential harvest of 1,326 birds) were issued. This represented a potential maximum harvest of 23% of the 1998 fall population and 18% of the 1999 fall population. The projected harvests of 201 in 1998 and 462 in 1999 represented a harvest of 3.5% and 6.4% of the estimated fall populations. Giesen (1999) reported that long-term data in Colorado indicated a harvest level of 28% of the fall population could be achieved without impacting subsequent breeding densities.

Field bag checks and wing barrels were used to collect hunter effort and harvest data in 1998. Since 1999, all Sharp-tailed Grouse hunters were required to return a harvest questionnaire and wing/tail feathers from harvested birds. Appendix 2 outlines reported hunter harvest statistics for 1998-2000. The sex and age ratio of the 1998-1999 harvest is reported in Figure 5.

Figure 5. Sex and age ratios of Columbian Sharp-tailed Grouse harvested in Utah, 1998-1999.

Year	Sample Size	Adult Males	Adult Females	Juvenile Males	Juvenile Females	Juveniles/Adult	Juveniles/Adult Females
1998	25					1.08	
1999	167	45	40	52	30	0.96	2.05

COLUMBIAN SHARP-TAILED GROUSE HABITAT

Habitat Requirements

In Utah, Sharp-tailed Grouse are associated with transitional zones within sagebrush communities, ranging in elevation from the interface of aspen-sagebrush communities to the edge of sagebrush and desert saltbush near the Great Salt Lake. Elevation within their distribution varies from 1,310-2,438 m (4,300-8,000 ft). Their distribution overlaps that of blue and ruffed grouse within aspen-mountain brush-sagebrush communities and sage grouse and Hungarian partridge within sagebrush rangelands and dryland farms.

Breeding Habitat

Within eastern Box Elder County, the highest breeding population densities occur where the landscape consists of 60% sagebrush and sagebrush/perennial grasses and 31% agriculture and CRP. The lowest breeding densities occur where 63% of the landscape is in agriculture and grasslands and sagebrush comprises only 13% of the area (Wilson 2000). Buss and Dzeidzic (1955) reported a rapid decline in Sharp-tailed Grouse populations when more than 70% of the Palouse Prairie region of eastern Washington was cultivated.

Sharp-tailed Grouse display a promiscuous mating system in which males defend small territories on traditional “dancing grounds” or “leks,” and compete for mating opportunities in the spring (Mark and Mark 1987). Males show a strong fidelity to lek sites and the areas are the focus of much year-long activity. Breeding habitat includes all land used for mating, nesting and

brood rearing within 2 km (1.2 mi) of the lek site. This area encompasses the lek, and most nest sites and brood use areas (Giesen and Connelly 1993).

Lek Sites

Leks are generally located in grass or shrub-grass vegetation located on ridge tops, knolls, and benches that are slightly higher in elevation than the surrounding terrain (Geissen and Connelly, 1993). In Utah, 56% of the active leks are within sagebrush and/or sagebrush/perennial grasses, 36% in CRP and 8% in agricultural lands. These results are similar to those reported for southeast Idaho (Schneider 1994, Ulliman 1995b).

Nesting Habitats

Most female Columbian Sharp-tailed Grouse nest within 1.0 km (0.6 mi) of the lek at which they were bred (Oedekoven 1985, Marks and Marks 1987, and Giesen and Connelly 1993). When native rangelands are used for nesting, most females nested beneath a shrub (Giesen and Connelly 1993). Nests are generally found beneath or within a few feet of a shrub (Evans 1968). Studies in Idaho reported 74% and 78% of nests located in shrub habitats (Marks and Marks 1987, Meints 1991). When available, sagebrush is preferred nesting habitat (Marks and Marks 1987) although snowberry, bitterbrush, serviceberry and other mountain shrubs are also used (Ulliman, 1994). Within shrub habitat, females select nest sites with denser grass, forb and shrub cover than at independent sites (Giesen 1987, Marks and Marks 1987, Meints 1991 and Schroeder 1994). Nest success within shrub habitat varied from 56% to 72%.

Studies in Utah during the 1930s-1940s (prior to the federal Conservation Reserve Program), found that, within intensively cultivated areas, hens selected alfalfa or wheat stubble for nesting, although nest success was only 47% and 18%, respectively (Hart et al. 1950). Implementation of CRP created extensive tracts of undisturbed nesting cover. Areas seeded with alfalfa and other forbs have developed into high quality nesting and brooding habitat. Meints (1991) found that nest success was higher in non-native (alfalfa and CRP) habitats (86%) compared to native habitats (53%).

Brooding habitat

Brooding habitat typically includes a high diversity of interspersed shrubs, perennial forbs and bunch grasses (Hart et al. 1950, Geisen 1987, Marks and Marks 1987, and Klott and Lindsey 1989). On native rangelands, brood habitat typically consists of 60-80 % grass/forb cover and 20-40% shrub cover (Parker 1970, McArdle 1976, Oedekovan 1985). Cultivated fields, native grasslands and CRP are used when the density and height of vegetation provides 20 cm-30 cm (8-12 in) of visual obstruction (Meints 1991). In eastern Idaho, Sharp-tailed Grouse broods preferred CRP fields, especially where alfalfa was included in the seeding mix, over native rangeland and cultivated fields (Sirotnak et al. 1991). Columbian Sharp-tailed Grouse seemed to respond to livestock grazing of brood habitat by moving to ungrazed rangelands or by concentrating in ungrazed CRP lands (Marks and Marks 1987, Sirotnak et al. 1991).

Winter Habitat

The selection of winter habitat depends primarily upon snow accumulation and the availability of feeding and roosting sites. Typical wintering areas include deciduous trees and mountain shrubs in upland and riparian areas (Giesen and Connelly 1993). In Utah, grouse often move from sagebrush up to maple-chokecherry cover types as snow accumulates (Marshall and Jensen 1937). If snow depths remain minimal, grouse do not move to higher elevation habitat (Ulliman 1995). The winter diet consists of the fruit, seeds, and buds of native and exotic shrubs, including serviceberry, hawthorn, birch, aspen, chokecherry, wild rose, willow, snowberry, Russian olive and the leaves of rabbit brush (Giesen and Connelly 1991, Schneider 1994). Where available, Sharp-tailed Grouse will also use wheat, corn, and barley (Hart et al. 1950). Generally, grouse do not have winter food problems because the browse species they use are often abundant (Bergerud and Gratson 1988), however, habitat alterations and land conversions have seriously reduced the quantity and quality of preferred berry and bud-producing shrubs available to Sharp-tailed Grouse in Utah (Hart et al. 1950). Movements to winter habitat of >5 km (3.1 mi) are typical (Hart et al. 1950), however, movements up to 20 km (12.5 mi) have been recorded in southeastern Idaho (Meints 1991). Marks and Marks (1988) reported that 80% of the Columbian Sharp-tailed Grouse winter observations in west central Idaho were within 2 km (1.2 mi) of leks.

Food Habits

During spring and summer, Sharp-tailed Grouse forage in areas dominated by dense forb and sparse grass cover (Connelly et al. 1998). During fall and winter, birds forage on the ground in areas where succulent forbs or grains are available and in areas dominated by sagebrush or in trees or shrubs on fruits and buds (Connelly et al. 1998). In Utah studies, the major food items in the diet during the spring and summer include clover, fruits, goldenrod, hawksbeard, grain, grass and grass seeds and dandelion (Marshall and Jensen 1937). Fall and winter food items included fruits, grain, rose hips, buds from aspen, chokecherry and willow, sunflower and the fruits of hawthorn, serviceberry and Russian olive (Marshall and Jensen 1937). Insects are eaten when available, and include grasshoppers, ants, crickets, beetles and galls from sagebrush (Connelly et al. 1998).

Habitat Trends

Within the current distribution of Columbian Sharp-tailed Grouse in Utah, only 49% of the area [(170,166 hectares) (420,311 acres)] remains as sagebrush, sagebrush/perennial grasses and grasslands (Appendix 5). During 1988-1999, 181 wildland fires destroyed 14,974-21,813 hectares (37,000-53,900 acres) of predominately sagebrush rangelands, representing a loss of 13-19% of all remaining sagebrush-steppe. Managing remaining Columbian Sharp-tailed Grouse habitat is compounded by the lack of public land ownership (only 9%) and the majority of private lands are in agricultural production. This clearly demonstrates the need for local working groups (LWGs) to coordinate closely with private landowners, Natural Resource Conservation Service (NRCS), Farm Service Agency (FSA) and other federal and state farm programs.

FACTORS CONTRIBUTING TO THE DECLINE OF COLUMBIAN SHARP-TAILED GROUSE

The accumulative loss of habitat, degradation of remaining habitat and physical disturbances to populations are thought to be the major factors contributing to the decline in distribution and abundance of Columbian Sharp-tailed Grouse in Utah (Connelly et al. 1998).

Habitat Loss

The main factors involved in the loss of habitat include:

- Conversion of low-elevation mountain brush, sagebrush and natural grassland communities into agricultural production, roads, towns, recreational developments and reservoirs.
- Changes in land use that have intensified the use of range and farmlands, the accumulative effects of which have lead to the loss of Sharp-tailed Grouse habitat. These uses include:
 1. Changes in the timing, duration, intensity of use and classes of livestock.
 2. Increases in farm size.
 3. Subdivision of ranches and farms.
 4. Clean farming, i.e. removing fence lines, odd corners and abandoned farmstead sites.
 5. Changes in human demographics.
 6. Suburban sprawl into foothill benches and rural areas.
 7. Increases in the incidence and magnitude of wild fires.
 8. Conversion of CRP lands back into crop production or livestock grazing.

Habitat Degradation

The quality of existing Columbian Sharp-tailed Grouse habitat has been reduced by:

- Long-term excessive livestock grazing that has changed plant communities and reduced the quality of various habitat components.
- Land treatments seeded into monotypic stands of non-native species that have limited value to Sharp-tailed Grouse.

- Over-utilization of winter habitat and winter food sources by livestock and big game.
- Lack of land treatments to renovate dense, decadent stands of sagebrush.
- Invasion of noxious annual grasses and weeds into native grasslands, wildfire areas and into the sagebrush understory.
- Weed control treatments that have removed sagebrush, mountain brush and riparian shrub species.

Physical Disturbances

Physical disturbances to individuals or groups of birds during biologically critical periods can cause nest abandonment, displacement from essential habitat, additional stress or increased vulnerability to predation. Sources of physical disturbances include:

- Predators.
- Weather.
- Hunting.
- Human disturbances to breeding, nesting and wintering birds.
- Power lines, fences.

COLUMBIAN SHARP-TAILED GROUSE MANAGEMENT ISSUES

Population Issues

- DNA assessment of Columbian Sharp-tailed Grouse populations within each management area.
- Low recruitment of juveniles into the fall population.
- Limit illegal and/or accidental harvest of Sharp-tailed Grouse in fragmented and low-density areas.
- Use reintroductions and augmentation transplants to increase the range and population size of Sharp-tailed Grouse in Utah.
- Poor winter survival in Box Elder County.

Habitat Issues

- Loss of the CRP.
- Degradation of traditional breeding, brooding and wintering areas.
- Continuing loss of essential habitat.
- Many remaining stands of sagebrush provide poor Sharp-tailed Grouse habitat because sagebrush canopy coverage is either too low or too high and/or herbaceous understory is depleted.
- Excessive livestock use of meadows, riparian habitats, seeps and other moist areas can adversely impact brood habitat by reducing vegetation diversity and production.
- Use of insecticides may decrease food supply for chicks during the first weeks after hatching.
- Loss of connectivity between sub-populations of Sharp-tailed Grouse resulting from habitat loss and degradation.
- Changes in land uses that impact Sharp-tailed Grouse habitat on private lands have not been compiled and/or recorded by federal or state agencies in a manner useable for detailed habitat planning.

Political and Social Issues

- Inventory of key Sharp-tailed Grouse habitats needs to be completed.
- Public attitude toward hunting Sharp-tailed Grouse if listed as threatened or endangered.
- Attitude of private landowners toward accommodating Sharp-tailed Grouse populations if listed as a threatened or endangered species.
- Knowledge of small isolated populations of Sharp-tailed Grouse on private lands is limited.
- Increased interest in wildlife viewing and photography may have negative impacts on Sharp-tailed Grouse leks.
- Increasing use of ATVs and snowmobiles may lead to increased physical disturbance of Sharp-tailed Grouse breeding, nesting and wintering areas.

STATEWIDE MANAGEMENT OBJECTIVES AND CONSERVATION STRATEGIES

A. COLUMBIAN SHARP-TAILED GROUSE POPULATION PROTECTION AND ENHANCEMENT

Objective A1: Protect existing Columbian Sharp-tailed Grouse populations.

Conservation strategies

A1.1 Continue with permit-only (limited entry) hunting in eastern Box Elder County, maintaining a conservative harvest of less than 10% of the estimated fall population within the hunt unit. Hunting should cease when:

- a. CRP expires and/or over 50% of the CRP acreage goes back into agricultural production.
- b. Lek densities decrease to less than 25.9 km²/lek (10mi²/lek) within identified high and medium quality habitat.

A1.2 Avoid activities that physically disturb breeding activity (March-June), including loud noise disturbances and mechanical, recreational, photographic activities within 0.8 km (0.5 miles) of an active lek (Idaho Columbian Sharp-tailed Grouse Conservation Plan).

A1.3 Lek sites isolated by more than 40 km (25 miles) from other lek sites should be considered isolated and priority given to establishing habitat to link the population to larger populations (Ulliman 1995). Consider augmenting these populations with birds from core areas.

A1.4 Avoid constructing power transmission lines, telephone lines and fences within 366 m (400 yds) of an active lek (Idaho Columbian Sharp-tailed Grouse Conservation Plan).

A1.5 Encourage the development of a Columbian Sharp-tailed Grouse lek viewing site on the Golden Spike National Monument, Box Elder County.

A1.6 Consider Columbian Sharp-tailed Grouse lek locations as sensitive information and restrict access accordingly.

Objective A2: Increase the distribution of Columbian Sharp-tailed Grouse into historical range.

Conservation strategies

A2.1 Refine the existing Sharp-tailed Grouse distribution map, concentrating effort on determining the presence/absence of Sharp-tailed Grouse in potential habitat areas in western Box Elder, Morgan, Rich, Summit, and Weber counties.

A2.2 Identify areas within the historical distribution with habitat suitable for reintroduction of Columbian Sharp-tailed Grouse. Areas identified will be prioritized, with areas adjacent to existing populations given the highest priority.

Objective A3: Increase public awareness of the status of Columbian Sharp-tailed Grouse and their biology and support for their conservation.

Conservation strategies

A3.1 Work with the Conservation Outreach Section within Utah Division of Wildlife Resources to develop an informational brochure, poster displays and audio-visual presentation depicting the status, habitat requirements and management needs of Sharp-tailed Grouse. These informational sources would be used to increase landowner awareness and knowledge of the status and issues involved in the management of Sharp-tailed Grouse.

B. COLUMBIAN SHARP-TAILED GROUSE HABITAT PROTECTION AND ENHANCEMENT

Objective B1: Identify protect, and enhance existing and potential (historic range currently degraded or unoccupied) Columbian Sharp-tailed Grouse habitat on private lands.

Conservation strategies

B1.1 Meet with landowners of essential habitat areas and encourage involvement in protecting and managing habitat.

B1.2 Meet with landowners interested in voluntary conservation actions and outline technical and financial assistance available.

B1.3 Develop an informational brochure on protecting and managing Sharp-tailed Grouse habitat. Make the brochure available to private landowners through federal, state and local conservation agencies.

B1.4 Provide federal and state natural resource management agencies, Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA) field offices, county offices, county land use planners and commissions with base maps outlining Sharp-tailed Grouse distribution and essential habitat areas.

B1.5 Coordinate with local county commissions and land use planners to protect Sharp-tailed Grouse habitat.

B1.6 Provide financial assistance for landowner-sponsored projects or cost-share assistance for federal or state projects designed to protect or enhance Sharp-tailed Grouse habitat.

B1.7 Provide assistance to landowners to establish new CRP contracts and extend or maintain existing CRP contracts in areas beneficial to Sharp-tailed Grouse.

Objective B2: Identify protect, and enhance existing and potential (historic range currently degraded or unoccupied) Columbian Sharp-tailed Grouse habitat on public lands and private lands involved in federal or state assisted programs.

Conservation strategies

B2.1 Vegetation Treatments

- a. Coordinate with agencies involved in vegetation treatments to ensure that projects are designed to maintain or improve habitat and avoid excessive impacts within a given area. Follow recommendations outlined in the “Guidelines For Management of Columbian Sharp-tailed Grouse Habitats” (Giesen and Connelly 1993).
- b. In breeding habitat, defer vegetation treatments during the breeding season (March-June). Limit treatments to no more than 20% of the area (individual treatments not to exceed 809 hectares (2,000 acres), space treatments no closer than one mile apart and allow 4-6 years for recovery before treating other portions of the nesting habitat (Ulliman et al. 1996).
- c. In winter habitat, avoid treatments that reduce the height, canopy coverage or density of key winter shrub species. Treatments designed to improve the quality of winter habitat should include less than 20% of the area, not to exceed 809 hectares (2,000 ac) and allow 7-10 years before treating other portions of the winter habitat are treated (Ulliman et al. 1996).

B2.2 Grazing Management

- a. In occupied habitat, implement grazing management and big game reduction to achieve and maintain good to excellent ecological condition of mountain brush, sagebrush and riparian communities, as defined by NRCS, Bureau of Land Management (BLM) and United States Forest Service (USFS) guides (Ulliman et al. 1996).
- b. In occupied habitat, regulate the utilization of current annual growth of key winter shrub species to <35% use (Ulliman et al. 1996). Fence water developments and nutrient supplement feed stations located within 400 m (0.25 miles) of thickets of key shrub species.
- c. In nesting habitat, control average annual utilization of key perennial bunchgrasses to achieve residual cover of at least 8 inches using the Robel pole visual obstruction technique (Robel et al. 1970, Ulliman et al. 1996).

B2.3 Fire Management

- a. Provide Utah Division of State Lands and Forestry, BLM and USFS with maps delineating essential Sharp-tailed Grouse habitat (including buffered lek sites and known winter habitat). Winter habitat should receive the highest priority for fire suppression. Priority areas for fire suppression should be delineated for each management area.
- b. Use Habitat Authorization and Wildlife Habitat Improvement Program (WHIP) funds to prescribe controlled fires to reduce canopy coverage within dense, monotypic stands of sagebrush habitat types.
- c. Evaluate all wildfires immediately to determine if reseeding is needed. Reseed with appropriate sagebrush species, and native shrubs, forbs and grasses. Reseed all wildfires occurring in Wyoming big sagebrush habitat types.
- d. Use volunteers, dedicated hunters and sportsman groups to collect native shrub and forb seeds annually. Investigate the feasibility of propagating and harvesting native forb and bunchgrass seed sources on UDWR property. Seeds could be used in re-seeding burns, land treatments and incorporated into CRP seed mixes.

B2.4 Habitat Restoration and Rehabilitation

- a. Use the Columbian Sharp-tailed Grouse Habitat Suitability Index (Meints et al. 1991) to evaluate the quality of breeding and wintering habitat associated with each active lek site. Identify habitat deficiencies and develop projects to enhance or restore habitat using appropriate species (Ulliman et al. 1996).

B2.5 Control of Noxious Weeds

- a. Provide county weed control boards with maps delineating essential Sharp-tailed Grouse wintering and breeding habitats. Coordinate with county weed control departments to avoid non-restricted spraying of noxious weeds within shrub thickets, riparian shrub corridors and lek sites.
- b. Promote integrated pest management, including the use of biological control of Dyer's woad and musk thistle.

B2.6 Use of Pesticides on Range and Croplands

- a. Avoid applying pesticides to breeding habitats during the brood rearing season (May 15-July 15). Pesticides reduce the supply of insect food sources needed for chick survival. To limit possible secondary poisoning, apply chemicals only to areas necessary to reduce threats to cropland (Ulliman et al. 1996).

C. COLUMBIAN SHARP-TAILED GROUSE INVENTORY AND MONITORING

Objective C1: Improve the base of knowledge on the status and distribution of Columbian Sharp-tailed Grouse and their habitats in Utah.

Conservation strategies

C1.1 Collect additional information on population distribution and density of Sharp-tailed Grouse populations within each management area.

C1.2 Refine information on Sharp-tailed Grouse distribution limits by conducting surveys utilizing sportsmen's groups, dedicated hunters, etc. Request information on sightings through a listing on the UDWR website.

C1.3 Monitor lek densities on nine study areas every three years. Revive population estimates based on lek densities and acres of habitat.

C1.4 Survey all state and federal lands with the current distribution of Sharp-tailed Grouse for the presence and/or absence for grouse.

C1.5 Evaluate Sharp-tailed Grouse populations prior to and after completion of habitat improvement projects.

C1.6 Monitor annual population changes, hunter harvest statistics and brood surveys.

C1.7 Conduct annual lek counts to monitor population trends. Establish annual lek routes to count maximum birds/lek, relocate leks that have moved and document the presence/absence of birds at inactive leks.

C1.8 Conduct annual harvest surveys to monitor hunter and harvest distribution, birds observed/hunter-day. Use field bag checks, mandatory wing envelopes and harvest questionnaires.

C1.9 Continue brood surveys in White's Valley and all of Box Elder County. Record birds observed/100 hours effort, number of broods and sizes and number of juveniles/100 adults observed.

Objective C2: Monitor the results of habitat management projects and habitat loss within Sharp-tailed Grouse distribution.

Conservation strategies

C2.1 Monitor changes in acreage of habitat by GAP Analysis every five years.

C2.2 Evaluate the quality and quantity of occupied and potential Sharp-tailed Grouse habitat within each management area.

C2.3 Evaluate Sharp-tailed Grouse habitat quality using the Habitat Suitability Index developed for southeastern Idaho (Meints et al. 1991).

C2.4 Monitor the results of habitat management projects.

C2.5 Document annual losses of sagebrush rangelands within the Sharp-tailed Grouse distribution. Have Utah Division of State Lands, Forestry and Fire and BLM report the location and magnitude of wildland fires. Have NRCS record and tabulate the extent of shrub reduction treatments and land conversions on private property.

D. RESEARCH

Objective D1: Complete research to improve management of Columbian Sharp-tailed Grouse in Utah.

Conservation actions

D1.1 Evaluate the winter food habits and habitat usage of Sharp-tailed Grouse in Hansel Valley, Cedar Hills and Wildcat Mountains, Box Elder County.

D1.2 Evaluate the effects of raptor predation on Sharp-tailed Grouse that winter in higher elevation pockets of mountain brush, chokecherry and aspen.

D1.3 Evaluate the effects of pesticide control of cricket and grasshopper infestations on the survival of juvenile Sharp-tailed Grouse.

D1.4 Develop more effective techniques for re-establishing native forbs and bunchgrasses into degraded sagebrush communities, wildfire burns and areas dominated by exotic annual grasses.

COLUMBIAN SHARP-TAILED GROUSE MANAGEMENT AREAS, ISSUES AND CONSERVATION STRATEGIES

Box Elder Management Area

The Box Elder Management Area (west of Interstate 15) is contiguous with the southeastern Idaho population and has the largest population of Columbian Sharp-tailed Grouse. Most Sharp-tailed Grouse habitat is associated with dryland farming and sagebrush rangelands. Human population growth is limited to the eastern edge of the area. Large blocks of BLM land southwest of Snowville, state land sections in White's Valley and Golden Spike National Monument provide habitat management opportunities on public lands. This population has the greatest probability of persistence.

Local Issues

- Protect existing sagebrush within dryland farm areas.

- Degraded sagebrush habitat. Sagebrush cover is too dense in many areas. Burn sites often need additional sagebrush cover.
- Excessive grazing of riparian habitats has eliminated or reduced many bud and berry-producing shrub species.
- Maintain a landscape within the Sharp-tailed Grouse distribution characterized by 60% sagebrush and 40% grasslands and agriculture.
- Checkerboard land ownership makes proper management difficult.
- The need for additional sagebrush and forbs in crested wheatgrass seedings.
- Lack of winter shrub food/cover in Hansel Valley, Cedar Hills and Wildcat Mountains.
- Retaining shrubs within renovated CRP tracts.
- Large scale pest control projects within high and medium density habitat areas.
- Loss of essential habitats to wildfires.
- The use of White's Valley as a solid waste dump site by Davis county.
- The disposal of State Institutional Trust Lands Administration (SITLA) lands in White's Valley and south of Curlew Junction.
- Coordination with Nevada Division of Wildlife and Idaho Department of Fish and Game on any Columbian Sharp-tailed Grouse reintroductions in the Goose Creek drainage of western Box Elder county.

Local Strategies

- Make wildfire suppression a priority in high-density habitat areas.
- Reseed burned areas with a mixture suitable for Sharp-tailed Grouse.
- Work with private landowners to manage sagebrush habitat in a way that is beneficial to Sharp-tailed Grouse.
- In areas lacking adequate winter food/cover, establish shelterbelts on abandoned farmsteads, odd field corners and fence lines. Preserve existing farmsteads and adjacent windbreaks through conservation easements.

- Coordinate with Golden Spike National Monument, Bridgerland and Wasatch Audubon Clubs to discuss establishing a Watchable Wildlife viewing site at the Monument.
- Work closely with local landowners in the Goose Creek drainage to substantiate the presence/absence of Sharp-tailed Grouse and solicit support for a reintroduction and/or augmentation transplant.
- Work with BLM to designate the Cedar Hill, Wildcat Mountains and BLM-SITLA lands south of Curlew Junction as an Area of Critical Environmental Concern (ACEC). The area could be the focus of extensive habitat protection and enhancement.
- Create a Sharp-tailed Grouse habitat management area in White's Valley, incorporating conservation easements on SITLA lands, key parcels of private land and the Davis County Solid Waste Management lands.

Cache Management Area

The Cache County Management Area is also contiguous with southeastern Idaho and Box Elder County populations. Most of the habitat is associated with CRP and native rangelands on foothill benches. Habitat loss associated with rural residential development and suburban sprawl represents the greatest threat to population persistence. All agricultural lands have potential for residential development. This population has the least probability of persisting.

Local Issues

- Lack of data on the distribution and status of Sharp-tailed Grouse populations.
- The subdivision of farms and ranches for residential and recreational developments.
- Accidental harvest of Sharp-tailed Grouse by upland game hunters.
- Loss of CRP.
- Degraded ecological condition of native sagebrush-bunchgrass ranges.
- Disturbances to Sharp-tailed Grouse leks during the breeding season.

Local Strategies

- Concentrate habitat management on USFS, UDWR and private lands south from the Idaho border to include the UDWR Richmond Wildlife Management Area.
- Solicit groups, organizations and Utah State University (USU) personnel to gather information on the distribution and status of Sharp-tailed Grouse.
- Continue to include updated Sharp-tailed Grouse data into UDWR Essential Lands coverage.
- Contact landowners and discuss conservation easement strategies to maintain open space within essential habitat.
- Work with county governments to maintain open space within recreational developments occurring within higher elevation bench lands.
- Restore sagebrush-steppe with use of mechanical manipulation and reseeded.

Weber/Morgan Management Area

The Weber/Morgan Counties Area is potentially isolated from both Box Elder and Cache Counties and current population distribution and density is unknown. Most Sharp-tailed Grouse habitat is used primarily for livestock grazing. Only 3% of the area is in agricultural production and CRP is very limited. Federal and state lands with Sharp-tailed Grouse habitat are limited. Close proximity to the Ogden-Salt Lake City metropolitan complex poses the threat of large-scale recreational developments and rural residential subdivisions on lower elevation sagebrush and mountain brush habitats. This population could persist, although as low densities, if existing habitat south and southeast of Huntsville is maintained in native sagebrush-steppe.

Local Issues

- Lack of data on the distribution and status of Sharp-tailed Grouse populations.
- Small, isolated populations.
- Loss of sagebrush habitat within the Gambel's oak community.
- Large-scale development of the Snowbasin Ski Resort and subsequent residential development into the Cottonwood Creek drainage.
- Residential developments within lower elevation mountain brush and sagebrush habitat.
- Accidental harvest of Columbian Sharp-tailed Grouse by upland game hunters.

Local Strategies

- Solicit groups, organizations and Weber State University Zoology Department personnel to gather additional information on the distribution and status of Sharp-tailed Grouse.
- Continue to include updated Sharp-tailed Grouse data into the UDWR Essential Lands coverage.
- Contact landowners and discuss the advantages of conservation easements to maintain open space within essential habitat areas.
- Work with county governments to maintain open space within recreational/residential developments that impact Sharp-tailed Grouse habitats.
- Restore sagebrush-steppe with the use of mechanical manipulation and reseeding.

Rich/Summit Management Area

The Rich/Summit Counties Management Area encompasses all of Rich County and that portion of Summit county north and west of Interstate 80 and Interstate 84. Hunters have reported Sharp-tailed Grouse east and west of Bear Lake, on the Deseret Land and Livestock Ranch near Woodruff, Utah and in Summit County near Henefer and Echo, Utah (none of these reports have been substantiated by UDWR personnel). A single Sharp-tailed Grouse wing was recovered from a sage grouse wing collection barrel in South Eden Canyon during the 2000 sage grouse hunting season.

There is potential to reintroduce and/or augment existing populations on UDWR, SITLA and private lands within this area. Sharp-tailed Grouse populations have the possibility to persist, if established.

Local Issues

- Lack of data on the distribution and status of populations.
- Small, isolated populations.
- Connectivity of populations in north Rich County with southeastern Idaho.
- Political support for the reintroduction and/or augmentation of existing populations.

Local Strategies

- Conduct intense surveys to substantiate reported sightings of Sharp-tailed Grouse.
- Evaluate the reintroduction of Sharp-tailed Grouse onto the Deseret Land and Livestock Ranch and the Henefer-Echo Wildlife Management Area in Summit County.

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Appendix 1. Utah Columbian Sharp-tailed Grouse lek count survey data.

State Summary: Sharp-tailed Grouse Lek Count Data

Lek Name and Number	Maximum Males Counted																				Average				
	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998		1999	2000	2001	
Box Elder County																									
1 West Hills Complex	15	4	12	0	14	0	18	46	40	33	40	75	53	55	5	6	0	5	0		57	34	9	24.5	
2 North White's Valley #1		0		6			2		18	11	9	8	14	5		2	8	8	4		12	3	2	7.9	
3 North White's Valley #2													10	32	3	7	18	5	22		24	2	0	13.7	
4 Hunsaker's - South White's Valley	3						2	0	6	7	3	13	3	13	4	2		2	1		4	20	7	6.6	
5 Pocatello Valley Complex	7	7	19	19	14	5	9	20	20	19	16	11	4			2	0				8	11	38	12.9	
6 Middle Canyon													9	14	2	6	11	19	15	33	67	33	12	20.9	
7 Blue Creek													6	5	Active	Active						5		5.3	
8 Howell													13	6										9.5	
9 Microwave								6	6	7	9	6											0	5.7	
10 Sunset													8	2									0	0	3.3
11 Nucor													11	6	Active						27	5	4	12.3	
12 Wellsville													8	8	3	2	0						0		3.5
13 Snowville													8	Active											8.0
14 Nucor #1																					12	19	11	15.5	
15 Golden Spike #1																					15	16	0	0	10.3
16 Golden Spike #2																					14	35	16	0	21.7
17 Golden Spike #3																						12	0	17	6.0
18 Golden Spike #4																					17	20			18.5
19 North Hansel Mountain #1																					18	21	33	12	24.0
20 North Hansel Mountain #2																					20	Active	0	0	10.0
21 North Hansel Mountain #3																					13	28	19	2	20.0
22 North Hansel Mountain #4																					9	5	12		8.7
23 North Hansel Mountain #5																					8	Active	4		6.0
24 Middle Canyon #1																					22	20	7	15	16.3
25 Middle Canyon #2																					13	18	0	0	10.3
26 Middle Canyon #3																					9	12	8	0	9.7
27 Middle Canyon #4																					33	48	17		32.7
28 North Promontory #1																					11	11	0		7.3
29 North Promontory #2																					32	18	9	12	19.7
30 North Promontory #3																					19	16	39	28	24.7
31 North Promontory #4																					26	16	39	8	27.0
32 North Promontory #5																					18	4	5		9.0
33 North Promontory #6																					8	1	9	23	6.0
34 North Promontory #7																					12	20	17		16.3
35 Blue Springs Hills #1																						6	0	0	3.0
36 Blue Springs Hills #2																						12	0		6.0
37 Short Divide #1																						21	2	12	11.5
38 Short Divide #2																						8	4	0	6.0
39 Cedar Hills #1																							10		10.0
40 Cedar Hills #2																							10		10.0

Appendix 1. (Continued) Utah Columbian Sharp-tailed Grouse lek count survey data.

State Summary: Columbian Sharp-tailed Grouse Lek Count Data

Lek Name and Number	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Average	
Cache County																									
1 Bankhead Well	2	2																						2.0	
2 Baxter Ridge		3	5	3																					3.7
3 Crow Mountain	13	4	11	3																					10.7
4 High Creek			7																						18.6
5 Clarkston (Old)																									12.3
6 Four Mile Complex																									15.2
7 Clarkston #1																									5.5
8 Clarkston #2																									4.5
Weber County																									
1 Monastery	3																								3.0
Morgan County																									
1 Cottonwood #1	3																								3.0
2 Cottonwood #2	25																								25.0
3 Deep Creek		4																							4.0
4 Bohman Hollow														11											5.5
State Total:	71	24	54	31	28	5	31	72	90	77	77	113	227	178	53	60	37	82	42	342	604	416	212		
Leks Counted	8	7	5	5	2	2	4	4	5	5	5	5	16	14	7	10	6	8	5	18	32	41	25		
State Average:	8.9	3.4	10.8	6.2	14.0	2.5	7.8	18.0	18.0	15.4	15.4	22.6	14.2	12.7	7.6	6.0	6.2	10.3	8.4	19.0	18.9	10.1	8.5		

Appendix 2. Columbian Sharp-tailed Grouse harvest statistics, 1979,1998-2000.

	1979	1998	1999	2000
Number of permits available	No limit	663, 2-bird permits	663, 2-bird permits	663, 2-bird permits
Number of permits sold	156	378	381	663
Number of hunters afield	156	235	332	157
Number of hunter-days	220	373	584	265
Projected harvest	76	172	413	204
Birds crippled and lost/hunter	ND	0.13	0.15	0.18
Projected number of birds lost	ND	29	49	29
Combined total harvest	76	201	462	233
CSTGR/hunter-day	0.35	0.46	0.71	0.77
CSTGR/hunter	0.48	0.73	1.24	1.30
Number of hunters (percent) who observed sharptails	ND	220 (93.7%)	328 (98.8%)	156 (100.0%)
Total sharptails observed	ND	3,549	6,597	2775
Number of sharptails observed/hunter-day	ND	16.1	20.1	17.7

Appendix 3. Assumptions used to project 1999 total fall population of Columbian Sharp-tailed Grouse in Utah.

1. The distribution of sharp-tailed grouse encompasses approximately 3,426.8 km² (1,323.1 mi²). Lek surveys conducted during 1998-1999 sampled 431.8 km² (166.7 mi²)(13%) of this area.

2. Habitat quality was classified as high, medium, or low based on the percent of sagebrush, sagebrush/perennial grass, and CRP.

High quality habitat had sagebrush > 50 % and agricultural land < 20 %.

Medium quality habitat had sagebrush > 25 % and < 50 % and agricultural land >20 % and < 40 %.

Low quality habitat had sagebrush < 25 % and agricultural land > 40 %.

3. The density of leks (mi²/lek) was determined within each category.

4. The average number of males/lek was calculated for each habitat category.

5. The following assumptions were used to estimate the 1999 fall population:

All leks in each study area were counted.

90 % of all males in the population were at lek sites.

Counts recorded the maximum number of males attending the leks.

Sex ratio of the population is 55 % males:45 % females.

The ten-year average age ratio for sharp-tailed grouse populations in southern Idaho (110 juveniles:100 adults) is representative of the population in Utah.

6. Population estimates for each habitat category are:

High Quality Habitat

740.7 km² (286 mi²)of habitat.

Lek density of 11.9 km²/lek (4.6 mi²/lek).

$740.7/11.9 = 62.2$ leks.

17.1 males/lek.

$17.1(62.2) = 1,063$ males.

$1,063 \text{ males}/.90 = 1,181$ total males.

$1,181/.55 \text{ males in population} = 2,148$ total adult population.

Fall age ratio of 110 juveniles/100 adults = 2,363 juveniles.

Estimated fall population = 2,148 + 2,363 = 4,511 grouse.

Medium Quality Habitat

1,202.3 km² (464.2 mi²)of habitat.

Lek density of 18.9 km² (7.3 mi²/lek).

$1,202.3/18.9 = 63.6$ leks.

14.7 males/lek

$14.7(63.6) = 935$ males.

$935 \text{ males}/.90 = 1,039$ total males.

Appendix 3 (Continued)

1,039 males/.55 males in population = 1,888 total adult population.

Fall age ratio of 110 juveniles/100 adults = 2,077 juveniles.

Estimated fall population = 1,888 + 2,077 = 3,965 grouse.

Low Quality Habitat

1,483.8 km² (572.9 mi²) of habitat.

Lek density of 31.1 km² (12.0 mi²/lek).

1,483.8/31.1 = 47.7 leks.

11.4 males/lek.

11.4 (47.7) = 544 males.

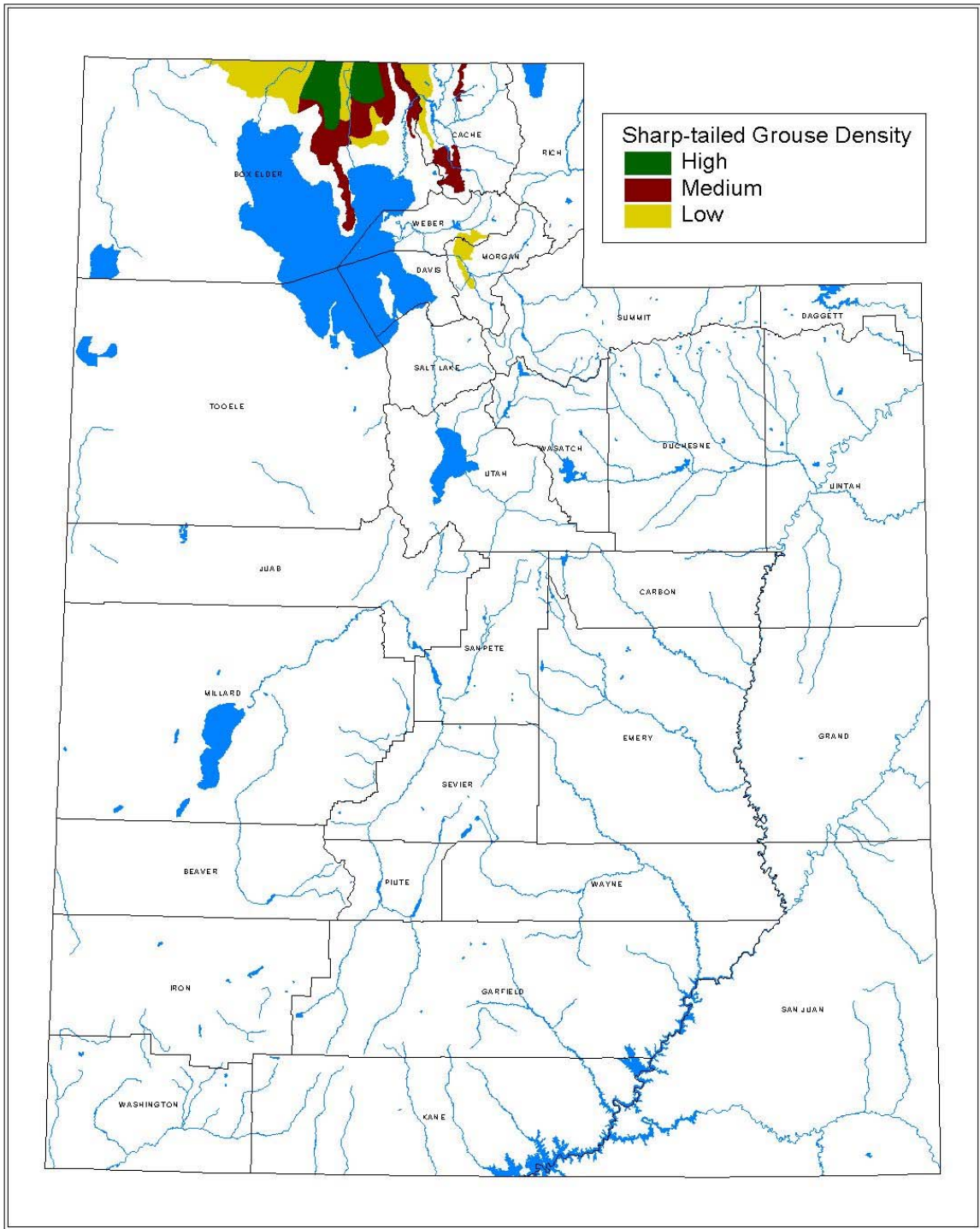
544/.90 = 604 total males.

604/.55 males in population = 1,098 total adults.

Fall age ratio of 110 juveniles/100 adults = 1,208 juveniles.

Estimated fall population = 1,098 + 1,208 = 2,306 grouse.

Estimated Total Fall Population = 2,306 + 3,965 + 4,511 = 10,782 grouse.



Appendix 4. Columbian Sharp-tailed Grouse hunt unit and current distribution.

Appendix 5. Summary of acreage by county, land ownership, and GAP vegetation cover types within the area of current distribution.

Current Distribution Area (by county)

	Hectares	Acres	Percent of Total
Total	342,912.6	846,994.1	100
Box Elder	275,975.4	681,659.2	80
Cache	50,205.4	124,007.3	15
Weber	4,910.7	12,129.4	1
Morgan	11,821.1	29,198.1	4

Land Ownership and Administration (within distribution area)

	Hectares	Acres	Percent of Total
BLM	18,961.0	46,833.7	6
USFS	4,099.2	10,125.0	1
Private	310,725.1	767,491.0	91
State	6,851.3	16,922.7	1.7
NPS	909.8	2,247.2	0.3

GAP Vegetation Cover Types (within distribution area)

	Hectares	Acres	Percent of Total
Sagebrush/Perennial Grass	48,907.9	120,802.5	14
Sagebrush	59,977.6	148,144.7	17
Grassland	61,281.2	151,364.6	18
Agriculture	99,793.6	246,490.2	29
Maple	13,382.9	33,055.8	4
Oak	4,704.1	11,619.1	1
Juniper	15,258.7	37,688.9	4
Aspen	135.1	333.7	<1
Mountain Shrub	527.3	1,302.4	<1
Lowland Riparian	575.1	1,420.5	<1