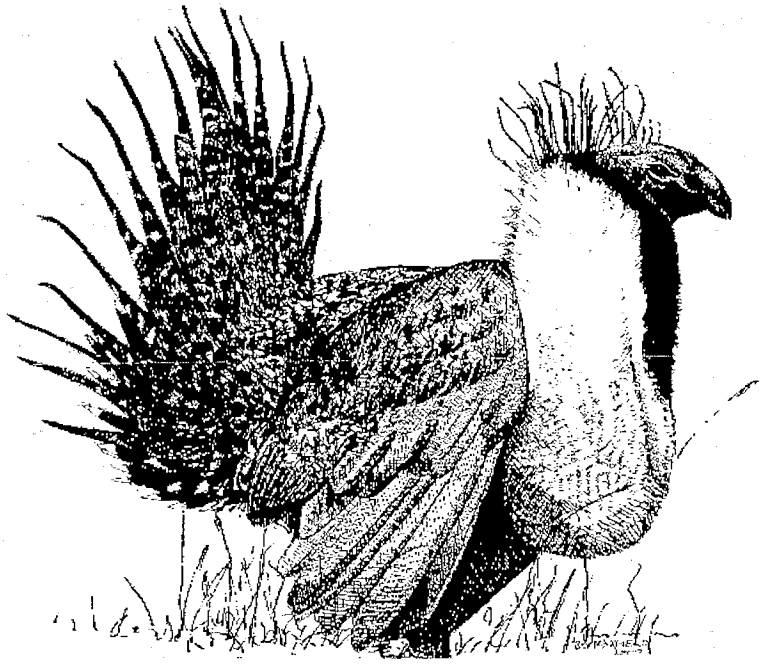
STRATEGIC MANAGEMENT PLAN
FOR
SAGE-GROUSE
2002



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INTRODUCTION

Sage-grouse have continued to decline throughout much of the western United States despite over seventy years of research and conservation efforts. Sage-grouse once inhabited sagebrush rangelands in 16 states and three Canadian Provinces. Currently, populations exist in 10 states and 1 province (Connelly and Braun 1997). In Utah, sage-grouse were historically distributed in all 29 counties but are now are found in only 26 counties (Figure 1). It is estimated that sage-grouse in Utah occupy only 50% of the habitat they once did and are one-half as abundant as they were prior to 1850 (Beck and Mitchell 1997). Currently, the largest populations of sage-grouse in Utah are found in western Box Elder County, on Blue and Diamond Mountains, Rich County, and on Parker Mountain. Smaller populations are found scattered in the central and southern parts of the state (Figure 1). Sage-grouse have been hunted in Utah since 1951 and are classified as an upland game species by the Utah Legislature. The Utah Division of Wildlife Resources (UDWR) has management responsibility for sage-grouse populations, while habitats are the responsibility of the landowner.

Research conducted in the Gunnison Basin of southwestern Colorado and San Juan County in southeastern Utah suggest that two species of sage-grouse inhabit both states. Sage-grouse populations that occur south and east of the Colorado River in Utah (Grand and San Juan counties) constitute a newly described species of sage-grouse, known as the Gunnison Sage-Grouse (*Centrocercus minimus*) (Young et al. 1994, Young et al. 2000). Greater Sage-Grouse (*C. urophasianus*) are located throughout the rest of the state (Figure 1). A Gunnison Sage-Grouse Conservation Plan was completed in 2000 by the San Juan County Gunnison Sage-Grouse Working Group (SWOG) and is being implemented by state and federal natural resource agencies, private landowners, and local governments.

The Utah Sage-grouse Strategic Management Plan has been developed by the Utah Sage-grouse Working Group comprised of representatives from state and federal natural resource agencies concerned with the health and proper management of sage-grouse and the sagebrush-steppe ecosystem in Utah. Conservation of the sagebrush-steppe ecosystem will not only benefit sage-grouse but a variety of neotropical songbirds, such as the Sage Sparrow (*Amphispiza belli*), Brewer's Sparrow (*Spizella breweri*), and Sage Thrasher (*Oreoscoptes montanus*), that are dependent upon a healthy sagebrush-steppe habitat. Big game species, such as pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), and elk (*Cervus elaphus*) will also benefit from the conservation of this habitat type as well as the endangered Utah prairie dog (*Cynomys parvidens*). Sage-grouse are an ideal indicator species for the sagebrush-steppe habitat (Young 1994).

This plan is designed as a framework for local working groups (LWGs) to develop area-specific management programs to maintain, improve and restore local sage-grouse populations and their habitat. Management areas, key local issues, conservation strategies and population information are provided as a starting point for LWGs.

This plan is expected to be in place until population and habitat goals are met in all management areas. It will be reviewed by the Utah Sage-grouse Working Group and updated and revised as new information becomes available.

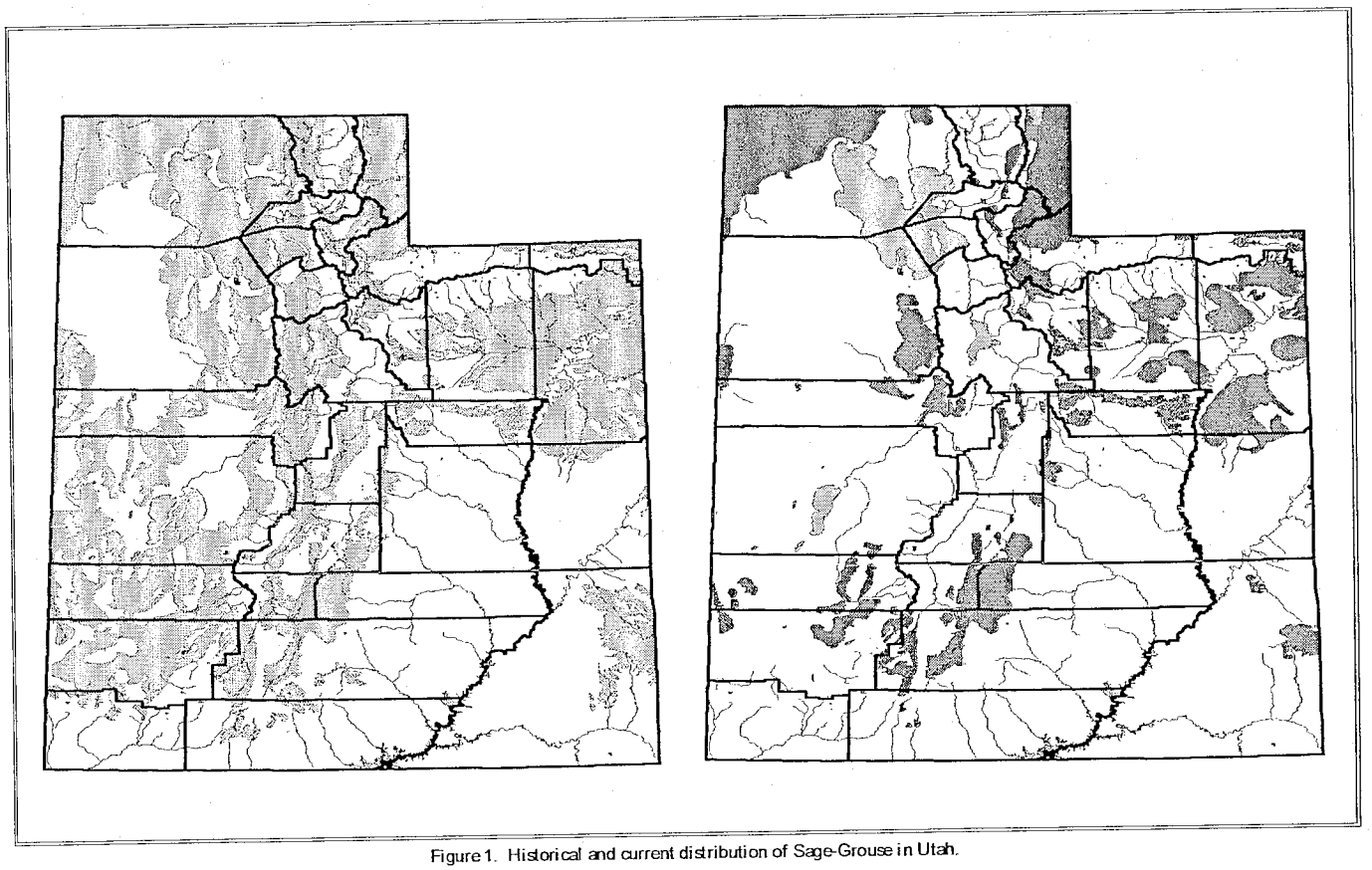

Figure 1. Historical and current distribution of Sage-Grouse in Utah.

Figure 1. Historical and current distribution of sage-grouse in Utah.

SAGE-GROUSE BIOLOGY AND POPULATION STATUS

Sage-grouse Biology/Ecology

Physical Description

The sage-grouse is the largest grouse species in North America. Adult males are larger than adult females. Adult males weigh 4-7 pounds (1.7-2.9 kg) and are 27-32 inches (65-75 cm) long compared to adult females weighing 2-4 pounds (1.0-1.8 kg) and measuring 20-25 inches (50-60 cm) long. Both sexes have narrow, pointed tails and a variegated pattern of grayish brown, buff, and black on the upper parts of the body and a diffuse black abdominal pattern. Males have blackish brown throats and a dark V-shaped pattern on the neck, and white breast feathers. When strutting, males inflate two gular sacs of olive green skin and erect hair-like black feathers (filoplumes) on the back of the neck. Females lack the V-shaped pattern, their throats are buff and their lower throats and breasts are barred with blackish brown (Schroeder et al. 1999).

There are noticeable morphological differences between Greater Sage-Grouse and Gunnison Sage-Grouse. Gunnison Sage-Grouse are two-thirds the size of Greater Sage-Grouse. Gunnison Sage-Grouse tail feathers have horizontal white barring along their length compared to a variegated pattern found in Greater Sage-Grouse. The filoplumes, found only on male sage-grouse, are much thicker and dense in Gunnison Sage-Grouse than in Greater Sage-Grouse. There are also noticeable differences in the strutting behavior of the two sage-grouse species (Young et al. 2000).

Seasonal Movements and Home Range

Sage-grouse populations can be defined as one of two types: 1) non-migratory - grouse do not make long-distance movements between seasonal ranges; and 2) migratory - grouse make long-distance movements between distinct seasonal ranges. Seasonal movements between seasonal ranges can exceed 45 miles (75 km) (Connelly et al. 1993).

Home range size for migratory sage-grouse populations can exceed 540 mi^2 (1,500 km^2) (Hulet 1983). For non-migratory sage-grouse populations, home range size varies from 4-11 mi^2 (11 to 31 km^2). Sage-grouse exhibit high fidelity to seasonal ranges (Fischer et al. 1993). Females return to the same area to nest each year and may nest near their previous year's nesting site (Bunnell et al. 2000, Gates 1983).

Breeding

The center of breeding activity for sage-grouse is the "lek" or strutting ground. Male sage-grouse begin to congregate on leks in early March and perform a ritualized courtship display. Use of leks may continue as late as early June. Mating occurs on the lek. Fifty to ninety percent of the males utilize leks during the breeding season. As sage-grouse populations decline, the number of males attending leks may decline or the use of some leks may be discontinued. Likewise, as populations increase, male attendance on leks may increase and/or new leks may be established or old leks reoccupied (Connelly et al. 1981).

Nesting/Reproduction

Nesting generally takes place 1-2 weeks after mating and may continue as late as early June (Wallestad 1975). Sage-grouse generally have lower reproductive rates and higher survival rates than other species of upland game birds (Connelly and Braun 1997). Nesting rates vary from year to year and from area to area (Bergerud 1988, Connelly et al. 1993, Schroeder 1997, Coggins 1998,). Connelly et al. (1993) reported that in Idaho up to 45% of yearling and 22% of adult female sage-grouse do not nest each year. Schroeder (1997) found that essentially all female sage-grouse in Washington nested. The variation is most likely a result of the quality of nutrition available and the health of pre-laying females (Barnett and Crawford 1994). Renesting by sage-grouse varies regionally from 20% (Hulet 1983, Connelly et al. 1993) to greater than 80% (Schroeder 1997). In summary, sage-grouse have the lowest reproduction rate of any North American game bird and as a result populations are not able to recover from low numbers as quickly as those of most other game birds.

Sage-grouse nest success varies from 12 to 86% (Trueblood 1954, Gregg 1991, Schroeder et al. 1999). Adult females may experience higher nest success rates that yearling females (Wallestad and Pyrah 1974). However, differential nest success between age groups has not been observed in other studies (Connelly et al. 1993, Schroeder 1997). Nest success is dependent on vegetation cover type (Gregg 1991). Gregg (1991) reported that the highest nest success occurred in mountain big sagebrush (*A. t. vaseyana*) cover type. Greater cover of medium-height shrubs with grass 7 inches (>18 cm) in height increases sage-grouse nest success (Gregg et al. 1994).

Clutch size of sage-grouse is extremely variable and relatively low compared to other species of game birds (Schroeder 1997). Average clutch size for first nests varies from 6.0 to 9.5 throughout the species range (Schroeder 1997, Sveum 1998). These differences may be related to habitat quality and overall health of pre-laying females (Coggins 1998).

Survival Rates

Annual survival rates for yearling and adult female sage-grouse vary from 35% to 85%; adult male survival rates vary from 38% to 54% (Wallestad 1975, Zablan 1993, Connelly et al. 1994). Lower survival rates for males may be related to physiological demands of sexual dimorphism and higher predation rates on males during the breeding season (Swenson et al.1987).

Sage-grouse predators include raptors, coyotes, ravens, squirrels, and skunks. The increase in urban development has resulted in the addition of non-native predators such as dogs, cats and foxes (Connelly et al. 1991).

Little information has been published on mortality of juvenile sage-grouse or the level of production necessary to maintain a stable population. Among western states, long-term juvenile to hen ratios have varied from 1.40 to 2.96 juveniles per hen in the fall. In recent years, this ratio has declined to 1.21 to 2.19 juveniles per hen (Connelly and Braun 1997). It is thought that at least 2.25 juveniles per hen should be present in the fall population to allow for stable to increasing sage-grouse populations (Connelly and Braun 1997, Edelmann et al. 1998).

Utah Sage-grouse Population Status and Trends

It is thought that sage-grouse were historically found in all 29 Utah counties. Today, sage-grouse are found in 26 of Utah's counties and are thought to only occupy 50% of the habitat they once did (Mitchell and Maxfield 2000). Strawberry Valley in central Utah is a dramatic example of the decline of sage-grouse in Utah. In the 1930s, Griner (1939) estimated that 3,000-4,000 sage-grouse inhabited this high mountain valley. Bunnell et al. (2000) estimated the population in the Strawberry Valley to be 250-350 grouse in 1999, representing a population decrease of 88-94%.

All known sage-grouse leks (historic, inactive, and active) have been input into a geographic information system (GIS). Of 333 known leks, 175 (53%) have been active in the last three years. Thirty-three (10%) are inactive and 125 (37%) are historic and have not been active for over 5 years (Figure 3).

UDWR biologists have identified 281.9 mi^2 (730.2 km^2) of nesting habitat, 1,132.6 mi^2 (2,933.4 km^2) of brood-rearing habitat (Figure 4), and 692.2 mi^2 (1,792.9 km^2) of winter habitat (Figure 4).

Lek Counts

Lek counts have been conducted in Utah since 1959 as an index of sage-grouse population size. Most lek count data for Utah was collected beginning in 1967 with Box Elder, Rich, and Summit counties starting earlier. The number of leks counted has increased over time, as new leks have been located (Figure 2). The highest number of leks counted since 1967 was in 1989 with 171 leks counted. The lowest number counted was in 1967 with 43 leks counted (Figure 2). Deep and persisting snow pack, making it difficult to access lek locations, explains much of the variation in the number of leks counted through the years.

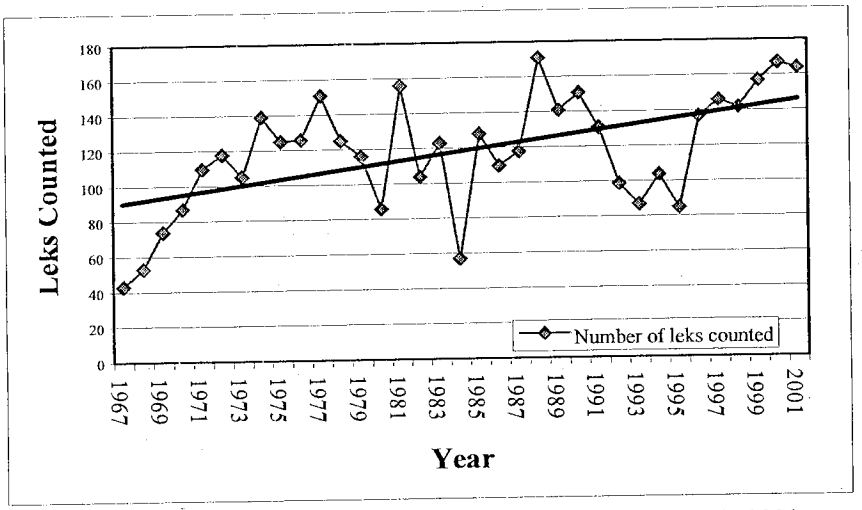

Figure 2. Number of sage-grouse leks counted each year, 1967-2001.

PROTECTED INFORMATION

Figure 3. Active, inactive, and historic sage-grouse leks in Utah.

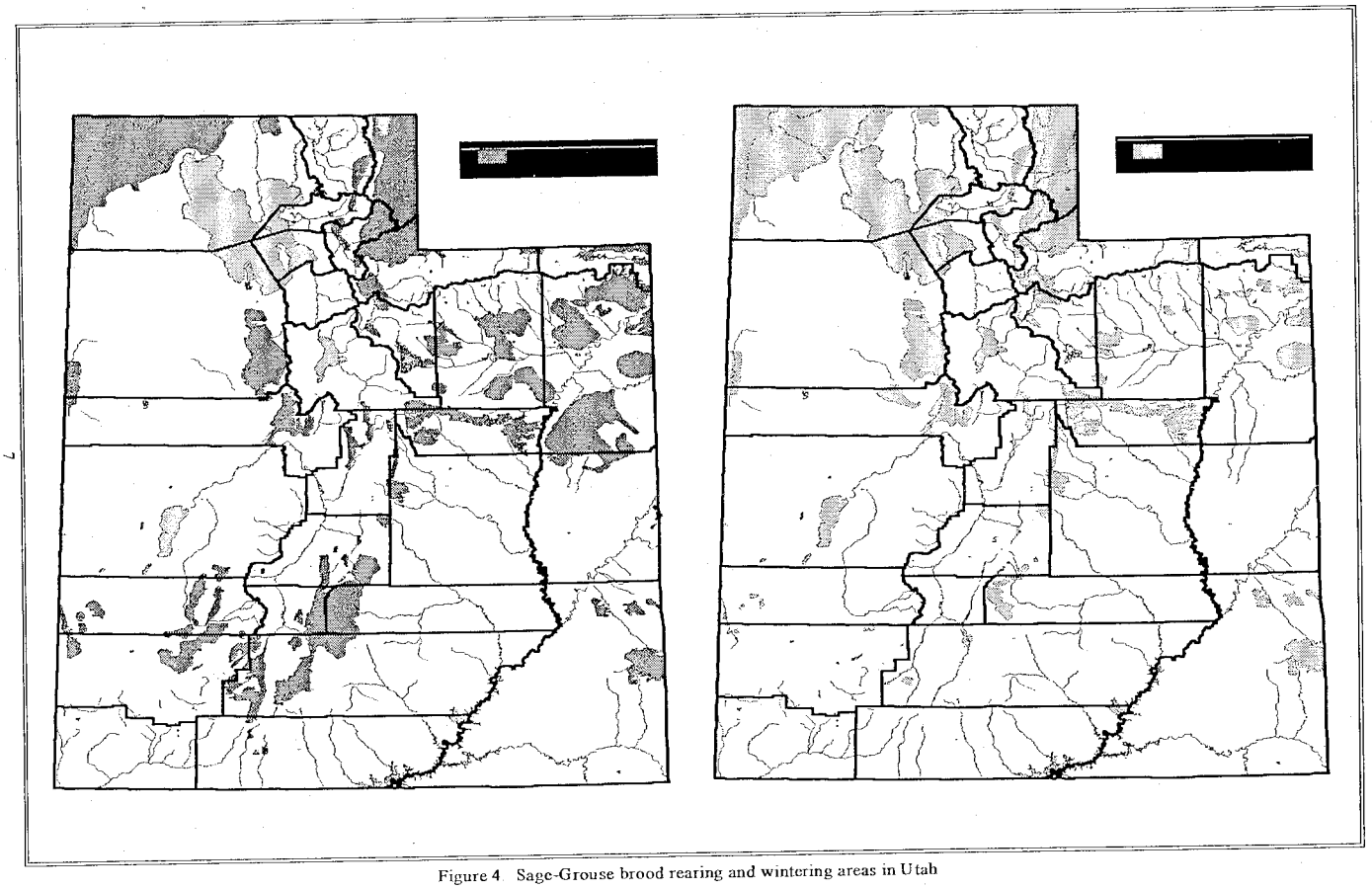

Figure 4 Sage-Grouse brood rearing and wintering areas in Utah

Figure 4. Sage-grouse brood-rearing and wintering areas in Utah.

Despite the increase in the number of leks counted each year, the average number of males counted on the leks has shown a decline from 1967-2001 (Figure 5). The highest number of males/lek was observed in 1969 with 32.0 males/lek and the lowest number of males/lek was observed in 1996 with 10.4 males/lek. Figure 5 displays the average number of males/lek from 1967-2001. A computer-generated trend line indicates a decline in the average number of males/lek during this time period. Also noticeable is a 10-year cycle with the highest figures reached during 1969-1970, 1979-1980, 1989-1990, and 1999-2001.

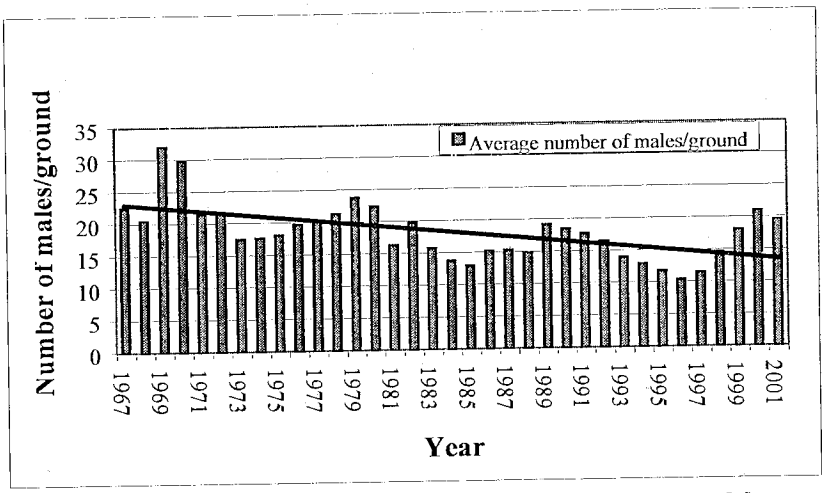

Figure 5. Average number of male sage-grouse counted per lek.

In 2001, Utah's estimated sage-grouse breeding population consisted of 12,999 birds. This estimate is based on the assumption that 75 percent of all males were counted on strutting grounds and that the male:female ratio in the population is 1:2. The fall population of sage-grouse in Utah was estimated at 22,996. This estimate is based on the assumption there was 50 percent nest success, and 2.3 chicks per successful nesting hen survived (Willis et al. 1993).

Brood Surveys

Summer brood surveys have been conducted since the 1960s to determine nesting success and juvenile:adult ratios. Mean brood sizes from 1967-2000 are displayed in Figure 6. The computer-generated trend line indicates a slight decrease in mean brood size over this time period.

The number of birds observed per 100 hours during brood surveys is displayed in Figure 7. An increase in the number of birds seen per 100 hours of survey time has increased during 1967-2000 as shown by the computer-generated trend line. This increase may be a result of a better knowledge of brooding areas and therefore less time spent looking for grouse in unused habitat. It may also be a result of less time spent on brood surveys and small sample sizes.

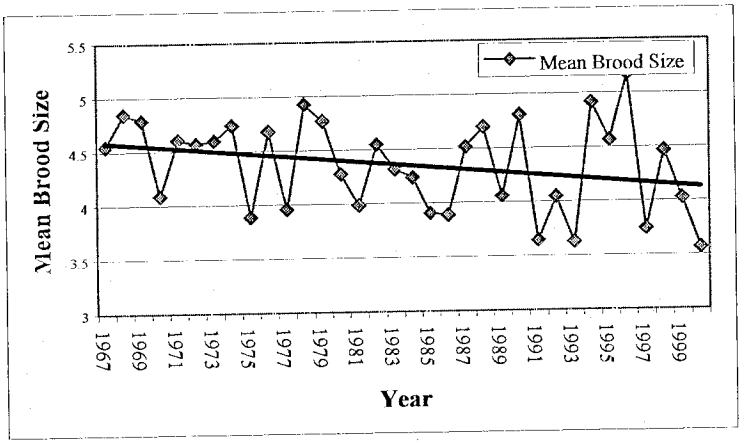

Figure 6. Mean brood size of sage-grouse, 1967-2000.

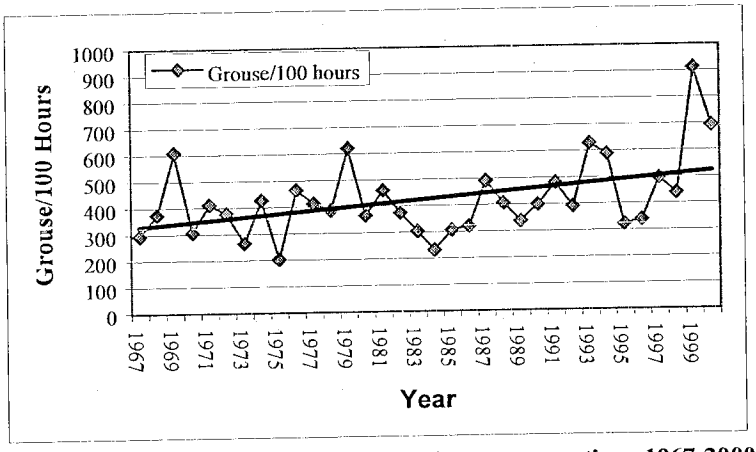

Figure 7. Sage-grouse observed per 100 hours survey time, 1967-2000.

Harvest Data

Field bag check data has been collected on sage-grouse in Utah since the 1960s and analysis of collected sage-grouse wings has been conducted since 1973. Wing analysis has provided a good method for determining annual chick production of sage-grouse, assuming harvest represents the population. The number of juvenile sage-grouse per 100 hens is displayed in Figure 8. There was a drop in juvenile grouse per 100 hens during the late 1980s and early 1990s likely representing drought conditions throughout much of Utah. During these years chick production was well below the recommended level of 225 juvenile grouse per 100 hens in the fall population.

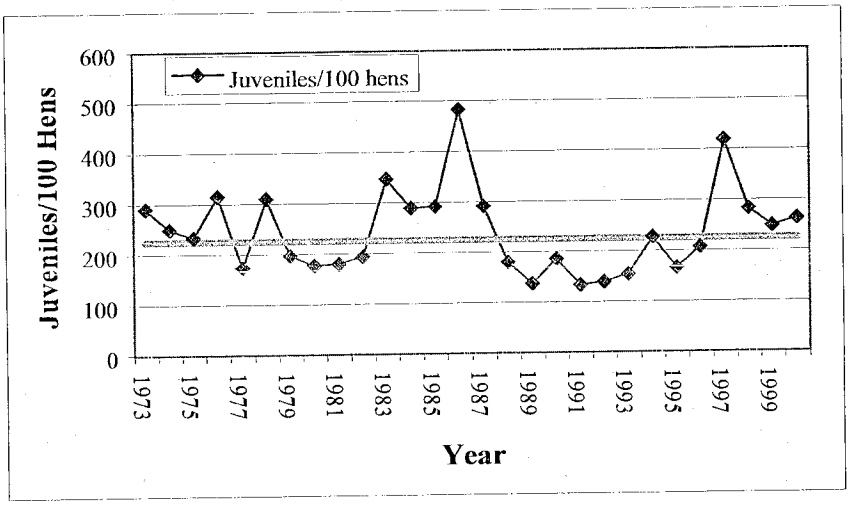

Figure 8. Juvenile sage-grouse per 100 hens, 1973-2000.

Four areas in Utah were open for sage-grouse hunting in 2000 (Figure 12). sage-grouse have been hunted legally in Utah since 1951. From 1951-1962 sage-grouse hunters and subsequently harvest were limited by permits. Harvest peaked in the late 1970s and early 1980s with the highest harvest at 28,280 grouse in 1979 and the lowest harvest (1,303) occurring in 1967 (Figure 9). Harvest for 2000 was estimated at 1,498 grouse, down 77% from the 1999 estimate. Beginning in fall 2000, a free permit was required to hunt sage-grouse in Utah. This requirement may have decreased the hunter participation in the sage-grouse hunt subsequently reducing the overall harvest. This permit will enable biologists to collect more accurate harvest data. The number of grouse harvested per hunter has shown an overall decrease from 1967-2000 with the lowest rate of 0.31 grouse/hunter attained during the 1997 hunting season (Figure 10). The number of grouse harvested per hunter-day has also shown a decline from 1967-1999 (Figure 11).

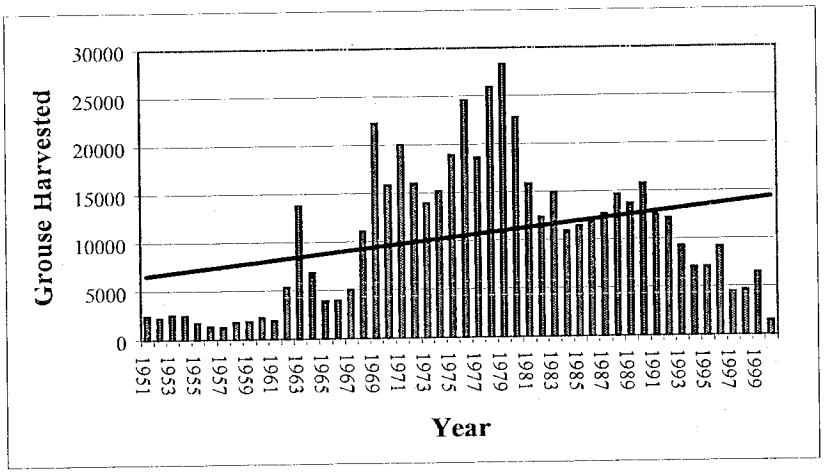

Figure 9. Sage-grouse harvest, 1951-2000.

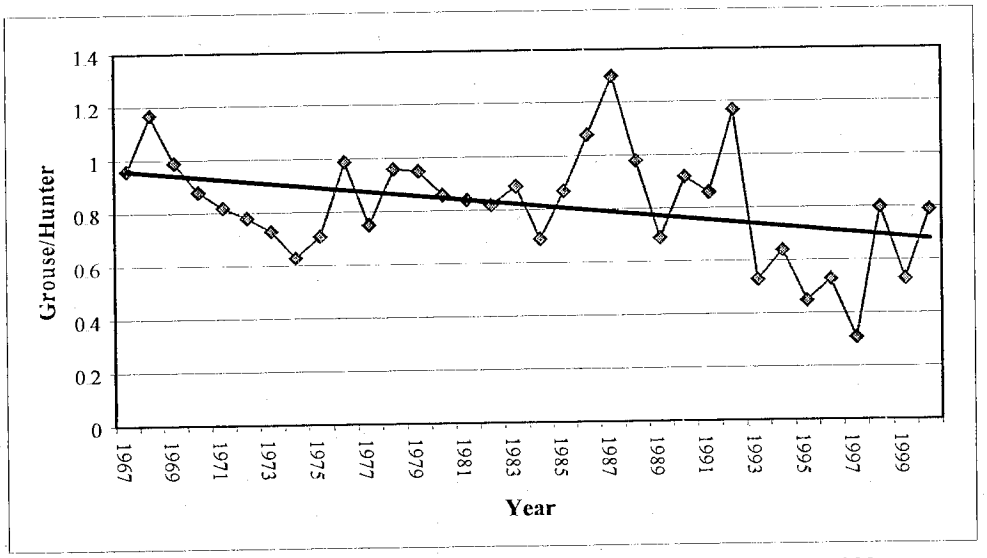

Figure 10. Average number of grouse harvested per hunter, 1967-2000.

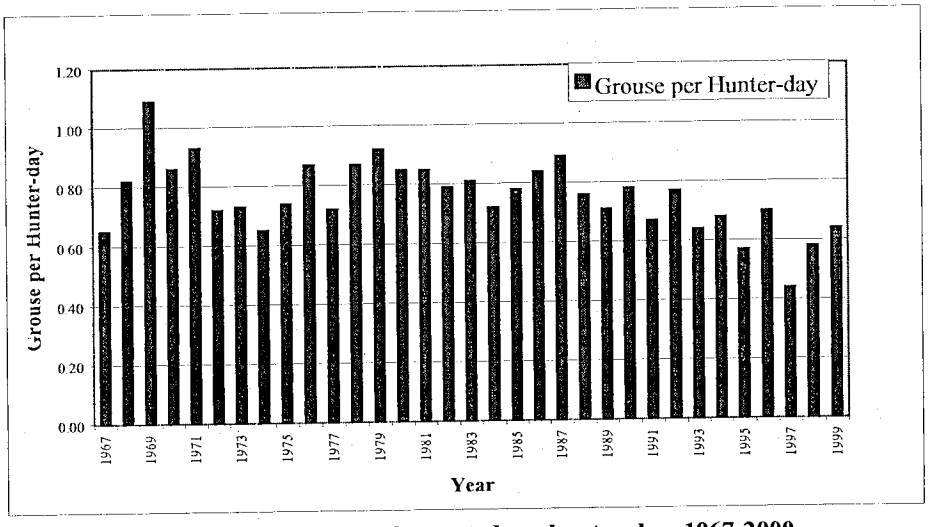

Figure 11. Sage-grouse harvested per hunter-day, 1967-2000.

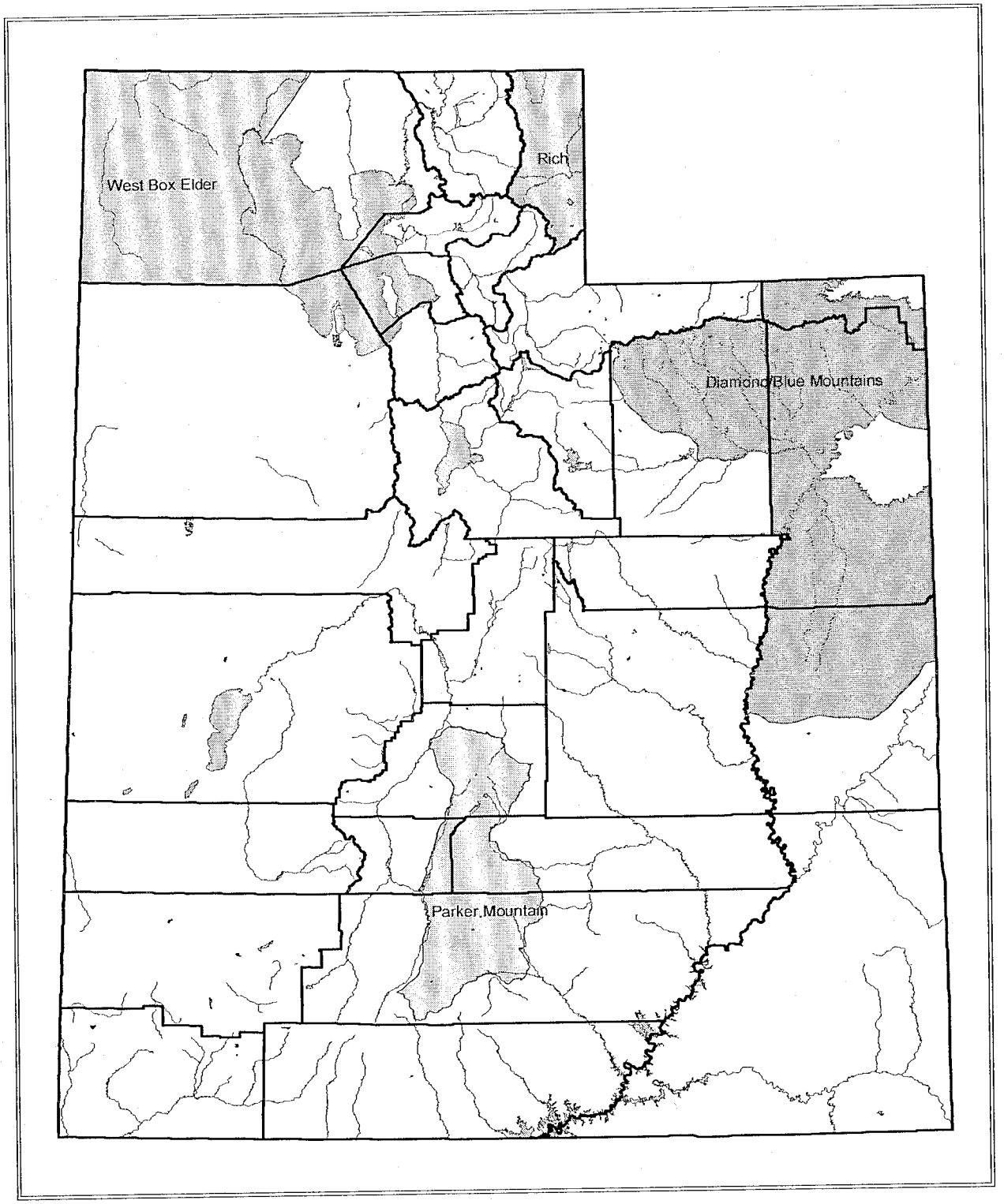

Figure 12. 2001 Sage-Grouse hunt units.

Figure 12. 2001 Sage-grouse hunt units.

SAGE-GROUSE HABITAT

Habitat Requirements

Breeding/Nesting Habitat

Leks, or strutting grounds, tend to be traditional. In general, the same areas are used year after year. Leks typically occur in open areas surrounded by sagebrush (Patterson 1952, Gill 1965). Examples of lek sites include landing strips, old lakebeds or playas, low sagebrush flats, openings on ridges, roads, cropland, and burned areas (Connelly et al. 1981, Gates 1985). Sage-grouse males appear to form leks opportunistically at sites within or adjacent to potential nesting habitat. The lek is considered to be the center of year-round activity for non-migratory grouse populations (Eng and Schladweiler 1972, Wallestad and Pyrah 1974, Wallestad and Schladweiler 1974), but this may not be the case for migratory populations (Connelly et al. 1988, Wakkinen et al. 1992). Average distances between nests and the nearest leks vary from 0.6-3.9 miles (1.1-6.2 km), however, some females may nest > 12.5 miles (20 km) away from the lek (Autenrieth 1981, Wakkinen et al. 1992, Fischer 1994, Hanf et al. 1994).

Habitat used by pre-laying hens is also part of the general breeding habitat. These areas provide hens with forbs high in calcium, phosphorus, and protein, all of which are necessary for egg production. The condition and availability of these areas are thought to have a significant effect on reproductive success (Barnett and Crawford 1994, Coggins 1998).

Most sage-grouse nests are located under sagebrush plants (Patterson 1952, Gill 1965, Gray 1967, Wallestad and Pyrah 1974); however, nests have been found under other plant species (Griner 1939, Connelly et al. 1991, Gregg 1991). Sage-grouse nesting under sagebrush experience a higher nest success than those nesting under other plant species (Connelly et al. 1991). Research on sage-grouse nesting habitat has documented that sage-grouse tend to select sites under sagebrush plants that have large canopies. The canopies provide overhead cover and an herbaceous understory, thus providing lateral cover and allowing birds to be hidden from view (Patterson 1952, Gray 1967, Klebenow 1969, Wallestad and Pyrah 1974, Wakkinen 1990, Gregg 1991, Fischer 1994, DeLong et al. 1995, Bunnell et al. 2000). Herbaceous cover associated with nest sites may provide scent, visual, and physical barriers to potential predators (DeLong et al. 1995).

Brood-rearing Habitat

Early brood-rearing habitat generally occurs relatively close to nest sites, but movements of individual broods may be highly variable (Connelly 1982, Gates 1983). Early brood-rearing habitats may be relatively open (≤ 14 percent canopy cover) stands of sagebrush when compared to optimum nesting habitat (Martin 1970, Wallestad 1971), but need > 15% canopy cover of forbs and grasses (Sveum et al. 1998, Bunnell et al. 2000). High plant species richness with abundant forbs and insects characterize brood areas (Dunn and Braun 1986, Klott and Lindzey 1989, Drut et al. 1994, Apa 1998). Insects, especially ants and beetles, are an important food component of early brood-rearing habitat (Drut et al. 1994, Fischer 1996). As herbaceous plants mature and dry, hens usually move their broods to more mesic sites during June and July where

more succulent vegetation is available (Gill 1965, Klebenow 1969, Connelly and Markham 1983, Connelly et al. 1988, Fischer et al. 1996, Bunnell et al. 2000). Sage-grouse broods occupy a variety of habitats during summer including sagebrush, relatively small burned areas within sagebrush, wet meadows, farmland, and other irrigated areas adjacent to sagebrush habitats (Savage 1969, Martin 1970, Connelly and Markham 1983, Gates 1983, Connelly et al. 1988, Pyle and Crawford 1996).

Late brood-rearing habitats are highly variable. Patterson (1952) reported that grouse move from summer to winter range in October but during mild weather in late fall some birds may still use summer range. Fall movements to winter range are slow and meandering and occur from late August to December (Connelly et al. 1988). Wallestad (1975) documented a shift in feeding habits from September, when grouse were consuming a large amount of forbs, to December when birds were feeding only on sagebrush.

Winter Habitat

Sage-grouse winter habitats are relatively similar throughout most of their range. Because their winter diet consists almost exclusively of sagebrush, winter habitats must provide adequate sagebrush that is accessible through the winter. Eng and Schladweiler (1972) and Wallestad (1975) indicated that most observations of sage-grouse during winter in Montana occurred in sagebrush habitats with >20% canopy cover. However, Robertson (1991) indicated that sage-grouse used sagebrush habitats that had average canopy cover of 15%. Sage-grouse tend to select areas with both high canopy cover and taller big sagebrush (*Artemisia tridentata*).

During winter, sage-grouse feed almost exclusively on leaves of sagebrush (Patterson 1952, Wallestad 1975). Big sagebrush dominates the diet of sage-grouse in most portions of their range (Patterson 1952, Wallestad 1975, Remington and Braun 1985, Welch et al. 1988) but low sagebrush (*A. arbuscula*), black sagebrush (*A. nova*) (Dalke et al. 1963, Beck 1977), fringed sagebrush (*A. frigida*) (Wallestad 1975) and silver sagebrush (*A. cana*) (Aldridge 1998) are also consumed in many areas depending on the availability. Sage-grouse in some areas apparently prefer Wyoming big sagebrush (*A. t. wyomingensis*) (Remington and Braun 1985, Myers 1992) and in other areas mountain big sagebrush (*A. t. vaseyana*) (Welch et al. 1988). Some of the differences in selection may be due to preferences for higher levels of protein (Remington and Braun 1985).

It is critical that sagebrush be exposed at least 10-12 inches (25 cm) above snow level (Hupp and Braun 1989). This provides both food and cover for wintering sage-grouse. In situations where snow covers the sagebrush, birds will move to areas where sagebrush is exposed.

During winter, sage-grouse will either partially or completely bury themselves in snow (snow roosting) for added thermal protection from winter temperatures.

Habitat Trends

The complex mosaic of land ownership and administration of the habitat compound the difficulty of properly managing sage-grouse. One population of sage-grouse can utilize land administered

by several different federal and state agencies as well as private land. Currently occupied habitat of sage-grouse in Utah covers primarily Bureau of Land Management (BLM) administered and private lands. Private lands provide the greatest amount of sage-grouse habitat at 40.5%, with BLM administered lands next at 34.4%. United States Forest Service (USFS) administers 9.7% of the current sage-grouse habitat and Utah State owned land accounts for 9.5% [State Institutional Trust Land Administration (SITLA) (8.0%), Division of Parks and Recreation (<1%), and Utah Division of Wildlife Resources (1.5%)]. Ute Tribal land covers 5.2% and National Park Service and military reservations cover less than one percent each.

Sage-grouse habitat quality and quantity has declined throughout Utah and coincided with declines in sage-grouse numbers. The reasons for habitat loss vary from site to site but include wildfire, urban expansion, agricultural conversion, herbicide treatments, prescribed fire, rangeland seeding, juniper expansion, and livestock grazing management.

STATEWIDE GOAL

Protect, enhance, and conserve sage-grouse populations and sagebrush-steppe ecosystems. Establish populations of sage-grouse in areas where they were historically found and the current sagebrush-steppe habitat is capable of maintaining a viable population of sage-grouse.

STATEWIDE MANAGEMENT ISSUES

Population Management Issues

- What is the history of sage-grouse transplants and relocations in Utah?
- What is the DNA composition of sage-grouse populations throughout Utah?
- Need video documentation of sage-grouse populations throughout Utah.
- What is the historical distribution of sage-grouse in Utah?
- What are the effects of disease on sage-grouse populations in Utah?
- Are small populations of sage-grouse located in fragmented and low-quality habitats susceptible to harvest.
- Need a set of criteria to direct reintroductions/transplants of sage-grouse in Utah.
- What are the effects of non-native predators on sage-grouse populations?
- Is there significant poaching of sage-grouse?
- Is there a need to protect sage-grouse leks located on roads?

- Need to locate/survey possible sage-grouse populations in areas where we have little information.

Habitat Issues

- Need to sign a MOU among agencies for managing sage-grouse habitats within the 2001 guidelines.
- Protection of traditional breeding, brooding, migration corridors, and wintering ranges.
- What was the historical distribution of sagebrush in Utah?
- What are the effects of coal bed methane, gas/oil drilling on sage-grouse populations?
- Continuing loss of sage-grouse habitat from wildfires, excessive livestock grazing, weed invasion, agricultural and residential expansion, herbicide treatment, mechanical treatment (sagebrush thinning and removal), prescribed burns and monoculture [smooth brome (*Bromus inermis*), crested wheatgrass (*Agropyron crestatum*)] reseedings.
- Many remaining sagebrush rangelands provide poor sage-grouse habitat because sagebrush canopy cover is either too low or too high and/or the herbaceous understory is depleted.
- Excessive livestock use of wet meadows, riparian habitats, seeps, and other moist areas can adversely impact brooding habitat by reducing vegetation diversity and production and reducing/altering insect production.
- Use of insecticides may decrease food supply for chicks during the first few weeks after hatching.
- Loss of habitat connectivity between grouse populations resulting from habitat loss and degradation.
- Loss of sage-grouse habitat to pinyon-juniper invasion.
- Inventory of key sage-grouse habitats still needs to be completed.

Planning Issues

- Management programs for sage-grouse must be ecosystem-based. Management actions vary in their impact over both time and space, i.e. management actions that impact a sage-grouse population negatively in the short-term may benefit it over the long-term. Care must be taken not to cause a permanent shift in habitats that will not return to the desired state.
- Management programs for sage-grouse will also affect other sagebrush-dependent

wildlife species. If programs designed to meet the goals of this plan could negatively impact some other important wildlife goals, then these conflicts need to be identified early and decisions made as to local and ecosystem priorities. For example, management actions designed for sage-grouse populations may impact Utah prairie dog populations in the same area.

- Changes in land use have not been compiled in a manner or scale usable for detailed planning.

- How do we effectively plan, implement, and monitor sage-grouse conservation practices.

Other Issues

- Public attitudes toward grazing and hunting and their affects on sage-grouse populations.

- Public awareness and education.

- Data availability and sharing among agencies.

- Knowledge of small, isolated populations of sage-grouse is limited especially on private land.

- Increased interest in wildlife viewing and photography may have negative impacts on sage-grouse lek sites.

- Increased use of ATVs and snowmobiles may have negative impacts on sage-grouse populations and habitats.

A. SAGE-GROUSE POPULATION PROTECTION AND ENHANCEMENT

Objective A1: Improve the base of knowledge on the status and distribution of Utah sage-grouse and their habitats.

Conservation Strategies:

A1.1 Continue and expand cooperative interagency efforts to determine the presence/absence of sage-grouse, baseline population data, distribution information, and key habitats using methods appropriate to the specific situation.

A1.2 Update seasonal and key habitat maps in GIS every year. Provide maps to local land management agency offices and others as requested.

A1.3 Allow permit-only (limited-entry) hunting, maintaining a conservative harvest of $\leq$ 10% of the estimated fall population in areas where $\geq$ 500 birds comprise the breeding population over a three-year running average (Connelly et al. 2000). Breeding populations will be estimated based on the assumption that 75% of males attend leks and

the male:female sex ratio is 1:2.

Objective A2: Monitor abundance and distribution of sage-grouse in Utah.

Conservation Strategies:

A2.1 Continue to conduct lek counts throughout Utah each year to allow monitoring of population trends. Continue to survey for new leks in suitable sage-grouse habitat. Seek assistance from all natural resource agencies in the effort.

A2.2 In areas where sage-grouse are hunted continue to collect an adequate sample of wings from check stations and wing barrels to monitor production.

Objective A3: Increase public awareness of the status of sage-grouse and their biology and support for their conservation.

Conservation Strategies

A3.1 Establish a Utah Sage-grouse Working Group including state and federal agencies and private groups that meets at least once a year to provide information, technical advice, and direction to interested parties throughout Utah. Form local working groups to develop solutions to local management area problems.

A3.2 Conduct at least one open house within each sage-grouse management area within one year of plan adoption. These open houses should be designed to provide the public with information on the status and management needs of Utah sage-grouse and outline the contents of this Plan.

A3.3 Develop a television piece for "Wild Utah" and an article for "Wildlife Review" outlining this Plan. Develop a series of news releases to encourage additional media coverage of sage-grouse.

A3.4 Establish a hunting season consistent with the population biology of sage-grouse and goals of this Plan. Currently, sage-grouse populations in Utah are not be hunted unless a 3-year running average of 500 breeding birds is detected. Areas open for sage-grouse hunting in the fall of 2000 are shown in Figure 11.

A3.5 Conduct briefings for BLM, NRCS, UDWR, USFS and other interested parties and staff on the needs of sage-grouse within 1 year.

A3.6 Have the cooperating state and federal agencies sign an MOU committing specific resources to this effort within 3 months of Plan adoption.

B. SAGE-GROUSE HABITAT PROTECTION AND ENHANCEMENT

Objective B1 : Identify, protect, and enhance existing and potential (historic range currently

degraded or unoccupied) sage-grouse habitat and sagebrush-steppe ecosystem within each Management Area. Critical to this effort is the understanding that land management actions taken by one landowner affect management options available to adjacent landowners.

Conservation Strategies

B1.1 All ownerships (with permission on private land).

Within each Management Area:

a. Prepare and distribute habitat maps which identify key seasonal habitats.

b. Prepare cover type maps and evaluate habitat conditions using standard methods for key seasonal habitats.

c. In cooperation with interested and affected parties, develop a site-specific habitat management program.

B1.2 Private land habitat (voluntary landowner actions).

a. Technical assistance.

1. Contact landowners in key seasonal habitat areas to explain sage-grouse needs and seek their support for improving sage-grouse habitat.

2. Meet with groups and agencies (i.e. Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA) that work with private landowners to explain and seek support for actions outlined in this plan.

b. Voluntary agreements.

1. Provide cost-share funds to aid private landowners in protecting, managing, and restoring sage-grouse habitat. Possible sources of funds include federal farm bill programs, Pheasants Forever, Utah Department of Natural Resources, and the U.S. Fish and Wildlife Service's Partners for Wildlife Program.

c. Pesticides.

1. Provide information to agricultural producers outlining methods to reduce potential for pesticide poisoning of sage-grouse.

2. Request landowners, pesticide applicators, and others to report incidents of dead or apparently intoxicated sage-grouse found in and around agricultural fields.

d. Long-term habitat protection.

1. Identify and prepare a prioritized list of the most important sage-grouse habitats on private land within each Management Area. Offer conservation easements or acquire critical habitats from willing sellers through land exchange, reserved interest deed, or direct purchase.

B1.3 Public land habitat (including habitat managed by Utah State and Institutional Trust Lands Administration, Utah Division of Parks and Recreation, Utah Division of Wildlife Resources and all federal agencies).

a. Vegetation management.

1. Manage nesting and early brood-rearing habitat to provide 15-25% sagebrush canopy coverage and 7 inches (15cm) or more of grass and forb understory during the May nesting period. Research (Connelly et al. 1991) shows that this provides 50% nesting success and potential for increasing populations.

2. Manage for late summer brood-rearing habitat that includes a variety of succulent vegetation adjacent to sagebrush escape and loafing cover.

3. Manage for winter habitat that has sagebrush exposed under all possible snow depths. This can consist of low sagebrush (*A. arbuscula* or *A. nova*) and big sagebrush (*A. tridentata*) communities. A sagebrush canopy of 15-25% with heights of 10-12 inches (22-27 cm) above the snow is critical to survival of sage-grouse.

4. Other vegetation management guidelines.

- When needed, timing and application of herbicides should be during the period of active growth of sagebrush, but when forbs are dormant.

- Tebuthiuron is a herbicide that is highly effective at selectively decreasing sagebrush cover when used at low application rates. It should be considered as an alternative when some sagebrush must be retained on a treated area and conservation of forbs is important. However, because little is known about the long-term effects of this herbicide on sage-grouse habitats, initial use should only be considered experimental.

b. Lek disturbance.

1. Avoid developing roads, fences, poles, and utility lines within 1,300 feet (400 meters) of a lek.

2. Avoid human disturbances within 0.6 mile (1km) of a lek during the breeding season (March1-May 31) from 1 hour before sunrise to 3 hours after sunrise.

c. Pesticides.

1. Avoid the use of pesticides in early brood-rearing habitat during the early developmental stage of sage-grouse chicks (April-July).

d. Grazing management (domestic and wild).

1. Implement grazing management and big game regulations to achieve and maintain sagebrush and riparian/meadow habitats in good ecological condition (as defined by NRCS Ecological Sites Guide or USFS Site Guides).

e. Fire management.

1. Rate sage-grouse wintering and nesting habitats as high priority for wildfire suppression.

2. Provide maps of important sage-grouse wintering and breeding habitats to help fire suppression personnel prioritize fire suppression efforts.

3. Use prescribed fire in high precipitation [> 16 inches (35 cm)] sagebrush communities (e.g., *A. t. vaseyana*) as needed to mimic natural fire frequencies.

4. Protect remaining sage-grouse habitat in *A. t. wyomingensis* habitats where natural fire frequency is 50-130 years and recent wildfire has greatly reduced sage-grouse habitat. This should include:
   - Increased emphasis or priority for fire suppression;
   - Development of strategically placed firebreaks using greenstripping, mechanical removal of fuel and/or special grazing which, when combined with existing landscape features, will stop or slow the spread of wildfires;
   - Better training of fire crews on the importance of sagebrush habitat;
   - Better delineation of the most important sage-grouse habitat;
   - Control of all noxious weeds.

5. When making fire management decisions, recognize that remaining islands of sagebrush within a wildfire are very important as a seed source for establishing sagebrush in a burned area.

f. Habitat restoration.

1. Include native forbs and grasses in seeding mixtures.

2. Include sagebrush seed (from local populations) in all seeding mixtures where residual natural seed sources are inadequate.

3. Improve techniques and seed sources for rehabilitation of areas that are at risk of annual weed establishment.

4. Following rehabilitation, base livestock grazing use on the biological needs of the range plants.

5. Rehabilitate gullied meadows to raise the water table and restore wet meadow characteristics.

6. Where needed, modify existing water pipelines (e.g., install floats on troughs) to enhance or restore springs, seeps, and associated moist areas.

7. Discourage development of natural water sources.

Objective B2: Monitor the condition and trend of sage-grouse habitat.

Conservation Strategies:

B2.1 Develop GIS database of historic and current habitat conditions throughout Utah's sage-grouse range.

B2.2 Utilize range trend survey data to determine habitat condition in appropriate areas.

B2.3 After adoption of local management area plans; conduct evaluations at appropriate intervals to determine if management objectives are being met. These should include:

1. Evaluation of current satellite imagery to classify habitats and quantify loss/gain of sagebrush.

2. Establishment of permanent transects in sagebrush habitats measuring shrub canopy coverage with line intercept and grass/forb cover and presence with Daubenmire frames. Shrub and grass height will also be measured along these transects.

3. Completion of an evaluation report at least every five years to determine if management changes are needed.

C. SAGE-GROUSE MANAGEMENT PLANNING AND COORDINATION

Objective C1: Management of sage-grouse must be ecosystem based.

Conservation Strategies:

C1.1 Evaluate management actions over both time and space.

C1.2 Identify areas where sage-grouse management may affect other species, i.e., Utah prairie dog, Burrowing Owl, mule deer.

Objective C2: Sage-grouse management must be a cooperative effort between federal and state land management agencies, Utah Division of Wildlife Resources, Tribal governments, and other interested groups.

C2.1 Have the cooperating state and federal agencies sign a Memorandum of Understanding (MOU) committing specific resources to this effort within 3 months of Plan adoption.

C2.2 Continue and expand cooperative interagency management activities that will affect sagebrush habitats.

C2.3 Increase data availability and sharing among agencies.

D. RESEARCH

Objective D1: Complete research to improve management of sage-grouse in Utah.

Conservation Strategies:

D1.1 Evaluate the effects of predation, insecticides, and other sources of mortality on the juvenile segment of sage-grouse populations.

D1.2 Develop more effective habitat restoration techniques for sage-grouse habitat to improve success of rehabilitation efforts after wildfire and to restore previously degraded sagebrush communities, meadows, and riparian areas in uplands.

D1.3 Evaluate the effects of disease on sage-grouse populations.

D1.4 Evaluate the effects of fire on sage-grouse habitats in higher precipitation [>16 inches (35 cm)] areas that are generally *A. t. vaseyana* habitats.

D1.5 Evaluate the effects of loud noises and other disturbances on sage-grouse attending leks.

D1.6 Evaluate the effects of livestock grazing on sage-grouse populations and habitat.

D1.7 Evaluate the effects of existing water developments on sage-grouse populations.

D1.8 Evaluate the effects of pesticides on sage-grouse populations.

D1.9 Evaluate the relationship between hunting and natural mortality on sage-grouse populations and trends.

SAGE-GROUSE MANAGEMENT AREAS, ISSUES AND CONSERVATION STRATEGIES

As a result of an analysis of historic and current sage-grouse distribution, existing lek count data, brood survey data, and harvest data, 13 Sage-grouse Management Areas have been delineated by combining populations that show similar population trends, management issues and land ownership (Figure 13).

Upon acceptance of this Plan, local working groups will be formed to develop local management area plans to meet the needs of sage-grouse in their local area. An important part of solving the habitat management problems that face sage-grouse, is to work together closely so that all landowners and land managers are aware of the needs of local populations and how to meet them. Although many of the potential strategies to better manage local sage-grouse populations are listed above in the "Statewide Management Objectives and Conservation Strategies" section, the following local management areas, key local management issues, conservation strategies, and population goals are provided as a starting point for local working groups to develop their own plans. For each local management area, a table summarizing lek count data (average cocks counted) for all known leks is provided. Leks were grouped together if located in close proximity to one another and exhibiting a possible population link (Appendix 2).

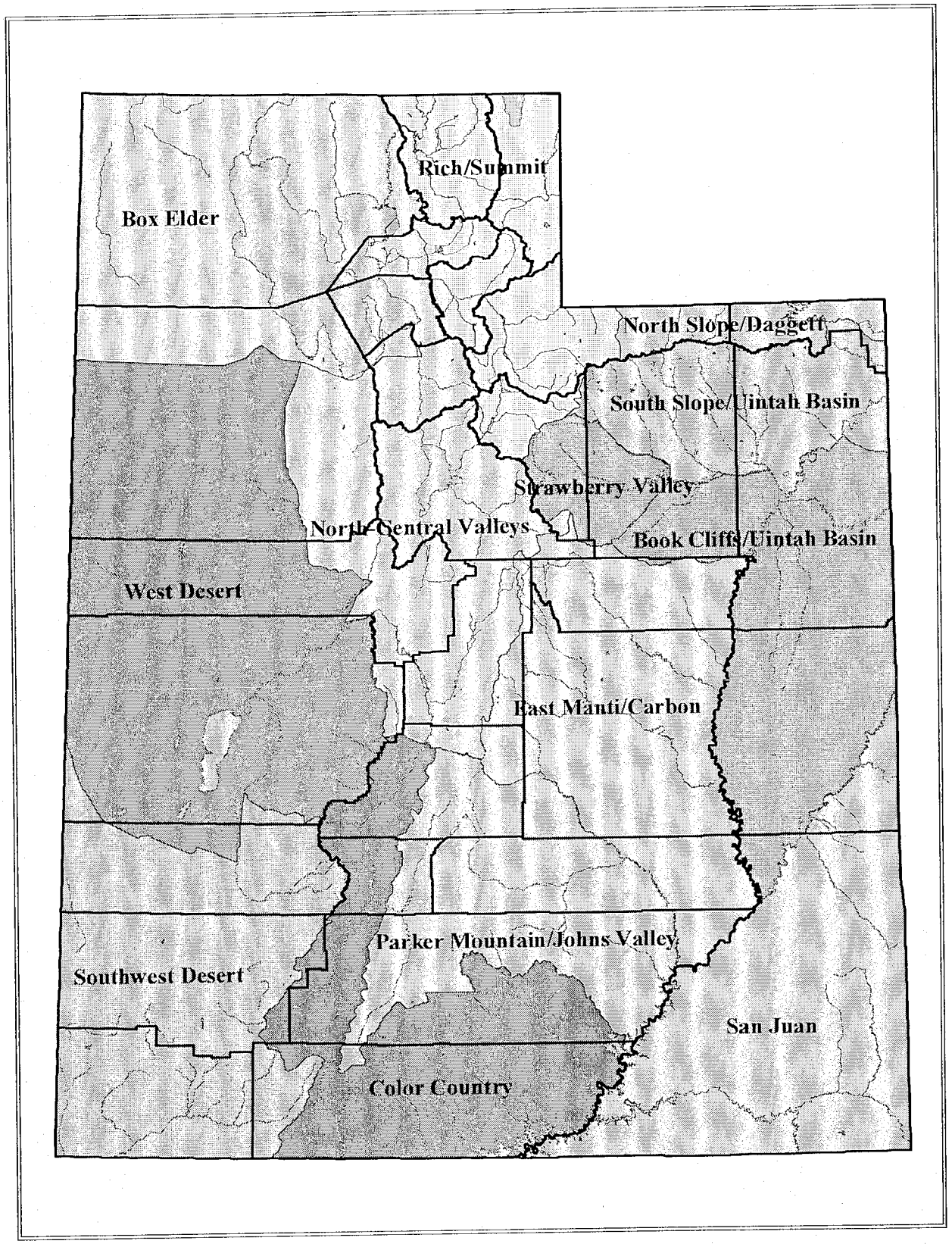

Figure 13. Utah sage-grouse management areas.

Management Area 1 (Box Elder)

Local Issues:

- Crested Wheatgrass (*Agropyron cristatum, A. desertorum*) seedings have replaced large amounts of sage-grouse habitat.
- Loss of critical habitat (especially winter habitat) to wildfires.
- Checkerboard land ownership makes management difficult.
- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.
- Needs of sharp-tailed grouse in eastern half of management area must be addressed along with sage-grouse.

Local Strategies:

- Make wildfire suppression a priority in critical sage-grouse habitats.
- Reseed burned areas with a mixture suitable for sage-grouse.
- Manage sagebrush habitats with sage-grouse needs a priority.
- Work with private landowners to manage sagebrush habitat in a way that is beneficial to sage-grouse.
- Restore sagebrush habitat with use of mechanical manipulation and reseeding.

Box Elder Management Area Lek Count Summary

Lek Complex	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
Curlew Valley	58.3*	13.5*	7.4*	16.0
Park Valley	14.0	10.3	17.0*	25.0
Dove Creek	125.1	110.7	82.9	75.0
Clark's Basin	13.0*	6.8	22.5	NC
Muddy-Rosebud	119.2	116.5	106.9	185.0
Sheep Trail	4.4*	2.8*	4.3*	12.0
Grouse Creek	50.9	51.1	27.2	37.0
Meadow Creek	66.8	59.8	44.9	102.0
Goose Creek	1.0*	9.0*	5.5*	8.0
Cotton Thomas	52.6	37.5	21.6	24.0
Lynn	11.4	8.7*	20.0*	42
Wildcat Creek	3.0*	8.9*	0.0*	2.0*
NE Raft River Mtn	NC	14.5*	2.0*	NC
East Box Elder	NC	NC	12.0	3.0

* - Less than six years counted
NC - No leks counted during this time.

Management Area 2 (Rich/Summit)

Local Issues:

- Mostly private land in southern portion of management area making management difficult.
- Crested Wheatgrass (*Agropyron cristatum, A. desertorum*) seedings have replaced large amounts of sage-grouse habitat.
- Lack of population data (lek counts) on private lands.
- Populations linked to sage-grouse in Idaho and Wyoming.
- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.

Local Strategies:

- Work closely with private landowners to gather population and habitat data on private land.
- Manage sagebrush habitats with sage-grouse needs a priority.
- Restore sagebrush habitat with use of mechanical manipulation and reseeding.
- Work with biologists in Idaho and Wyoming to determine needs of grouse using state border areas.

Rich/Summit Management Area Lek Count Summary

Lek Complex	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
Harris Hollow	40.7	7.0	NC	18.0
Dog Hollow	18.4	14.0	<1	5.0
Randolph	65.4	22.5	5.2	20.0
Meadowville	NC	8.5	2.8*	6.0
East Bear Lake	46.0	137.0	104.5	88.0
Otter Creek	72.7	72.4	34.9	84.0
Dry Hollow	82.9	42.2	55.2	78.0
Deseret L&L	26.1	82.1	229.5	598.0
Kamas-West Hills	138.3	25.6	13.5*	1.0
East Canyon	30.6	35.5	43.4	71.0
Henefer-Echo	NC	2.0*	1.5*	14.0*
Morgan-Cottonwood	19.9	9.6	7.0*	NC
Hardware Ranch	50.5	11.5	15.5	21.0
Avon-Liberty	NC	0.0	0.0	NC
Wallsburg	NC	NC		

* - Less than six years counted
NC - No leks counted during this time.

Management Area 3 (North Slope/Daggett)

Local Issues:

- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.
- Checkerboard land ownership makes proper management difficult.
- Populations linked to sage-grouse in Wyoming.

Local Strategies:

- Work with biologists in Wyoming to determine needs of grouse using state border areas.
- Restore sagebrush habitat with use of mechanical manipulation and reseeding.
- Work closely with private landowners to gather population and habitat data on private land.

North Slope/Daggett Management Area Lek Count Summary

Lek Group	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
E. Flaming Gorge	40.5	33.9	22.3	84
Brown's Park	6.8*	11.0*	5.0*	NC

* - Less than six years counted.
NC - No leks counted during this time.

Management Area 4 (South Slope/Uintah Basin)

Local Issues:

- Large areas of sage-grouse habitat located on Ute Tribal Lands and a lack of data from these areas.
- Checkerboard land ownership makes proper management difficult.
- Loss of sage-grouse habitat to agriculture.
- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.

Local Strategies:

- Work closely with Ute Tribe to coordinate data collection and management of sage-grouse habitat.
- Work closely with private landowners to gather population and habitat data on private land.
- Restore sagebrush habitat with use of mechanical manipulation and reseeding.

South Slope/Uintah Basin Management Area Lek Count Summary

Lek Group	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
Blue Bench	19.1	19.6	2.2*	5.0
South Slope	103.3	81.6	49.7*	40.0
Halfway Hollow	25.6	38.9	35.0	15.0
Little Mountain	14.0	5.5*	14.9	NC
Diamond Mtn	168.3	106.4	155.3	220
Blue Mountain	NC	99.0	36.2*	46.0
Red Narrows	14.9	20.2	29.1	35.0

* - Less than six years counted
NC - No leks counted during this time.

Management Area 5 (Strawberry Valley)

Local Issues:

- Heavy predation by red fox (*Vulpes vulpes*).
- Smooth brome (*Bromus inermis*) seedings lack suitable forb and sagebrush for sage-grouse habitat.
- Migration corridors and winter range located primarily on private land.
- Loss of winter habitat to sagebrush treatments and residential development.
- Small remnant population.

Local Strategies:

- Work with Utah State Department of Agriculture (USDA) Wildlife Services to control red fox population in Strawberry Valley.
- Treat smooth brome seedings to increase forbs and improve the sagebrush condition.
- Work with private landowners to protect and enhance migration corridors and critical winter range.
- Conduct vegetation treatments in Strawberry Valley to improve the mix of sagebrush canopy cover across the valley and improve understory production, particularly native perennial forbs.
- Increase wet meadow areas.

Strawberry Valley Management Area Lek Count Summary

Lek Group	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
Strawberry Valley	133.0	53.0	30.4	31.0
Fruitland	35.0	16.0	12.4	10.0

* - Less than six years counted

NC - No leks counted during this time.

Management Area 6 (North-Central Valleys)

Local Issues:

- Loss of habitat to agriculture and residential development.
- Crested Wheatgrass (*Agropyron cristatum, A. desertorum*) seedings have replaced large amounts of sage-grouse habitat.
- Loss of critical sage-grouse habitat to wildfire.
- Large areas of sage-grouse habitat converted to annual grassland.
- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.
- Small, isolated populations.
- Lack of data on some populations.
- Checkerboard land ownership makes proper management difficult.

Local Strategies:

- Make wildfire suppression a priority in critical sage-grouse habitats.
- Reseed burned areas with a mixture suitable for sage-grouse.
- Work closely with private landowners to gather population and habitat data on private land.
- Restore sagebrush habitat with use of mechanical manipulation and reseeding.

North-Central Valleys Management Area Lek Count Summary

Lek Group	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
South Vernon	63.8	46.0	45.0	110.0
South Tintic	12.0	4.1	5.8*	0.0
Rush Valley	17.8	2.6	7.5*	NC
Sanpete Valley	5.2	3.1	0.0*	NC

* - Less than six years counted.
NC - No leks counted during this time.

Management Area 7 (West Desert)

Local Issues:

- Crested Wheatgrass (*Agropyron cristatum, A. desertorum*) seedings have replaced large amounts of sage-grouse habitat.
- Loss of critical sage-grouse habitat to wildfire followed by invasion of cheatgrass and other weeds.
- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.
- Small, isolated populations.
- Lack of data on some populations.
- Areas of sage-grouse habitat are found on Goshute Tribal Land.
- Populations linked to grouse in Nevada.
- Difficult habitat rehabilitation because of low rainfall and potential for invasion by cheatgrass.

Local Strategies:

- Make wildfire suppression a priority in critical sage-grouse habitats.
- Reseed burned areas with a mixture suitable for sage-grouse.
- Restore sagebrush habitat with use of herbicide treatments, mechanical manipulation, prescribed fire and reseeding.
- Work closely with Goshute Tribe to coordinate data collection and management of sage-grouse habitat.
- Work with biologists in Nevada to determine needs of grouse using state border areas.
- Reseed with appropriate seed mixture for low rainfall.

West Desert Management Area Lek Count Summary

Lek Group	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
Ibapah	NC	13.8	24.0	33.0

* - Less than six years counted

NC - No leks counted during this time.

Management Area 8 (Book Cliffs/Uintah Basin)

Local Issues:

- Large areas of sage-grouse habitat located on Ute Tribal Lands and a lack of data from these areas.
- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.

Local Strategies:

- Work closely with Ute Tribe to coordinate data collection and management of sage-grouse habitat.
- Restore sagebrush habitat with use of mechanical manipulation and reseeding.

Book Cliffs/Uintah Basin Management Area Lek Count Summary

Lek Group	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
Anthro Mountain	9.3	1.3	5.0*	12.0
Myton Bench	NC	NC	3.5*	0.0
Sand Wash	NC	49.4	33.7	4.0
Bonanza	NC	7.7	4.7	9.0
Book Cliffs	10.4	6.1	6.8	0.0

* - Less than six years counted.
NC - No leks counted during this time.

Management Area 9 (East Manti/Carbon)

Local Issues:

- Loss/fragmentation of sage-grouse habitat by oil and gas development.
- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.
- Checkerboard land ownership makes proper management difficult.
- Difficult access into high elevation areas because of persisting spring snow resulting in lack of population data in some areas.

Local Strategies:

- Work with oil and gas developers to mitigate loss of sage-grouse habitat.
- Restore sagebrush habitat with use of mechanical manipulation and reseeding.
- Work closely with private landowners to gather population and habitat data on private land.

East Manti/Carbon Management Area Lek Count Summary

Lek Group	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
Emma/Whitmore	59.4	70.8*	54.8	144.0
Scofield	1.3*	0.0*	NC	NC
Range Creek	20.0*	NC	9.3*	54.0
South/North Horn	12.0	13.7	2.7	0.0
Wildcat Knoll	NC	NC	14.6	14.0

* - Less than six years counted
NC - No leks counted during this time

Management Area 10 (San Juan)

Local Issues:

- Separate species of sage-grouse located in this area, Gunnison Sage-Grouse.
- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.
- Sage-grouse habitat is found largely on private lands.

Local Strategies:

- Restore sagebrush habitat with use of mechanical manipulation and reseeding.
- Work closely with private landowners to gather population and habitat data on private land.
- Continue working with the San Juan County Gunnison Sage-Grouse Working Group (SWOG).

San Juan Management Area Lek Count Summary

Lek Group	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
Hatch Point	NC	9.7	4.1	NC
Monticello	118.9	38.3	33.0	57.0

* - Less than six years counted.
NC - No leks counted during this time.

Management Area 11 (Parker Mountain/John's Valley)

Local Issues:

- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.
- Livestock grazing impacts on sage-grouse habitat.
- Management of sage-grouse and Utah prairie dog together.

Local Strategies:

- Restore sagebrush habitat with use of mechanical manipulation and reseeding.
- Work with livestock permittees to assess impacts of grazing on sage-grouse habitat.
- Continue working with Parker Mountain Adaptive Resource Management Working Group (PARM).

Parker Mountain/John's Valley Management Area Lek Count Summary

Lek Group	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
Parker Mountain	255.6	212.2	264.8	472
Forsyth Reservoir	5.7*	0.0*	0.0*	0.0
Angle	NC	NC	37.2	63.0
Jones Corral	4.5*	0.0*	1.1*	1.0
John's Valley	70.0	70.1	44.8	65.0

* - Less than six years counted
NC - No leks counted during this time.

Management Area 12 (Color Country)

Local Issues:

- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.
- Checkerboard land ownership makes proper management difficult.
- Loss of sage-grouse habitat to agriculture.
- Pinyon-Juniper invasion.

Local Strategies:

- Restore sagebrush habitat with use of mechanical manipulation and reseeding.
- Work closely with private landowners to gather population and habitat data on private land.
- Conduct vegetation treatments to decrease the rate of invasion in of pinyon-juniper.

South-Central Valleys Management Area Lek Count Summary

Lek Group	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
Piute Reservoir	6.6*	NC	NC	NC
Panguitch/Hatch	106.5	108.0	101.0	159.0
Dog Valley	75.4	43.8	53.8*	91.0
Kane County	NC	11.0*	6.4	11.0

* - Less than six years counted.
NC - No leks counted during this time.

Management Area 13 (Southwest Desert)

Local Issues:

- Remnant populations.
- Lack of data on critical wintering areas.
- Loss of critical sage-grouse habitat to wildfire.
- Large areas of sage-grouse habitat converted to annual grassland.
- Degraded sagebrush habitat. Sagebrush cover is too dense in some areas and inadequate in other areas. Forb/grass component is below levels recommended for sage-grouse.
- Small, isolated populations.
- Populations linked to grouse in Nevada.
- Difficult habitat rehabilitation because of low rainfall.
- Historical distribution linked with Arizona.

Local Strategies:

- Make wildfire suppression a priority in critical sage-grouse habitats.
- Reseed burned areas with a mixture suitable for sage-grouse.
- Restore sagebrush habitat with use of mechanical manipulation and reseeding.
- Work with biologists in Nevada to determine needs of grouse using state border areas.
- Locate critical wintering areas.

Southwest Desert Management Area Lek Count Summary

Lek Group	1970-1979 Average	1980-1989 Average	1990-1999 Average	2000 Count
Antelope Point	16.8	14.2*	0.0*	NC
Buckskin/Coyote	7.6	33.0	6.7	27.0
Parowan Gap	9.2	41.4	23.8	32.0
Bald Hills	NC	0.0*	5.2*	16.0
Minersville/ Beaver	32.0	37.7	22.6	10
Pine Valley	13.3	14.0	9.0*	9.0
Hamblin Valley	89.2	61.5	38.5	73.0

* - Less than six years counted
NC - No leks counted during this time.

LITERATURE CITED

Aldridge, C. L. 1998. Status of the sage grouse (*Centrocercus urophasianus urophasianus*) in Alberta. Alberta Environmental Protection, Wildlife Management Division, and Alberta Conservation Association. Wildlife Status Report 13. Edmonton, Alberta.

Apa, A. D. 1998. Habitat use and movements of sympatric sage and Columbian sharp-tailed grouse in southeastern Idaho. Dissertation, University of Idaho, Moscow.

Autenrieth, R. E. 1981. Sage grouse management in Idaho. Idaho Department of Fish and Game Wildlife Bulletin Number 9. Boise.

Barnett, J. K., and J. A. Crawford. 1994. Pre-laying nutrition of Sage grouse hens in Oregon. Journal of Range Management 47:114-118.

Beck, J. L., and D. L. Mitchell. 1997. Brief guidelines for maintaining and enhancing Sage grouse habitat on private lands in Utah. Utah technical notes: UT190-7-3. U.S. Natural Resources Conservation Service, Salt Lake City, Utah.

Beck, T. D. 1977. Sage grouse flock characteristics and habitat selection during winter. Journal of Wildlife Management 41:18-26.

Bergerud, A. T. 1988. Population ecology of North American grouse. Pages 578-648 in A. T. Bergerud and M. W. Gratson, editors. Adaptive strategies and population ecology of northern grouse. University of Minnesota Press, Minneapolis.

Bunnell, K. D., D. J. Bambrough, and J. T. Flinders. 2000. Revised progress report: Strawberry Valley Sage grouse recovery project. Brigham Young University, Provo, Utah.

Coggins, K. A. 1998. Sage grouse habitat use during the breeding season on Hart Mountain National Antelope Refuge. Thesis. Oregon State University, Corvallis.

Connelly, J. W. 1982. An ecological study of Sage grouse in southeastern Idaho. Dissertation, Washington State University, Pullman.

Connelly, J. W., and O. E. Markham. 1983. Movements and radionuclide concentrations of Sage grouse in southeastern Idaho. Journal of Wildlife Management 47:169-177.

Connelly, J. W., and C. E. Braun. 1997. Long-term changes in Sage grouse (*Centrocercus urophasianus*) populations in western North America. Wildlife Biology 3:229-234.

Connelly, J. W., W. J. Arthur, and O. D. Markham. 1981. Sage grouse leks on recently disturbed sites. Journal of Range Management. 34:153-154.

Connelly, J. W., H. W. Browers, and R. J. Gates. 1988. Seasonal movements of Sage grouse in southeastern Idaho. Journal of Wildlife Management 52:116-122.

Connelly, J. W., W. L. Wakkinen, A. D. Apa, and K. P. Reese. 1991. Sage grouse use of nest sites in southeastern Idaho. Journal of Wildlife Management 55:521-524.

Connelly, J. W., R. A. Fischer, A. D. Apa, K. P. Reese, and W. L. Wakkinen. 1993. Renesting of Sage grouse in southeastern Idaho. Condor 951041-1043.

Connelly, J. W., K. P. Reese, and W. L. Wakkinen, M. D. Robertson, and R. A. Fischer. 1994. Sage grouse ecology report. Idaho Department of Fish and Game Job completion Report. W-160-R-19. Subproject 9. Boise.

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. Wildlife Society Bulletin. 28:967-985.

Dalke, P. D., D. B. Pyrah, D. C. Stanton, J. E. Crawford, and E. F. Schlatterer. 1963. Ecology, productivity, and management of sage grouse in Idaho. Journal of Wildlife Management 27:810-841.

DeLong, A. K., J. A. Crawford, and D. C. DeLong, Jr. 1995. Relationships between vegetational structure and predation of artificial Sage grouse nests. Journal of Wildlife Management 59:88-92.

Drut, M. S., W. H. Pyle, and J. A. Crawford. 1994. Technical note: diets and food selection of Sage grouse chicks in Oregon. Journal of Range Management 47:90-93.

Dunn, P. O., and C. E. Braun. 1986. Summer habitat use by adult female and juvenile Sage grouse. Journal of Wildlife Management 50:228-235.

Edelmann, F. B., M. J. Ulliman, M. J. Wisdom, K. P. Reese, and J. W. Connelly. 1998. Assessing habitat quality using population fitness parameters: a remote sensing/GIS-based habitat-explicit population model for Sage grouse (*Centrocercus urophasianus*). Technical Report 25. Idaho Forest, Wildlife and Range Experiment Station, Moscow.

Eng, R. L., and P. Schladweiler. 1972. Sage grouse winter movements and habitat use in central Montana. Journal of Wildlife Management 36:141-146.

Fischer, R. A. 1994. The effects of prescribed fire on the ecology of migratory Sage grouse in southeastern Idaho. Dissertation. University of Idaho, Moscow.

Fischer, R. A. 1996. An investigation on fire effects within xeric Sage grouse brood habitat. Journal of Range Management 49:194-198.

Fischer, R. A., A. D. Apa, W. L. Wakkinen, K. P. Reese, and J. W. Connelly. 1993. Nesting-area fidelity of Sage grouse in southeastern Idaho. Condor 95:1038-1041.

Gates, R. J. 1983. Sage grouse, lagomorph, and pronghorn use of a sagebrush grassland burn

site on the Idaho National Engineering Laboratory. Thesis, Montana State University, Bozeman.

Gates, R. J. 1985. Observations of the formation of a Sage grouse lek. Wilson Bulletin 97:219-211.

Gill, R. B. 1965. Distribution and abundance of a population of Sage grouse in North Park, Colorado. Thesis, Colorado State University, Fort Collins.

Gray, G. M. 1967. An ecological study of Sage grouse broods with reference to nesting, movements, food habits and sagebrush strip spraying in the Medicine Lodge drainage, Clark County, Idaho. Thesis, University of Idaho, Moscow.

Gregg, M. A. 1991. Use and selection of nesting habitat by Sage grouse in Oregon. Thesis, Oregon State University, Corvallis.

Gregg, M. A., J. A. Crawford, M. S. Drut, and A. K. DeLong. 1994. Vegetational cover and predation of sage grouse nests in Oregon. Journal of Wildlife Management 58:162-166.

Griner, L. A. 1939. A study of Sage grouse (*Centrocercus urophasianus*), with special reference to life history, habitat requirements, and numbers and distribution. Thesis, Utah State Agricultural College, Logan.

Hanf, J. M, P. A. Schmidt, and E. B. Groschen. 1994. Sage grouse in the high desert of central Oregon: results of a study, 1988-1993. U. S. Department of Interior, Bureau of Land Management Series P-SG-01, Prineville, Oregon.

Hulet, B. V. 1983. Selected responses of Sage grouse to prescribed fire, predation and grazing by domestic sheep in southeastern Idaho. M. S. Thesis, Brigham Young University, Provo, Utah.

Hupp, J. W., and C. E. Braun. 1989. Topographic distribution of Sage grouse foraging in winter. Journal of Wildlife Management 53:823-829.

Klebenow, D. A. 1969. Sage grouse nesting and brood habitat in Idaho. Journal of Wildlife Management 33:649-662.

Klott, J. H., and F. G. Lindzey. 1989. Comparison of sage and sharp-tailed grouse leks in south central Wyoming. Great Basin Naturalist 49:275-278.

Martin, N. S. 1970. Sagebrush control related to habitat and Sage grouse occurrence. Journal of Wildlife Management 34:313-320.

Meyers, O. B. 1992. Sage grouse habitat enhancement: effects of sagebrush fertilization. Dissertation, Colorado State University, Fort Collins.

Mitchell, D. L. and B. D Maxfield. 2000. Distribution and status of sage grouse in Utah: 2000 Status Report. Utah Division of Wildlife Resources, Salt Lake City.

Patterson, R. L. 1952. The Sage grouse in Wyoming. Sage Books, Inc. Denver, Colorado.

Pyle, W. H., and J. A. Crawford. 1996. Availability of foods of Sage grouse chicks following prescribed fire in sagebrush-bitterbrush. Journal of Range Management 49:320-324.

Remington, T. E., and C.E. Braun. 1985. Sage grouse food selection in winter, North Park, Colorado. Journal of Wildlife Management 49:1055-1061.

Robertson, M. D. 1991. Winter ecology of migratory Sage grouse and associated effects of prescribed fire in southeastern Idaho. Thesis, University of Idaho, Moscow.

Savage, D. E. 1969. Relation of Sage grouse to upland meadows in Nevada. Nevada Fish and Game Commission, Job Completion Report, Project W-39-R-9, Job 12. Reno.

Schroeder, M. A. 1997. Unusually high reproductive effort by Sage grouse in a fragmented habitat in north-central Washington. Condor 99:933-941.

Schroeder, M. A., J. R. Young, and C. E. Braun. 1999. Sage grouse (*Centrocercus urophasianus*). In A. Poole and F. Gill, editors. The Birds of North America, No. 425. The Birds of North America, Inc., Philadelphia, Pennsylvania.

Sveum, C. M., W. D. Edge, and J. A. Crawford. 1998. Nesting habitat selection by Sage grouse in south-central Washington. Journal of Range Management 51:265-269.

Swenson, J. E., C. A. Simmons, and C. D. Eustace. 1987. Decrease of Sage grouse *Centrocercus urophasianus* after ploughing sagebrush steppe. Biological Conservation 41:125-132.

Trueblood, R. W. 1954. The effect of grass reseeding in sagebrush lands on Sage grouse populations. Thesis, Utah State Agricultural College, Logan.

Wakkinen, W. L. 1990. Nest site characteristics and spring-summer movements of migratory Sage grouse in southeastern Idaho. Thesis. University of Idaho, Moscow.

Wakkinen, W. L., K. P. Reese, and J. W. Connelly. 1992. Sage grouse nest locations in relation to leks. Journal of Wildlife Management 56:381-383.

Wallestad, R. O. 1971. Summer movements and habitat use by Sage grouse broods in Summer movements and habitat use by Sage grouse broods in central Montana. Journal of Wildlife Management 35:129-136.

Wallestad, R. 1975. Male Sage grouse responses to sagebrush treatment. Journal of Wildlife Management 39:482-484.

Wallestad, R., and D. Pyrah. 1974. Movement and nesting of Sage grouse hens in central Montana. Journal of Wildlife Management 38:630-633.

Wallestad, R. O. and P. Schladwiller. 1974. Breeding season movements and habitat selection of male Sage grouse. Journal of Wildlife Management 38:634-637.

Welch, B. L., J. C. Pedersen, and R. L. Rodriquez. 1988. Selection of big sagebrush by Sage grouse. Great Basin Naturalist 48:274-279.

Willis, M. J., G. P. Keister Jr., D. A. Immell, D. M. Jones, R. M. Powell, and K. R. Durbin. 1993. Sage grouse in Oregon. Or. Dept. Fish and Wildl. Wildl. Research. Rpt. No. 15. 70pp.

Young, J. R. 1994. The influence of sexual selection on phenotypic and genetic divergence among Sage grouse populations. Dissertation, Purdue University, West Lafayette, Indiana.

Young, J. R., J. W. Hupp, J. W. Bradbury, and C. E. Braun. 1994. Phenotypic divergence of secondary sexual traits among Sage grouse, *Centrocercus urophasianus*, populations. Animal Behavior. 47:1353-1362.

Young, J. R., C. E. Braun, S. J. Oyler-McCance, J. W. Hupp, and T. W. Quinn. 2000. A new species of Sage grouse (Phasianidae: *Centrocercus*) from southwestern Colorado. Wilson Bulletin 112:445-453.

Zablan, M. A. 1993. Evaluation of Sage grouse banding program in North Park, Colorado. Thesis, Colorado State University, Fort Collins.

Appendix 1: Local Sage-grouse Working Groups (LWGs)

Background

The Utah Sage-grouse Working Group has developed this statewide plan that provides for local working groups (LWGs) to assist in the development of area-specific management plans and programs to maintain, improve, and restore local sage-grouse populations and their habitat.

Goal of LWGs

To assist in the development of sage-grouse management efforts that achieves local population and community goals.

Membership

Membership in LWGs is open to anyone that has interest in sage-grouse management.

Organization of LWGs

The Utah State University Community-based Conservation Extension Specialist (CCES) will organize the first meeting of each LWG. Subsequent meetings will be organized by a leadership team chosen by the LWG and should include at least one representative from an agricultural group, one from a federal or state land management agency, one from the Utah Division of Wildlife Resources, and one from a wildlife conservation group. The leadership team should be chosen at the first meeting and if larger than 4 members, should include a balanced membership.

A neutral and trained facilitator or the CCES will lead all meetings. Volunteer LWG subcommittees could be formed to accomplish specific tasks. The entire local working group will review all products of these subcommittees.

Schedule

With adoption of the Utah Sage-grouse Strategic Management Plan, the CCES will organize the initial meetings of the LWGs in the 13 sage-grouse management areas.

Within one year of their first meeting, each LWG will use the Utah Sage-grouse Strategic Management Plan to develop a strategic management plan and programs to manage local sage-grouse and their habitat. All local strategic management plans will be submitted to the Utah Sage-grouse Working Group for review and incorporation under the statewide strategic management plan. Once a local strategic management plan is completed, each LWG will meet at least twice annually to review progress, address new issues, and modify actions as necessary.

It is crucial that groups that want to help develop local strategic management plans be involved from the beginning and commit to involvement throughout the process. All LWGs should be balanced in composition so that all interests are given fair representation.

Appendix 2. Lek-Lek Group (Complex) Summary

Management Area	Group (Complex) Name	Lek Name
Box Elder - 1	Curlew Valley	Curlew Sink
		Park Valley Jct.- Gravel Pit
		Pilot Spring
		NW Wildcat
		Wildcat
		N. Locomotive Spring
	Park Valley	Park Valley - Rosette
		Park Valley Rosette East
		Park Valley Fields
		Board Ranch
	Dove Creek	Dove Creek
		Warm Springs Road
		Highway Cut
		Upper Dove Creek
	Clark's Basin	Clark's Basin Middle Fork
		LHF Dove Creek
	Muddy-Rosebud	Dry Basin
		Keg Spring Turnoff
		East Keg Spring
		Buck Pasture
		SE Sickle Spring
		Prohibition Spring
	Sheep Trail	Sheep Trail
		NE Cliff Reservoir
		W Cliff Reservoir
		2 Miles West of Cliff Reservoir
		Dove Creek Sink
	Grouse Creek	Badger Flat
		Ray Kimber Ranch
		Kimber Ranch Spring
		Dake Pass
		Tom's Cabin Creek
		North Cluster Spring
	Meadow Creek	Meadow Creek
		Meadow Creek Pass
		Hardister Creek Road
		Devil's Gate
		Dry Canyon Mountain
	Goose Creek	Goose Creek

Box Elder - 1 (Continued)		West Goose Creek (Nevada)
	Cotton Thomas Basin	Cotton Thomas Lynn-Cotton Thomas Red Bank Spring Kimbel Creek
	Lynn	Lynn Crested Wheat NE Lynn Reservoir Lynn Spring
	Wildcat Creek	Broad Hollow Fields Wildcat Creek
	NE Raft River Mountain	Dive Hollow Duffy-Birch Creek Divide Strevel Pass
	East Box Elder	Middle Canyon

Rich/Summit - 2	Harris Hollow	Huffackers #! Huffackers #2
	Dog Hollow	South Dog Hollow Dog Hollow
	Randolph	Little Creek Limnestone Reseeding
	Meadowville	Meadowville Dump
	East Bear Lake	Six Mile McKinnon Spring Duck Creek Red Spring Rabbit Creek Rabbit Creek Turnoff North Eden South Lake South Lake North Sage Creek
	Otter Creek	North Otter Creek Hawk Spring
	Dry Hollow	South Dry Hollow North Dry Hollow
	Deseret Land & Livestock	Deseret Neponset North Dip South Dip

Rich/Summit - 2 (Continued)		Log Buffalo Jump Pasture Alkali Hollow South Bench McKay Hollow Dixon Hollow Lake Ridge Stacey Hollow Murphy Ridge Steer Pasture
	Kamas-West Hills	Bittner's Flat Brown's Canyon Big Four Flat West Hills Sage Hen Hollow Rock Quarry Rock Quarry North Bittner Ranch
	East Canyon	Henefer Divide Pioneer Camp
	Henefer-Echo	Wolf den-Hay Hollow Weight Station Castle Rock Leonard Canyon Harris Canyon, Clay Pits
	Morgan-Cottonwood	Cottonwood Canyon (A) Cottonwood Canyon (B) Cottonwood Corral
	Hardware Ranch	Hardware Ranch Hardware Plateau Sheepcreek Ridge
	Liberty-Avon	Liberty-Avon Divide
North Slope/Daggett - 3	East Flaming Gorge	Goslin Mtn. Martin Draw Clay Basin Meadows Seedskadee Upper Antelope Bare Top East Antelope Flat Clay Basin - Walt Meyers
	Brown's Park	Brown's Park Airport
		Brown's Park Stateline

South Slope/Uintah Basin - 4	Blue Bench	Blue Bench #1 Blue Bench #2 Blue Bench #3
	South Slope	Lower John Starr #1 Lower John Starr #2 Cottonwood Gulch #1 Cottonwood Gulch #2 Rock Creek East Tower Ridge Tuwanta Flat Yellowstone Oil Well Monarch Ridge Mountain Home Cattle Guard - Indian Boundary
	Halfway Hollow	Observatory Lapoint Halfway Hollow South Gusher U 88 East Pole Line North Twelve Mile South Twelve Mile
	Little Mountain	Little Mountain North Little Mountain South
	Diamond Mountain	Diamond Springs Borens Salt Shed Taylor Mtn. Pole Line Hatch Cabin B.S. Ridge Pope's Point-Island Park Colton Ridge-Gartrell Davenport Junction Chicken Springs Diamond Mountain Burn (Kelsey) Diamond Rim West - Rim Ranch West McKeachnie Diamond Gulch Brush Creek Mountain Taylor Mtn. Point Springs East Pot Creek West Pot Creek Speck's Cabin
	Blue Mountain	Chew's Corral-Blue Mountain West Benchmark Blue Mountain Snow's Pond
South Slope/Uintah Basin - 4		East Benchmark

(Continued)		Stuntz Reservoir
		Stuntz Reservoir SE
	Red Narrows	Red Narrows #1
		Red Narrows #2
Strawberry Valley - 5	Strawberry Valley	Road Hollow
		Stinking Springs
	Fruitland	Lower Saleratus
		Upper Saleratus
		Buck Knolls
		Grassy Hollow
		North Tulley Mtn.
		Lower Red Creek
North-Central Valleys - 6	South Vernon	Little Valley - Vernon
		McIntyre (B) - Meadow
		Benmore Pastures
		McIntyre (A) - Ridge
	South Tintic	Maple Springs Complex
		N.E. Gilson Mtn.
		Furner Valley
	Rush Valley	Rush Valley
		So. Clover
	Sanpete Valley	Fairview
		Fountain Green
West Desert - 7	Ibapah	Ibapah 1
		Ibapah 2
Book Cliffs/Uintah Basin - 8	Anthro Mountain	Anthro Mountain
		Thomas-Anthro Mountain
	Myton Bench	Sandwash
		Myton Bench - Wells Draw
	Sand Wash	East Bench
		Sand Wash Rim
	Bonanza	Bonanza
		North Deadman
	Book Cliffs	Monument Ridge
		Horse Point (Winter Ridge)
		Winter Ridge
		Black Ridge - Ute Tribe
East Manti/Carbon - 9	Emma/Whitmore Park	Moynier Meadows

		Funnon Shimmon
		Iriant Pond - Whitmore Park C
		Clay Banks
		Hillcrest
		Dry Pond
		Coal Creek - Whitmore Park B
		Brook Meadow - Whitmore Park A
		Antone Creek
		Cabin Spring
	Scofield	Scofield
		Jap Point
	Range Creek	Bishop Ridge #2
		Cold Spring
		Bishop Ridge #1 - Corral (Cedar Ridge)
		Steer Ridge #1
		Steer Ridge #2
		Steer Ridge #3
		Cottonwood Ridge
		Summerhouse Ridge
	North/South Horn	South Horn Mtn.--S.O.B. Hill
		North Horn Mtn.--TV Tower
		South Horn-South Rim
	Wildcat Knoll	Wildcat Knoll
San Juan - 10	Hatch Point	Hatch Point
	Monticello (Gunnison Sage-Grouse)	Roring
		Barton Ranch
		Hickman Flats
		Lloyd Adams
		East Seep Wash
		Seep Wash
		BLM
		Dam Ridge
		Dodge Point
Parker Mountain/John's Valley - 11	Parker Mountain	Black Point Res. Parker Mtn.
		Vance's Corral-Parker Mtn.
		Sage Res.-Parker Mtn.
		Moroni Peak Res.-Parker Mtn.
		Dry Lake-Parker Mtn.
		Hunts Res.-Parker Mtn.
		Hare Lake-Parker Mtn.
		So. Burnt Knoll-Parker Mtn.
		Bald Knoll Res.-Parker Mtn.
		Mud Lake Res.-Parker Mtn.
Parker Mountain/John's Valley - 11 (Continued)		Cyclone Knoll-Parker Mtn.
		East Cedar Grove-Parker Mtn.

		Flossie Lake Big Hollow, (Bull Roost Res.) Cedar Peak (Cedar Knoll Res.) Vance Reservoir Balsam Hollow Reservoir Angle
	Forsyth Reservoir	Forsyth Reservoir Tidwell Slope Dog Flat
	Jone's Corral	Jone's Corral
	John's Valley	John's Valley #1 (Tom Best Spring) John's Valley #2 (Cottonwood) John's Valley-Widtsoe John's Valley-John L. Swale Flake Mountain West Cottam Ranch
Color Country - 12	Piute Reservoir	Head House Elbow King Ranch
	Panguitch/Hatch	Panguitch East Bench Sage Hen Hollow Butler Creek Hatch Airport Hoyt's Ranch-Hatch Pole (Norton) Hollow Ridge Haycock Cove
	Dog Valley	Dog Valley
	Kane County	Sink Valley (Swapp Homestead) Skutumpah Ford Pasture
Southwest Desert - 13	Antelope Point	Antelope Point (West Cove Fort) N.E. Mineral A N.E. Mineral B North Mineral
	Buckskin/Coyote	Buckskin - South Spring Coyote Bench Buckskin Buckskin - Upper Pond
	Parowan Gap	Parowan Gap
Southwest Desert – 13 (Continued)	Bald Hills	Horshoe-Bald Hills Poorman-Bald Hills

Minersville/Beaver	Minersville Beaver Valley-Cox's Ranch Adamsville Big Wash
Pine Valley	Gurney's East Indian Peak - Pine Valley Pine Valley - New Gurney
Hamblin Valley	Rain Gauge White Bridge - Hamblin Bridge Indian Peak - Pine Valley Hamblin Valley Butcher Troughs