

**Southwest Desert Adaptive Resource Management Local Working Group  
2010  
Plan of Work**

*Written as an appendix to the  
Southwest Desert Greater Sage-grouse Local Conservation Plan*

**Purpose**

The mission of the Southwest Desert Adaptive Resource Management Sage-grouse Conservation Plan is to help reach the goal of maintaining and improving current abundance and viability of Greater Sage-grouse (*Centrocercus urophasianus*) populations and their habitat in the Southwest Desert, while taking into consideration historical land uses and long-term socioeconomic issues. The Plan will help to meet this goal by providing management solutions based on local or compatible data and research to the extent practical. In addition, SWARM hopes to develop management solutions that will result in diverse and productive sagebrush habitat for sage-grouse while recognizing that healthy sagebrush habitats are valuable to the existence of other species as well. The Plan will identify management areas, key local issues, conservation strategies, population information, research and monitoring needs, and support long-term funding. Adaptive management will be used to maintain the Plan as a continuously evolving document. In addition, the Plan will coordinate the development of project proposals with the Southwest Desert Utah Partners for Conservation and Development Regional Team to maintain and enhance sage-grouse habitat.

This Plan was called for in, and builds on, the Utah Greater Sage-grouse Strategic Management Plan (Strategic Plan) that was passed by the Utah Wildlife Board in 2002. The Strategic Plan was developed by the Utah Greater Sage-grouse Working Group, which included representatives from state and federal natural resource agencies, and local conservation organizations concerned with the health and proper management of Greater Sage-grouse and sagebrush-steppe ecosystems throughout Utah. The primary purpose of the Strategic Plan was to address declining populations of sage-grouse and to develop a framework for agencies to work within. Further, the Strategic Plan identified certain management units throughout the state where Adaptive Resource Management Local Working Groups could be organized to identify local issues. These groups were then expected to implement local adaptive resource management plans to address declining sage-grouse populations, and the loss, degradation, and fragmentation of sagebrush steppe communities, and the protection and conservation of these and other natural resources into the future.

The Plan is designed to meet the guidelines set forth by the USFWS in their Policy for Evaluation of Conservation Efforts (PECE) standards. The USFWS uses PECE standards as a guideline to evaluate whether conservation plans will be considered when making listing and listing priority decisions. The Plan was also written to address the USFWS five Listing Factors:

1. Present or threatened destruction, modification, or curtailment of its habitat or range.
2. Over-utilization for commercial, recreational, scientific, or educational purposes.
3. Disease or predation.
4. Authorities and inadequacy of existing regulatory mechanisms.
5. Other natural or man-made factors affecting its continued existence.

The Plan directly and indirectly addresses the five USFWS listing factors as they apply to Greater Sage-grouse (hereafter referred to as sage-grouse) in the Southwest Desert area. In addition, the Plan will identify issues, potential strategies, and provide for implementation of proposed conservation actions. The Plan is neither a National Environmental Policy Act (NEPA) decision document nor a federal or state recovery plan. Any Candidate Conservation Agreement with Assurances developed by the UDWR will be based on the Plan, but will include the NEPA process. Use of this plan by agencies, private enterprise, and private individuals is strictly voluntary. State and federal resource management agencies involved with sage-grouse management, however, are required to manage sage-grouse populations and habitat by various state and federal statutes and policies. The information contained in the Plan is intended to serve as a set of guidelines for those state and federal agencies to maintain and enhance sage-grouse populations and their habitat in the Southwest Desert. Participation by private landowners and consideration of the needs of the landowner is critical for management of sage-grouse populations and habitat located on private lands and will be of great importance to meet the overall goals of the Plan. True success will only be achieved by managing on an overall landscape scale. The Plan provides an opportunity to promote ecologically sound management of private and public lands for sage-grouse without impinging on private property rights.

## **Goals and Scope**

The goals of this Plan are separated into two categories: Assessment Goals and Strategy Goals. The goals are not listed in any particular order.

### Assessment Goals:

The Plan will provide an assessment of the status of the Southwest Desert sage-grouse population by accomplishing the following goals:

1. Estimate current population size and evaluate population trends; estimate amount and condition of habitat.
2. Identify research needs and knowledge gaps.
3. Determine population and habitat needs for the future.
4. Identify and discuss threats that have the potential to impact sage-grouse in the Southwest Desert, especially those associated with the five USFWS Listing Factors.

### Strategy Goals:

The intent of the Plan is to maintain and where possible, increase sage-grouse populations and improve habitat conditions in the Southwest Desert by carrying out the following goals:

1. Incorporate management strategies from state and federal agency partners, local

governments, and established rangewide conservation and management guidelines (Connelly et al. 2000, Connelly et al. 2004).

2. Increase effective communication with all potential stakeholders in the Southwest Desert and the state of Utah through outreach, information distribution, and education.
3. Address and prioritize threats to aid in prioritizing management solutions.
4. Identify and pursue funding sources, or support partners in their pursuance of funding for projects that will help achieve specific strategies and actions

## **Scope**

This Plan is designed to span multiple land ownerships and multiple land uses throughout its geographic area. We hope that with the implementation of this plan, specific conservation issues will be addressed, implemented, and monitored across geographic and political boundaries to increase consistency of practices implemented and information collected. The assessment and strategies described herein are specific to the Southwest Desert and developed with the unique ecological, social, and economic concerns of that area in mind. A detailed description of the Southwest Desert Resource Area is provided later in the Plan.

## **Assessment of Local Population**

### Plan Area

The Southwest Desert Resource Area (Resource Area) is located in southwestern Utah, and encompasses Beaver, Iron, and Washington counties, and portions of Garfield, Kane, and Millard, counties. The Resource Area includes 5,672,052 acres, bounded to the north and east by land formations, to the west by the Nevada border, and to the south by the Arizona border (Figure 1). The Resource Area is divided into four focus areas representing sage-grouse breeding complexes. These breeding complexes are based on geographic boundaries and groupings of leks. Although movement between complexes is likely, the complexes represent discrete subpopulations of sage-grouse in the Resource Area (Figure 1).

Southwestern Utah encompasses some of the most varied habitat in North America. The Southwest Desert contains habitat ranging from Alpine Tundra at elevations over 11,000 feet to the Mojave Hot Desert type at elevations as low as 2,000 feet. However, since all present sage-grouse habitat is located within the cold desert ecotone, the Plan will limit descriptions to this area. Habitat descriptions are adapted from Bowns (2004).

The cold desert is also known as the northern desert shrub, salt-desert shrub, or the Great Basin Desert. The Great Basin is sometimes referred to as a physiographic province, but is more often considered part of the larger Basin and Range Physiographic Province. This desert actually extends beyond the Great Basin into the adjacent Columbia and Colorado Plateaus.

The elevation of sage grouse habitat within the Resource Area is largely between 5,000 and 9,000 feet. Summers are warm and winters are cold. Annual precipitation is mostly between 8

and 16 inches and is most abundant as winter snow, spring storms and brief but high intensity summer monsoonal moisture. As a result, the vegetation is predominantly deep-rooted shrubs or plants that mature prior to the summer drought period. Growth is limited and confined to the brief spring period when plants utilize the deep infiltrated moisture from snow received the previous fall or winter. This desert is a result of its distance from oceanic sources of precipitation and the rain shadow created by high mountain ranges intercepting the westerly flow of the jet stream.

The desert vegetation is conveniently divided into two major units: 1) sagebrush-grass, and 2) salt-desert shrub. Sagebrushes and other genera of the Compositae (sunflower) family as well as several species of grasses dominate the sagebrush-grass vegetation community. The native vertebrate animals residing in this plant community are a mixture of grassland and desert species. Sagebrush obligate vertebrate species are sage-grouse, sage sparrow, Brewers sparrow, sage thrasher, pygmy rabbit, sagebrush vole, sagebrush lizard, and pronghorn antelope. None of these is known to cause major negative feedbacks on vegetation. Jackrabbits, however, which are also present in this community, can cause major impacts on the vegetation.

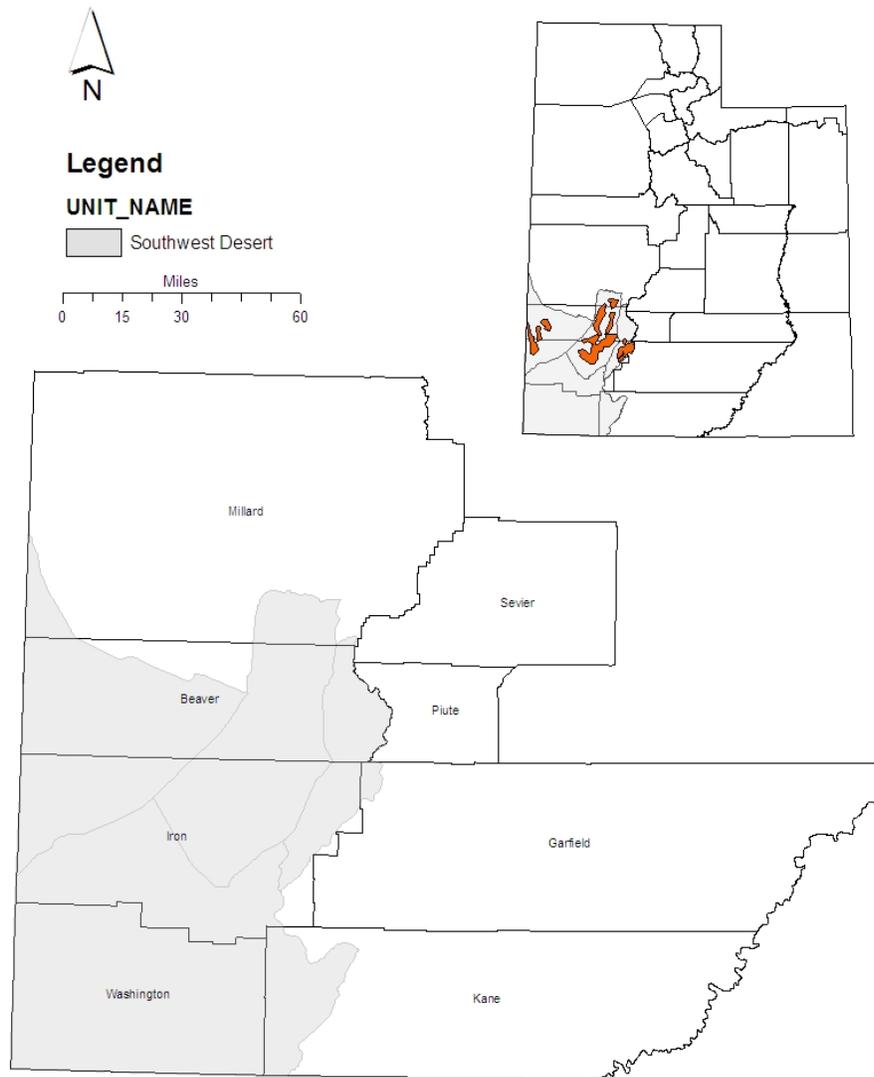


Figure 1. General location of the SWARM Resource Area.

Salt-desert shrub occurs where conditions result in high soil salinity, alkalinity, or both. This generally either occurs at the bottom of drainages in enclosed basins, or on soils derived from marine shales (Mancos or tropic shales). The salt-desert portion of the Great Basin Desert is located in the valley bottoms where salts and fine-textured stream or lake materials have not been able to escape to the oceans, hence the name Great Basin. Common halophytes (salt tolerant plants) are shad scale, gardner saltbush, winter fat, greasewood, four-wing saltbush, seep weed, desert molly, salt grass, and pickle weed. This zone has limited value for sage grouse.

Important shrubs of the Great Basin, in addition to those already mentioned, are bud sagebrush, basin big sagebrush, low rabbit brush, rubber rabbit brush, and spiny hopsage. Cool season grasses, those that evolved under temperate climates and flower in spring or early summer, include Indian rice grass, squirrel tail, blue bunch wheatgrass, needle and thread, and basin wild rye. Warm season grasses, those that evolved under tropical climates and usually flower later in the summer, include sand drop seed, galleta, blue gramma, and alkali sacaton. Perennial grasses have been introduced in many areas, the most common of which is crested wheatgrass.

Forbs are an important component of sage-grouse habitat, but their presence is highly variable due to yearly fluctuations in precipitation patterns and historical management activities. Native annuals are not common in this desert, but several exotic annuals introduced from Eurasia have become very common and have had serious impacts on this ecosystem. The most serious of these annuals are halogeton, Russian thistle, and cheatgrass. Cheatgrass, a winter annual, is widespread throughout the western U.S. and has had the greatest impact on sage-grouse habitat of any nonnative annual plant. It has invaded and sometimes replaced the native vegetation on millions of acres of sagebrush-grass, salt-desert shrub, and other major range types. Cheatgrass has provided fine fuel for fires, which has resulted in changes in fire frequency and intensity and has caused severe depletion of much of the native vegetation. It does provide good forage when it is green and provides reasonably good ground cover for soil stabilization. Production of all annuals is highly variable and varies with the timing and amount of precipitation.

Once desert communities have been taken over by annuals or other undesirable plants, it is extremely difficult or impossible to bring them back to their original condition. Depleted salt-desert shrub ranges are slow to improve under either good range management or complete protection. Therefore, direct re-vegetation seems to be the only satisfactory alternative. Unfortunately, the harsh environment of salt-desert shrub ranges prevents the use of species and direct-seeding methods that have proven successful in other western ranges. The sagebrush-grass zone responds more favorably to restoration methods although care must be taken to avoid hot burns and other methods that are favorable to cheatgrass but would hinder sagebrush reestablishment.

The desert communities have been used mainly for livestock winter ranges and as such are unique among American grazing lands. Because of the arid climate, herbage yields and grazing capacities are low. However, nutritional quality of the dormant shrubs is adequate for the maintenance of breeding or gestating livestock. These winter ranges have been described as the “backbone of the intermountain sheep industry,” but are now grazed more by cattle than sheep because of the declines in range sheep numbers.

Fire suppression has facilitated the invasion of sagebrush by pinyon and juniper woodlands

(Beck et al. 2003). This limits sage-grouse habitat in the Southwest Desert and requires birds to make longer migrations over or through marginal habitat areas. While current distribution has made it possible to separate sage-grouse populations into the three focus areas, it is thought that these habitat areas were more connected and less fragmented in the past (Beck et al. 2003). Within the three focus areas, it is believed that populations are both migratory and non-migratory. This is based on cumulative knowledge of the local working group (years of sage-grouse sightings) and unpublished radio telemetry studies conducted by the Utah Division of Wildlife Resources in the 1970s.

This area serves as habitat for wildlife that range in size from insects and small mammals to large herbivores. There is an abundance of birds, small mammals, lizards, snakes, and insects. Several species are important as game, including mourning doves, cottontail rabbits, blue grouse, pronghorn antelope, mule deer, and elk. Sage-grouse, although not currently hunted within the Resource Area, were once a popular game species. Chukar and wild turkey numbers have increased through active management which provide upland game opportunities.

### *Landownership*

Most of the Resource Area is public land; less is in private ownership (Table 2, Figure 2). In Beaver and Iron counties, the majority of federally owned land is managed by the BLM. Land managed by the USFS, Dixie National Forest, and Fishlake National Forest is located in Iron and Washington counties and along the eastern edge of the Resource Area. Private land is scattered throughout the Resource Area with the largest towns, Beaver (Beaver County), Cedar City (Iron County), and St. George (Washington County), located along I-15 which is the primary north-south travel corridor for this area (Figure 1).

Table 2. Landownership and management jurisdiction by acre and percentages within the SWARM Resource Area.

| <b>Management Agency</b>  | <b>Acres</b>   | <b>% of Resource Area</b> |
|---|----------------|---------------------------|
| Bureau of Land Management Wilderness Area                         | 3523           | < 1                       |
| Bureau of Land Management   | 2858328        | 51.3                      |
| Native American Tribes  | 30924          | < 1                       |
| National Park Service   | 149918         | 2.7                       |
| Private   | 1377674        | 24.7                      |
| State of Utah   | 396388         | 7.1                       |
| State, County, City; Wildlife, Park, and Outdoor Recreation Areas | 25860          | < 1                       |
| US Forest Service   | 670653         | 12                        |
| US Forest Service Wilderness Area                                 | 57305          | 1                         |
| Water   | 3026           | < 1                       |
| <b>Total</b>  | <b>5574132</b> |                           |

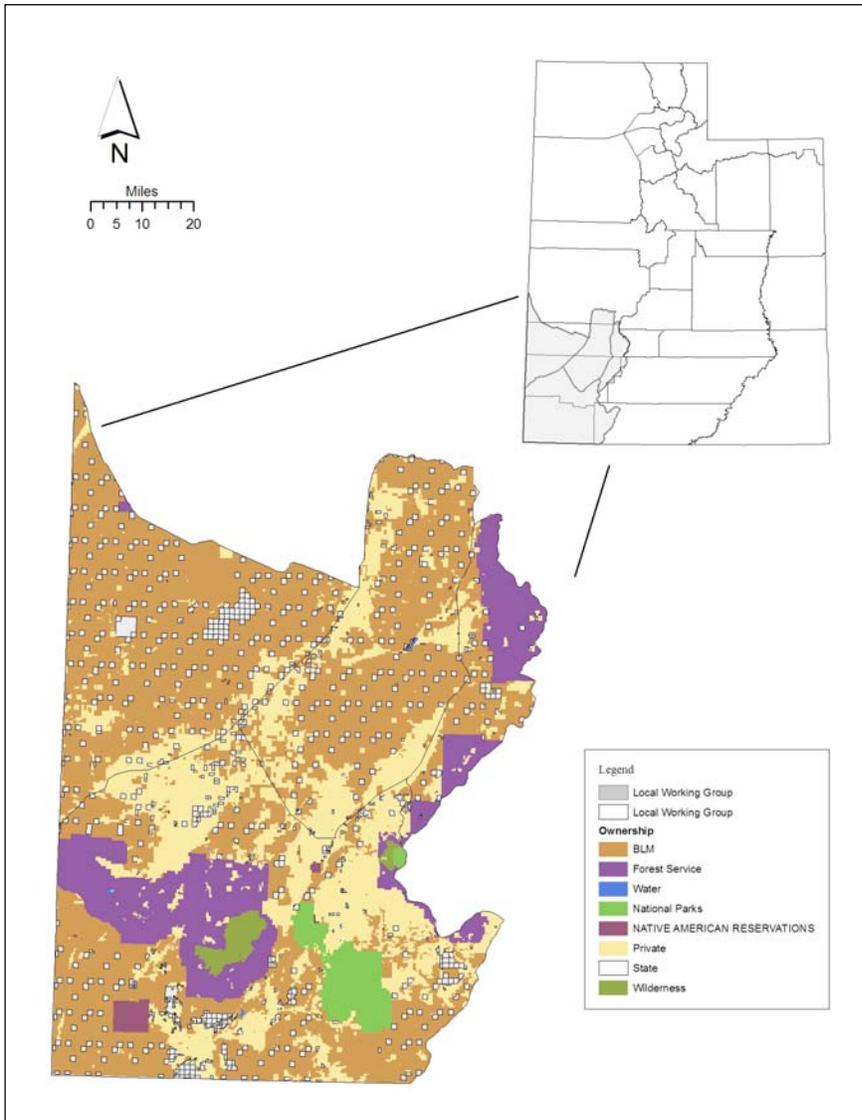


Figure 2: Ownership of land in the Southwest Desert Local Working Group area.

### *Wildlife Populations*

Several species of birds, small mammals, and reptiles are found only in sagebrush environments. Passerine birds obligated to use sagebrush environments include Brewer's sparrow, sage sparrow, and sage thrasher. Additionally, though not obligated to use only sagebrush environments, vesper sparrow and loggerhead shrike are also commonly found in sagebrush communities in this Resource Area. Other obligate species include the sagebrush vole and the sagebrush lizard. In addition to these obligates, a large number of other birds, small mammals, and reptiles commonly make use of sagebrush environments within the Resource Area.

While sage-grouse populations in the Resource Area have been counted and studied, little or nothing is known about the local status of these other wildlife species. We assume that their numbers and geographic extent are tied to the condition and extent of big sagebrush communities. Therefore, this Plan operates with the intent that maintenance of substantial areas of high quality sagebrush steppe, measured by healthy populations of sage-grouse, will provide sufficient habitat for these other sagebrush obligate species.

### *Human Populations*

Parowan Valley in Iron County was a popular home for the Fremont people, and Native American activity has always been common in the Resource Area. The Southern Piute Indian Reservation headquarters is in Cedar City, Iron County. Anglo-American settlers came to southwest Utah in 1851 to set up a county seat in Parowan began iron and coal mining around Cedar City. Unlike many other mining towns, Parowan and Cedar City did not experience a boom-bust cyclic economy. Many of the residents in the surrounding area turned to agriculture and livestock grazing when the mines inevitably closed. The Union Pacific Railroad came through Iron County in the early 1900s, boosting its economy. The railroad also provided early transportation to tourists eager to explore the lands that would soon become National Parks. Iron County is less dependent on agriculture than many rural areas. The largest employer in this county is Southern Utah University and the Iron County School District employs another large segment of the population. There are also several large manufacturing companies, and tourism-related activities cater to more than a million tourists annually. Beaver County was founded in 1856 remaining mostly unsettled until the building of Fort Cameron in 1873 to guard against Native American hostilities. Beaver County's growth was largely attributed to mining activities and the Utah Southern Railroad, which shipped mined products and mercantile to Salt Lake City. Today, Beaver County's economy relies mostly on agriculture, forestry, and fishing.

### *Livestock Grazing*

The history and place of herbivory in the Intermountain West often leads to debate about the appropriateness of domestic livestock grazing on federal lands (Vavra, et al. 1994, Clifford 2002). Young (1994), Young et al. (1976), Vale (1975), and Daubermine (1970) have all indicated our current plant communities are different from those present "pre-European contact." All have listed numerous reasons for this difference including grazing, fire, introduced plants, agriculture, and more recently, climate change. In response to this assumption, historical land management practices (livestock grazing) were developed with an additional assumption that livestock grazing was an unnatural impact on native plant communities. In a somewhat different

slant, Burkhardt (1996) questioned the often-held assumption that Intermountain plant communities evolved without the presence of large herbivores (i.e., bison, elk). A rather large body of research was presented by Burkhardt that indicates plant communities in the Intermountain West did evolve in the presence of grazing by large herbivores, and paleontological/geological records indicate that Pleistocene era plant communities were similar to the present native flora of the Intermountain West.

Livestock grazing was introduced into the intermountain west in the mid to late 1800s. Records indicate livestock grazing was introduced to the southwest desert in the 1850s (Seegmiller 1998). Grazing was unregulated in southwest Utah until the formation of the USFS in 1903 and the formation of the Grazing Service in the 1930s. Historical numbers of livestock in southwest Utah have varied and, like other areas in the west, were affected by weather, markets, and regulations. There has been a great decline in sheep numbers in southwest Utah over the last 100 years while cattle numbers increased into the 1970s and then more or less held steady (Figures 3-5).

Even though the range livestock numbers are declining, grazing still has a significant impact on other sectors of the local economy. Based on declining sage-grouse populations throughout the west, the USFWS has been petitioned to list the species under the provision of the Endangered Species Act. Should the sage-grouse be listed, the livestock industries as well as all natural resource users will fall under intense regulatory scrutiny. Torell et al. (unpublished report) address the economic implications of some grazing management alterations to benefit sage-grouse. Elimination of spring grazing on BLM ranges to enhance sage-grouse nesting habitat would have a significant impact on the viability of many ranches.

Listing sage-grouse under the provisions of ESA could also have a variety of local impacts. Affected activities could include noxious weed control, maintenance of rights-of-way, subdivisions and land development, livestock grazing management, big game wildlife management, and recreational land use.

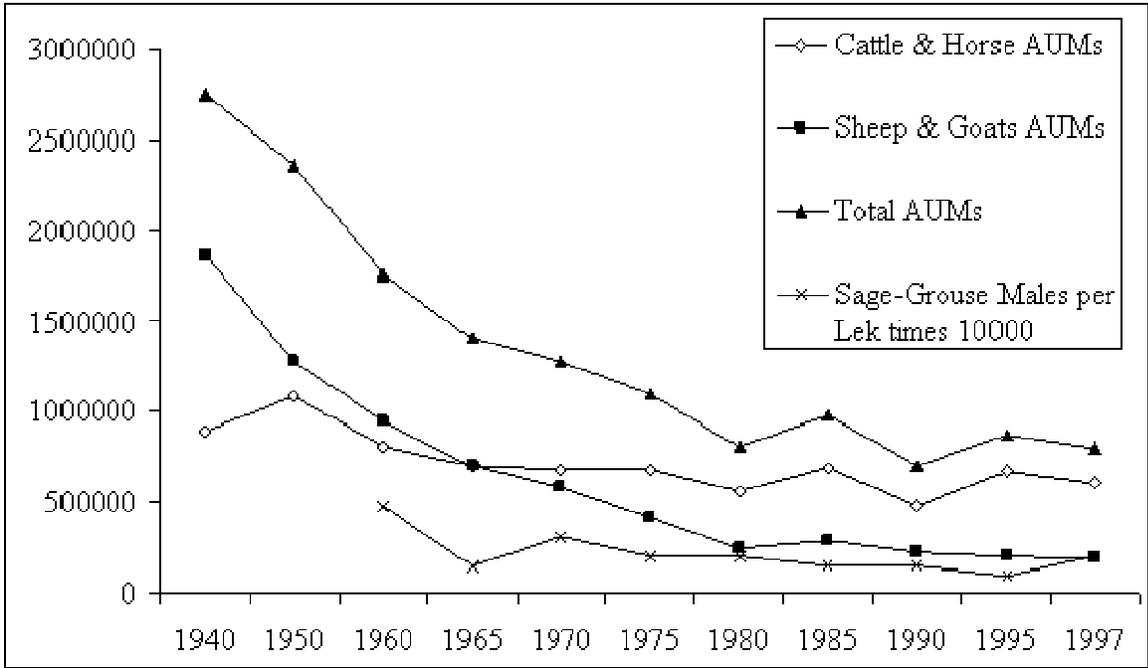


Figure 3. Livestock and sage-grouse numbers on BLM Land in Utah, 1935-1977.

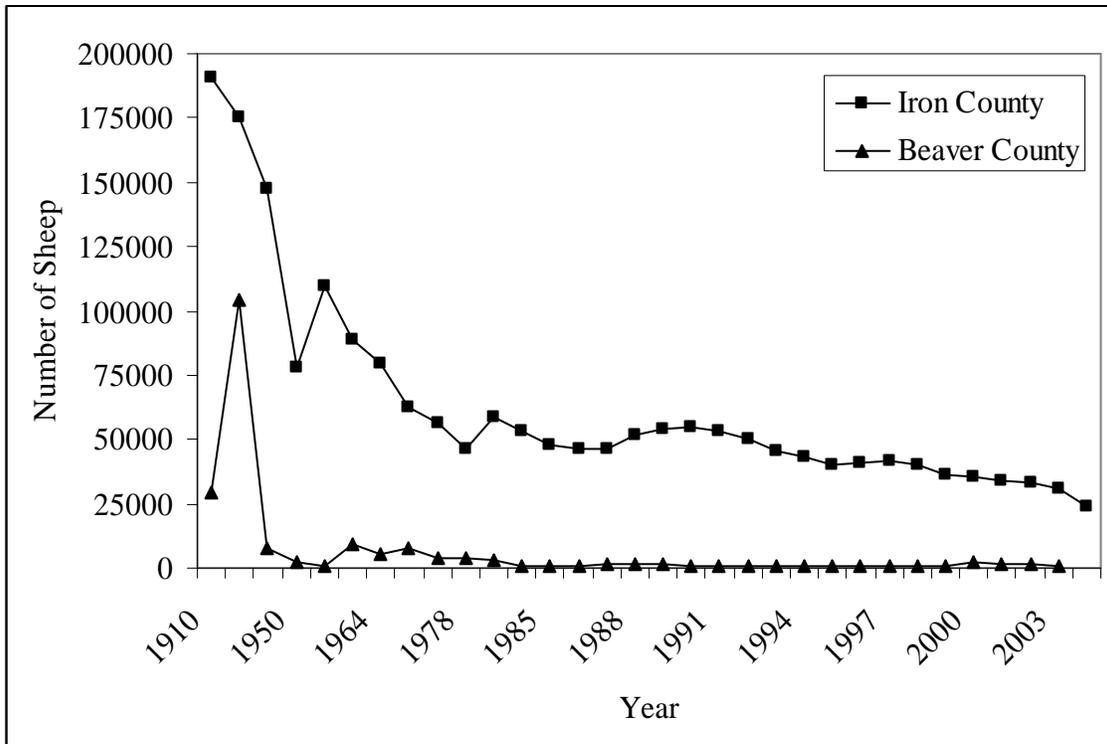


Figure 4. The number of sheep in Iron and Beaver Counties, Utah, 1910–2005.

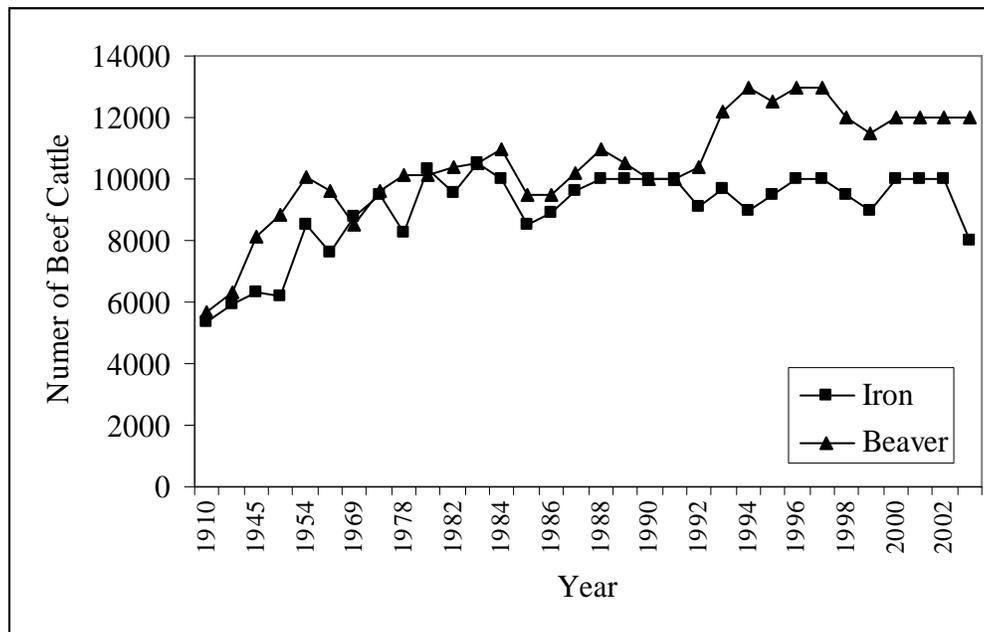


Figure 5. The number of beef cattle in Iron and Beaver Counties, Utah, 1910–2005.

## Farming

While range livestock production is still the dominant use of the majority of the landscape, other agriculture operations are important economic enterprises especially in Iron and Beaver Counties. Beaver County leads the state in cash receipts for agriculture operations. It should be mentioned that a large portion of those receipts are generated by a large hog operation cooperative. Iron County ranks first in the state for alfalfa hay production and fourth in sheep and lamb numbers. In fact, from 1992–1997 market value of agriculture products sold increased 67 % in Iron County. (Utah Agricultural Statistics Service, unpublished report).

## Population Status and Distribution of Sage-grouse

The UDWR began using lek counts to monitor sage-grouse populations in the Resource Area in 1969 (Figure 6). That year, 100 male sage-grouse were counted on four leks. During early surveys, the locations of only a few leks were known. Thus, most counts of males are accompanied by the number of leks that were counted that year. There was a wide fluctuation in counts of male sage-grouse at leks throughout the data collection period. According to Connelly et al. (2004), a minimum of ten leks must be counted before a reasonably accurate population estimate can be made. It was not until 1998 that ten or more leks were consistently counted each year. By placing a trend line of a five-year moving average over the males per lek counts, it is noticeable that sage-grouse in the Resource Area have been declining since 1993 (Figure 7).

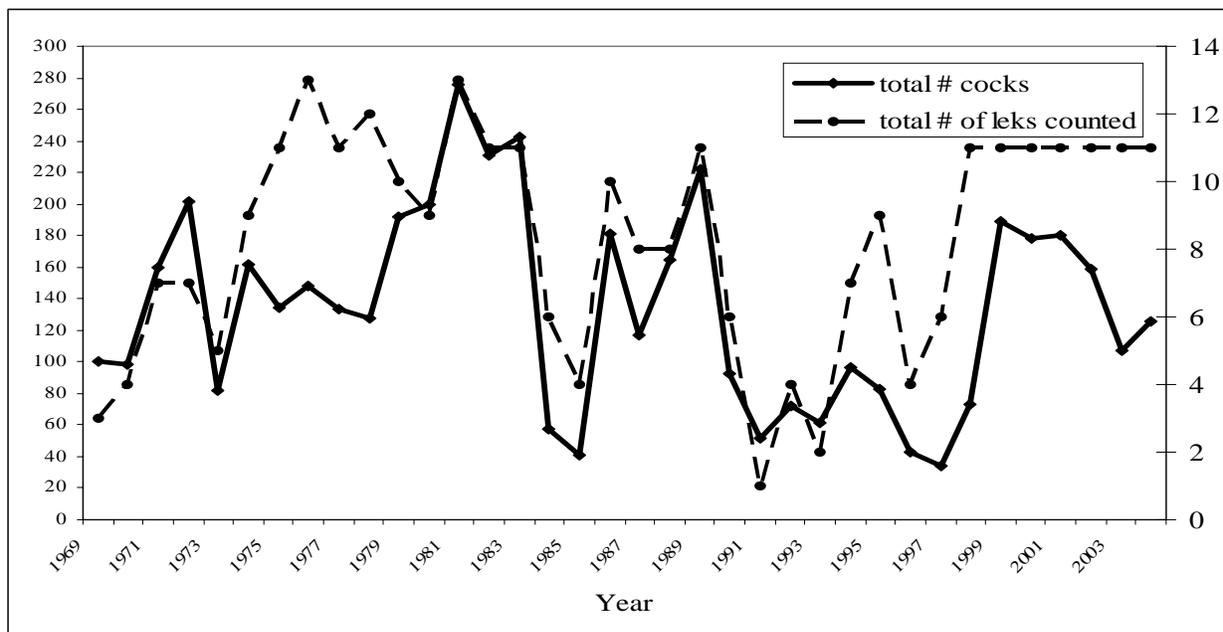


Figure 6. The number of male sage-grouse and sage-grouse leks counted within the SWARM Resource Area, 1969–2005.

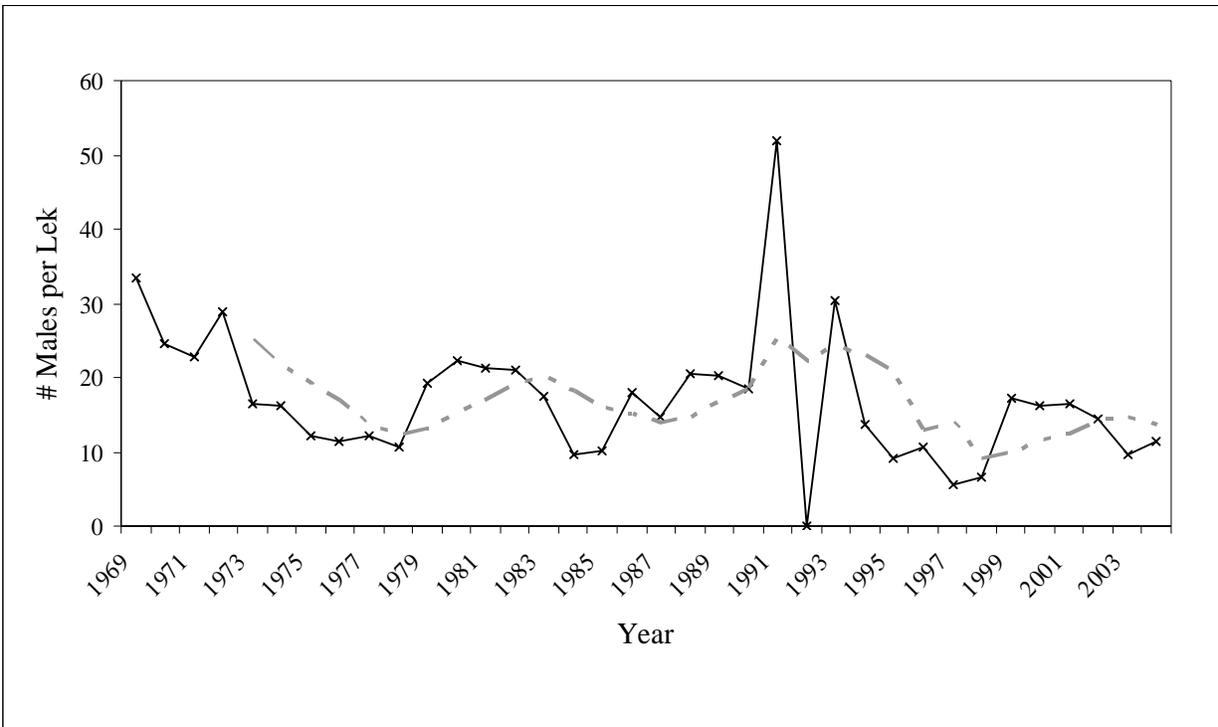


Figure 7. The number of male sage-grouse counted per lek in the SWARM Resource Area 1969–2005, shown with a five-year trend line.

The number of active leks can also be used to index sage-grouse population trends. In recent history, little effort was put forth in the Resource Area to locate new leks or survey activity at historic leks that were no longer being counted. Therefore, in spring 2006, the DWR began searching for undocumented activity. Five new leks were discovered, encouraging the DWR to continue to look for new leks.

Local Ecology and Life History

Little published information is available regarding the ecology and life history of sage-grouse populations in the Resource Area. Although monitoring (lek counts) has been conducted regularly since the late 1960s (Figures 6 and 7), few studies have documented information about aspects of habitat use, survival, sources of mortality, and reproductive success.

Local Habitat

The extent of seasonal habitat types in the Resource Area was mapped by the UDWR in 1999. Figures 8 and 9 illustrate where nesting, brood-rearing, and winter habitats are located in the Resource Area. This depiction is a rough estimate based on historical and present accounts of sage-grouse habitat use, and efforts will be taken to determine actual use in the future

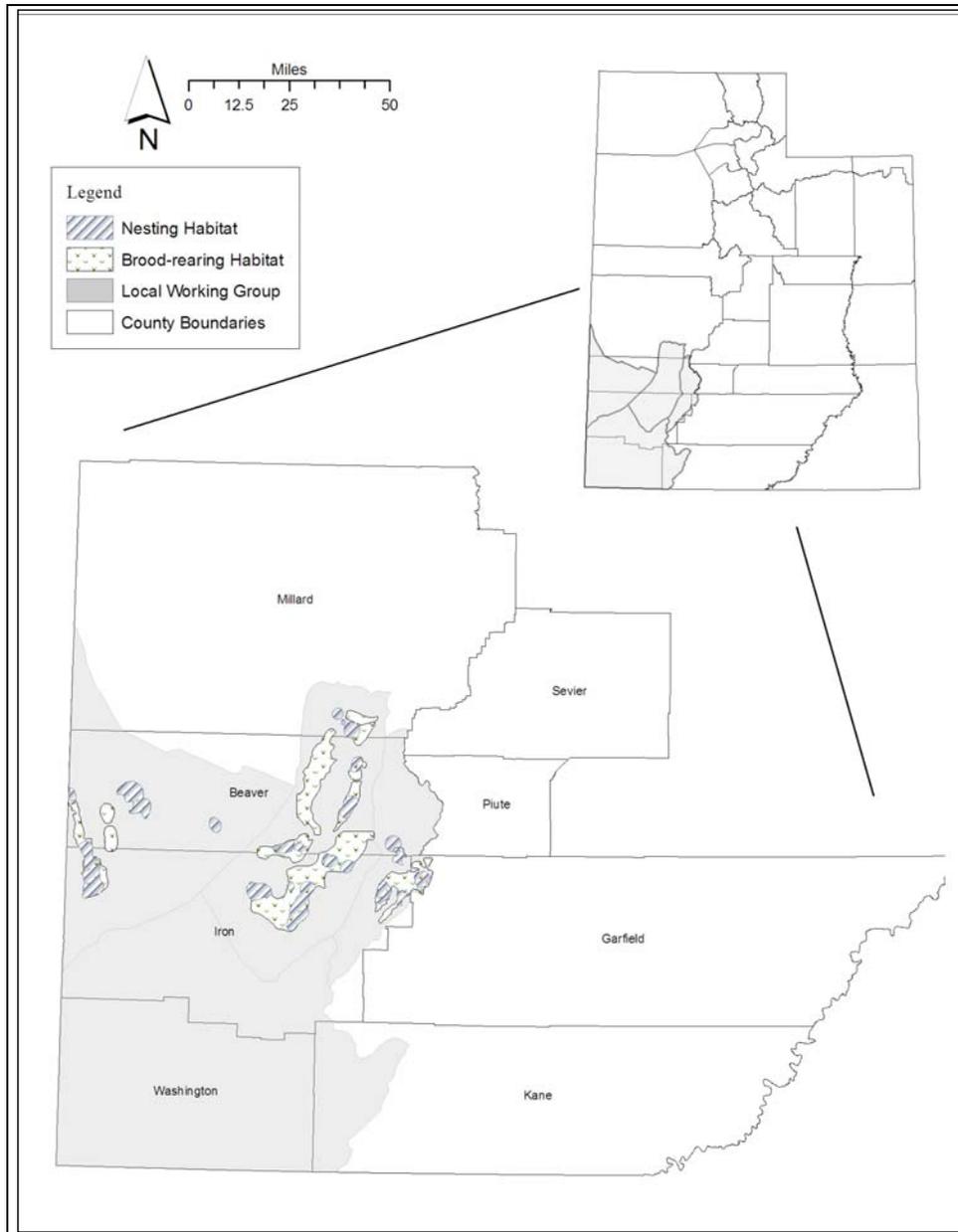


Figure 8. Location of sage-grouse nesting and brood-rearing habitat in the SWARM Resource Area in 1999.

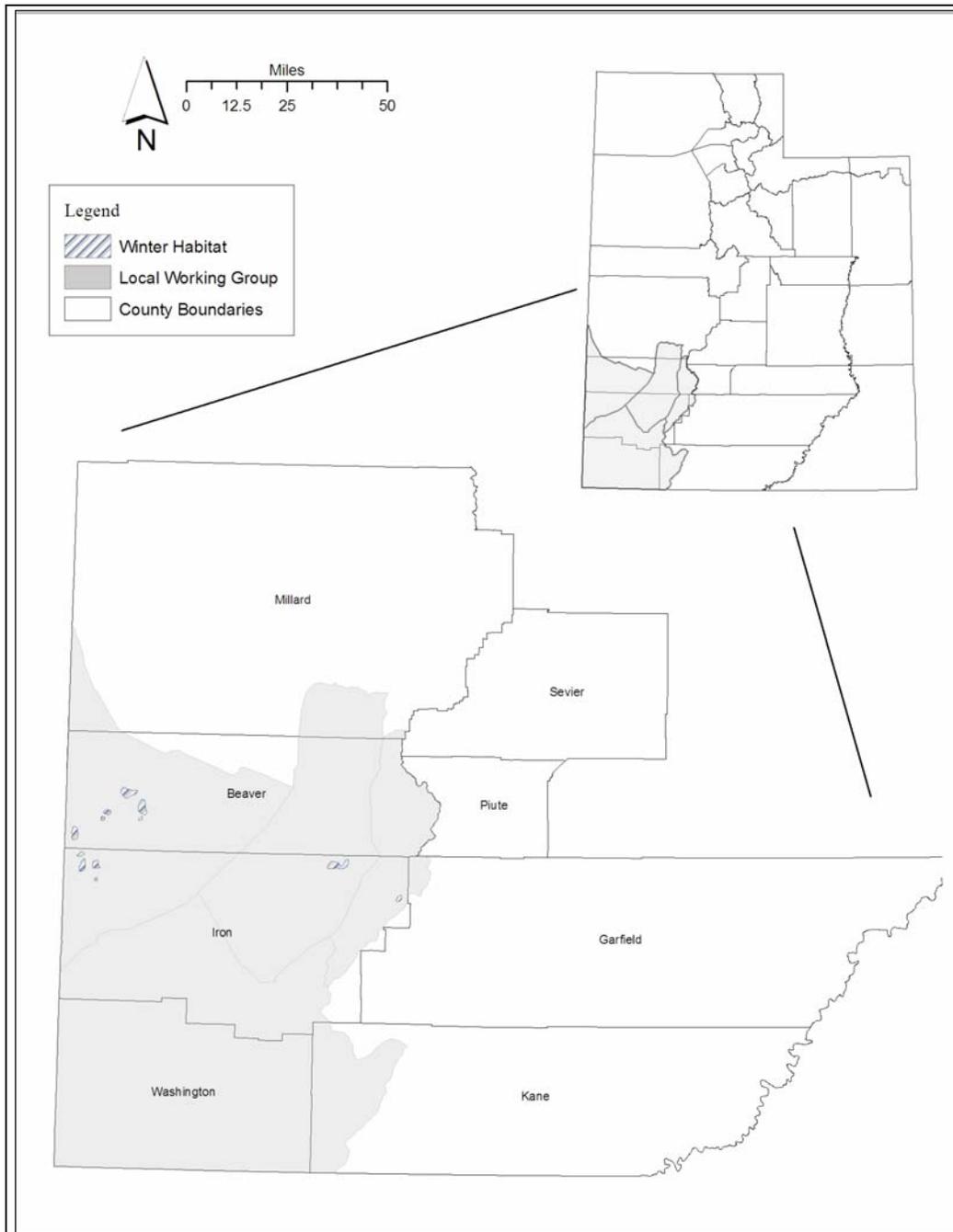


Figure 9. Location of sage-grouse winter habitat in the SWARM Resource Area in 1999.

Habitat Improvements and Completed Conservation Actions

The BLM has participated in several projects to improve areas that were degraded, in an effort to improve sagebrush habitat. For example, in 1999 280-acres and in 2003 370-acres were reseeded to stimulate growth of sagebrush-steppe vegetation. In 2005, the BLM reseeded Lee’s Wash after a wildfire to promote the re-growth of this landscape into a healthy sagebrush-steppe ecosystem.

Table 3. Examples of habitat improvement projects implemented in 2005 and proposed for 2006 by land management agencies in the SWARM Resource Area.

| Year            | Project Name                         | Acres |
|-----------------|--------------------------------------|-------|
| 2005            | Fishlake NF Sagebrush Enhancement    | 4445  |
| 2006 (proposed) | South Beaver Rehabilitation          | 2000  |
|                 | Brad Bowler chaining                 | 1000  |
|                 | North Hills Lop and Scatter          | 1000  |
|                 | Blawn Wash Seeding                   | 2700  |
|                 | Salt Cabin Re-seed                   | 1200  |
|                 | Pine Valley Guzzler Repair           |       |
|                 | Hamlin Valley Pinyon Juniper Removal | 1000  |
|                 | Hamlin Valley                        | 10    |
|                 | Mt. Home Post Harrow Cutting         | 2500  |
|                 | Parowan Front Dixie Harrow           | 250   |

**Conservation Strategy**

One of the main purposes of this Plan is to provide a framework of strategies and associated actions that can be implemented to abate threats, address information gaps, and guide monitoring efforts. Strategies and actions listed below (the order is irrelevant) were developed by SWARM partners. Several other documents and publications provide recommendations and guidelines for management of sage-grouse populations and their habitats, many of which were reviewed in the Introduction of this Plan. Strategies developed by SWARM are designed to be specific to the local area while taking into consideration the guidelines provided at a rangewide level.

Implementation of strategies and actions is strictly voluntary on the part of SWARM partners. Despite this, we have designated for each strategy the public and private partners who might be involved in implementation. Designation does not imply responsibility or commitment of resources of any sort to implementing, initiating, or completing any actions; however, it provides a framework of resources and expertise.

The following are excerpts from the strategies and actions listed in the Southwest Desert Local Working Group Conservation Action Plan. These actions have been identified as the focus of the working group during the calendar year 2010.

## Strategies and Actions

7. **Strategy:** Improve age distribution of sagebrush-steppe communities by 2016.
  - 1.3 **Action:** Monitor the response of sage-grouse to changing habitat conditions.
  - 1.4 **Action:** Implement treatments to change age class distribution of sagebrush.

Several projects have been initiated this year, as partnerships among USU Extension, Utah Division of Wildlife Resources, and Bureau of Land Management to address these issues.

**Partners:** UDWR, BLM, USU EXT, USFS, local county residents

**Threats Addressed:** Fire and vegetation management, communication among parties, invasive/alien vegetation species

**Aspects of Sage-grouse Ecology Addressed:** Lack of key habitat-type connectivity, poor condition of surrounding communities, degradation of winter habitat quality, loss of breeding habitat quality, loss of brood-rearing habitat quality, loss of riparian area quality, reduction of population size, reduction of population distribution

8. **Strategy:** Improve water availability in brood-rearing habitat by 2016.
  - 2.2 **Action: Partner with watershed specialists to identify new water sources.**
  - 2.3 **Action: Consider new water developments that are multi-use and multi-purpose.**  
**Action step: Construct guzzlers in areas identified as needing water.**
  - 2.6 **Action: Restore and improve wildlife access to water.**

**Partners:**UDWR, BLM, NRCS, interest groups

**Threats Addressed:** Invasive/alien vegetation species, concentrated wildlife and/or livestock use

**Aspects of Sage-grouse Ecology Addressed:** Loss of brood-rearing habitat quality, loss of riparian area quality, reduction of population size, reduction of population distribution

9. **Strategy:** Improve wildlife and livestock distribution in winter and brood-rearing habitat throughout the next ten years.
  - 3.2 **Action:** Implement habitat improvements and direct management actions to improve distribution.

**Partners:** UDWR, BLM, FS, USU EXT, SITLA, NRCS

**Threats Addressed:** Concentrated wildlife and/or livestock use

**Aspects of Sage-grouse Ecology Addressed:** Degradation of winter habitat quality, loss of brood-rearing habitat quality, reduction of population size, reduction of population distribution

10. **Strategy:** Increase participation of local public and private landowners with SWARM over the next ten years.

**4.1 Action: Develop partnerships with landowners and interest groups to increase visibility of sage-grouse management.**

**4.1.1 Action step: Develop fact sheet to distribute to special interest groups concerning sage-grouse natural history and threats to populations.**

This could include fact sheet of how much money/time is spent, and how the money is spent.

**4.4 Action: Distribute annual reports to local management agencies, county commissioners, and other interested parties.**

**Partners:** USU EXT, NRCS, RC&D

**Threats Addressed:** Lack of communication among public parties, alternative land uses (mining, wind power, water development), development of roads or utilities, recreational use

**Aspects of Sage-grouse Ecology Addressed:** Lack of key habitat type connectivity, poor condition of surrounding communities, degradation of winter habitat quality, loss of breeding habitat quality, loss of brood-rearing habitat quality, loss of riparian area quality, reduction of population size, reduction of population distribution

11. **Strategy:** Locate and monitor new active lek sites over the next ten years.

**5.5 Action: Maintain and improve current lek site habitat.** In particular, target non-native vegetation at the newly found Minersville lek, to rejuvenate it.

**Partners:** UDWR, USFS, BLM, USU EXT, interest groups

**Threats Addressed:** Enhanced native and domestic predators, recreational use, concentrated wildlife and/or livestock use, fire and vegetation management, development of roads or utilities, alternative land uses (mining, wind power, water development), dramatic weather events

**Aspects of Sage-grouse Ecology Addressed:** Loss of breeding quality (leks and nesting) habitat

7. **Strategy:** Manage unwanted plant species in sage-brush steppe habitat by 2016.

**7.1 Action:** Remove juniper and pinyon pines from brood-rearing habitat.

**7.2 Action:** Reduce abundance of unwanted and/or invasive plant species.

**Action step:** Re-seed area after land disturbances such as mechanical treatments, fire, and human development.

**Action step:** Utilize dedicated hunters to help with re-seeding and rehabilitation efforts.

**Partners:** UDWR, BLM, USFS, USU EXT, interest groups

**Threats Addressed:** Invasive/alien vegetation species, fire and vegetation management

**Aspects of Sage-grouse Ecology Addressed:** Loss of brood-rearing habitat quality, reduction of population size, reduction of population distribution, lack of key habitat type connectivity, poor condition of surrounding communities, degradation of winter

habitat quality, loss of breeding quality (leks and nesting) habitat

**8. Strategy:** Minimize impacts of new land developments and/or recreational uses on sage-grouse populations during the next ten years.

**8.4 Action: Involve local county and city planning commissions in SWARM meetings.**

**8.5 Action: Provide input into management plans for federal, state, and local agencies.**

**Partners:** USU EXT, UDWR, SITLA, NRCS, USFS, BLM, interest groups

**Threats Addressed:** Alternative land uses (mining, wind power, water development), development of roads or utilities, lack of communication among public parties, recreational uses

**Aspects of Sage-grouse Ecology Addressed:** Reduction of population size, lack of key habitat type connectivity, poor condition of surrounding communities, reduction of population distribution, loss of breeding quality (leks and nesting) habitat, loss of brood-rearing habitat quality, loss of riparian area quality

**10. Strategy:** Reduce threat of predators on sage-grouse over ten-year period.

**10.4 Action:** Determine predator community composition and depredation rate.

In particular, design and implement an egg predation study in Parowan.

**Partners:** UDWR, USU EXT, WS

**Threats Addressed:** Enhanced native and domestic predators

**Aspects of Sage-grouse Ecology Addressed:** Loss of breeding quality (leks and nesting) habitat, loss of brood-rearing habitat quality, reduction of population size, reduction of population distribution