RAC AGENDA – MAY 2013

Revised 5-6-2013

1. Welcome, RAC Introductions and RAC Procedure
   - RAC Chair

2. Approval of Agenda and Minutes
   - RAC Chair

3. Wildlife Board Meeting Update **INFORMATIONAL**
   - RAC Chair

4. Regional Update **INFORMATIONAL**
   - DWR Regional Supervisor

5. Upland Game Recommendations **ACTION**
   - Blair Stringham, Upland Game Biologist

6. Bighorn Sheep Management Plan **ACTION**
   - Kent Hersey, Big Game Project Leader

7. Goat Management Plan **ACTION**
   - Kent Hersey, Big Game Project Leader

Region Specific Items – to be presented in the specified region only.

CR & NR - Urban Deer – New Rule R657-65 **ACTION**
- Martin Bushman, Attorney

NR - Deer Management Plans **ACTION**
- Darren Debloois, Asst. Wildlife Manager

SR - BYU Research Update **INFORMATIONAL**

Meeting Locations

SR RAC – May 7th 7:00 PM
Richfield High School
510 W. 100 S, Richfield

SER RAC – May 8th 6:30 PM
John Wesley Powell Museum
1765 E Main St., Green River

NER RAC – May 9th 6:30 PM
Wildlife Resources NER Office
318 North Vernal Ave, Vernal

CR RAC – May 14th 6:30 PM
Springville Public Library
45 S. Main Street, Springville

NR RAC – May 15th 6:00 PM
Brigham City Community Center
24 N. 300 W. , Brigham City

Board Meeting – June 4th 9:00 AM (Tuesday)
DNR, Boardroom
1594 W. North Temple, SLC

State of Utah
DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Wildlife Resources
GREGORY SHEEHAN
Division Director

GARY R. HERBERT
Governor

GREGORY S. BELL
Lieutenant Governor

DATE: April 18, 2013
TO: Utah Wildlife Board / Regional Advisory Council Members
FROM: Blair Stringham
Migratory Game Bird Program Coordinator
SUBJECT: 2013 Migratory Upland Game Hunt Recommendations

The interior population of band-tailed pigeons has shown a stable to declining trend for the last 40 years. The results of the 2012 Breeding Bird Survey and Hunter Harvest Report show a similar trend in declining population and reduced harvest. At the March 2013 Pacific Flyway Council meeting the Council decided to reduce the daily bag for the interior population of band-tailed pigeon from five to two, which only allows Utah a maximum bag of two birds per day. The Division is recommending a bag of two birds for the 2013 season.

The current band-tailed pigeon hunt area includes Beaver, Garfield, Grand, Iron, Kane, Millard, Piute, San Juan, Sanpete, Sevier, Utah, Washington, and Wayne counties. These counties have the highest densities of band-tailed pigeon, and opening the hunt up to the entire state will not greatly increase harvest of band-tailed pigeon. The Division recommends opening hunting of band-tailed pigeon state-wide for consistency and to simplify regulations.

The numbers of sandhill cranes migrating through Uintah County are the highest in the state, yet percent harvest success remains the lowest of our four hunt areas. In order to increase harvest we are recommending extending the hunting period and creating three separate hunts.

Specific season and bag recommendation changes for the 2013 Utah band-tailed pigeon, mourning dove, and sandhill crane seasons are as follows:

Species	Season Date
Band-tailed Pigeon (2 bag/6 possession)	9/2/2013-9/30/2013
Mourning Dove (10 bag/30 possession)	9/2/2013-9/30/2013
Sandhill Crane 1 (Uintah County)	9/21/2013-9/29-2013
Sandhill Crane 2 (Uintah County)	10/1/2013-10/9/2013
Sandhill Crane 3 (Uintah County)	10/12/2013-10/20/2013

Additionally, it is anticipated that the United States Fish and Wildlife Service (USFWS) will allow states the option of increasing their migratory game bird species possession limits to three-times the daily bag for the 2013 hunting seasons. Therefore, the Division recommends increasing the possession limit for band-tailed pigeon and mourning dove to three-times the daily bag, contingent upon the increase being allowed by USFWS.

UTAH BIGHORN SHEEP
STATEWIDE MANAGEMENT PLAN

UTAH DIVISION OF WILDLIFE RESOURCES
DEPARTMENT OF NATURAL RESOURCES

UTAH DIVISION OF WILDLIFE RESOURCES
STATEWIDE MANAGEMENT PLAN FOR BIGHORN SHEEP

I. PURPOSE OF THE PLAN

A. General

This document is the statewide management plan for bighorn sheep in Utah. The plan will provide overall guidance and direction to Utah's bighorn sheep management program. The plan assesses current information on bighorn sheep, identifies issues and concerns relating to bighorn sheep management in Utah, and establishes goals and objectives for future bighorn management programs. Strategies are also outlined to achieve goals and objectives. The plan will be used to help determine priorities for bighorn management and provide the overall direction for management plans on individual bighorn units throughout the state.

B. Dates Covered

The statewide bighorn sheep plan will be in effect for five years upon approval of the Wildlife Board. (Expected dates covered June 2013 – June 2018).

II. SPECIES ASSESSMENT

A. Natural History

Bighorn sheep are found in western North America from central British Columbia to Mexico and from California to the Dakotas and are one of the most impressive large mammals in North America. They are named for the massive horns grown by the males of the species. Horns grow throughout life and typically reach maximum size at 8 to 10 years of age. Females also have horns that are similar in size to yearling males. Males, females, and young of the year are called rams, ewes, and lambs respectively. Rams normally separate themselves from groups of ewes and lambs, except during the breeding season, which occurs from mid October to early December. During that time, rams engage in impressive head butting clashes to establish dominance. Gestation is about 180 days. Lambs, which are nearly always singles, are born in mid April to early June.

Bighorn sheep are native to Utah. Archeological evidence indicates they were well known to the prehistoric inhabitants of Utah, since bighorns are depicted in pictographs and petroglyphs more than any other form of wildlife. Historical records of the first white men in the state also confirm the presence of bighorns. Father Escalante noted in his journal as he crossed the Colorado River in Utah - "through here wild sheep live in such abundance that their tracks are like those of great herds of domestic sheep" (Rawley 1985). Explorers, trappers, pioneers and settlers also recorded numerous observations of bighorn sheep throughout the state. Rocky Mountain bighorns *(Ovis canadensis canadensis)* are generally recognized to have inhabited northern and central Utah, whereas desert bighorns *(Ovis canadensis nelsoni)* were found in southern Utah. California bighorns *(Ovis canadensis californiana)* historically inhabited portions of the Great Basin in Nevada and Idaho. Although it is not known conclusively whether or not California bighorns

inhabited Utah, recent studies indicate there is no genetic or taxonomic distinction between Rocky Mountain and California bighorns (Ramey 1993). Thus, they should both be considered the same subspecies (Rocky Mountain bighorn sheep). Some mixing and interbreeding of Rocky Mountain and desert bighorns likely occurred where their ranges converged in Utah, making a clear distinction of historic ranges difficult.

Native populations of Rocky Mountain bighorn sheep were nearly extirpated following pioneer settlement. A few scattered sightings of bighorns persisted in northern Utah as late as the 1960's. Factors contributing to their demise included competition with domestic livestock for forage and space, vulnerability to domestic livestock-borne diseases, habitat conversions away from native grasslands towards shrub lands due to excessive grazing and fire suppression, and unregulated hunting (Shields 1999).

Utah's desert bighorn sheep populations also struggled to survive civilization. Whereas some herds suffered early extirpation, others remained relatively unexploited until the 1940's and 1950's, when uranium was discovered on the Colorado Plateau. By the 1960's, only a small population of desert bighorns remained in Utah along the remote portions of the Colorado River. Desert bighorn populations were thought to have declined for the same reasons previously described for Rocky Mountain bighorns.

B. Management

1. DWR Regulatory Authority

The Utah Division of Wildlife Resources (DWR) presently operates under authority granted by the Utah Legislature in Title 23 of the Utah Code. The Division was created and established as the wildlife authority for the state under Section 23-14-1 of the Code. That Code also vests the Division with its functions, powers, duties, rights, and responsibilities. The Division's duties are to protect, propagate, manage, conserve, and distribute protected wildlife throughout the state.

The Utah DWR is charged to manage the state's wildlife resources and to assure the future of protected wildlife for its intrinsic, scientific, educational, and recreational values. Protected wildlife species are defined in code by the Utah Legislature.

2. Population Status

Rocky Mountain and California Bighorns

Rocky Mountain and California bighorns currently exist in the northern half of the state (Figure 1). The current statewide population estimate for Rocky Mountain bighorns in Utah managed by DWR is nearly 2200 sheep and has shown an increasing trend over the past 15 years (Figure 2). Of the total population, approximately 770 are considered California bighorn sheep and are found on Antelope Island, the Newfoundland Mountains, and the Stansbury Mountains. Utah currently has 12 distinct populations of Rocky Mountain and California bighorn sheep, all of which are the result of transplant efforts. Six of these populations are showing increasing trends, 3 are stable, and 3 are showing declining trends or have low numbers of sheep (Table 1). One

population, North Slope-Goslin Mountain was culled in 2009 due to disease issues and concerns about the disease spreading to nearby herds. Initial indications show that this effort was successful, and efforts will likely be made to attempt to reestablish this population in the future. In addition to the DWR managed herds, populations of Rocky Mountain bighorn sheep populations are also found in Dinosaur National Monument and on Ute tribal lands in northeastern Utah.

Desert Bighorn

Desert bighorns inhabit the slickrock canyon areas of southern Utah (Figure 1). Significant populations occur across the Colorado Plateau including the San Rafael Swell and throughout the Colorado River and its many tributaries. The current population estimate for desert bighorns in Utah managed by DWR is 2000 sheep and has been relatively stable for the past 10 years (Figure 2). Utah currently has 12 distinct populations of desert bighorn sheep. Of those 12, 3 are showing increasing trends, 4 are stable, and 5 are showing declining trends or have low numbers of sheep (Table 2). In addition to those herds, desert sheep populations also occur in Arches, Canyonlands, Capital Reef, and Zion National Parks, and on Navajo tribal lands.

3. Population Surveys

In Utah bighorn sheep populations are surveyed via helicopter every 2–3 years (Table 1, Table 2). During these flights, biologists survey all potential bighorn sheep habitat during the peak of the rut in late October to December depending on the management unit. All observed animals are counted and classified as ewes, lambs, and rams, with rams being further classified as Class I (2.5 years old), II (2.5–5.5 years old), III (6.5–7.5 years old), or IV (8.5+ years old) according to Geist. Previous studies have shown that sightability on bighorn sheep populations varies between 60-70%, depending on the unit and conditions. In addition to the helicopter surveys, many bighorn sheep populations in Utah have radio-collared animals. These collars allow biologist to monitor annual survival and movements. The collars also allow biologists to locate animals and collect ground classification data in years without helicopter surveys. In conjunction with Brigham Young University, Utah State University, Utah Foundation for North American Wild Sheep (FNAWS), and Sportsmen for Fish and Wildlife (SFW), DWR has conducted and participated in many bighorn sheep research projects. Findings from those research projects have greatly improved the current knowledge of bighorn sheep and have improved management practices.

4. Hunting

Bighorn sheep are managed as an once-in-a-lifetime species in Utah. The first hunt for bighorn sheep in Utah was held in 1967 for the desert subspecies on the San Juan Unit (Table 3). A total of 10 permits were issued, 9 hunters went afield, and all 9 harvested rams. The first hunt for Rocky Mountain bighorns in Utah was in 1991 on the Book Cliffs Rattlesnake Unit. Two permits plus 1 high-bid permit were issued and all 3 hunters harvested rams. Since the initial hunts, bighorn sheep permits have generally been increasing. The highest number of desert bighorn sheep tags issued in Utah was in 2011 when 54 permits were issued. For Rockies, the highest number of tags was issued in 2012 with 40 permits being issued. From 1967 to 2012, a

total of 1378 people hunted bighorn sheep (324 Rocky Mountain, 1054 desert) resulting in the harvest of 1182 bighorn sheep (321 Rocky Mountain, 861 desert). Success rates for bighorn sheep in Utah are high and average 99% for Rockies and 82% for deserts. Demand for bighorn sheep permits is extremely high, and demand is increasing faster than supply (Table 4, Table 5). The odds of drawing a bighorn sheep permit are worse than any other species in Utah. In 2012, a total of 20,009 hunters applied for the 71 public draw permits available resulting in drawing odds of 1 in 283.

5. Transplants

Utah DWR, in partnership with local conservation groups including FNAWS, SFW, and the Wild Sheep Foundation, has been involved in an aggressive program to restore bighorn sheep to their native habitat for over 40 years. Extensive efforts have been made to reintroduce and supplement populations of both Rocky Mountain and desert bighorn sheep (Table 6, Table 7). Rocky Mountain bighorns were first reintroduced into the state near Brigham City in 1966, whereas desert bighorns were first reintroduced in Utah in 1973 in Zion National Park. Since restoration efforts began, over 1000 Rocky Mountain bighorn sheep (including 190 California bighorn sheep) and over 850 desert bighorns have been released in areas of historical habitat. Most desert bighorn transplants have been successful, whereas there have been some failures of Rocky Mountain bighorn transplants. Although the exact reasons behind the transplant failures are unknown, disease issues, predation, and not moving enough animals have all been hypothesized as potential reasons.

C. Habitat

Bighorn sheep are uniquely adapted to inhabit some of the most remote and rugged areas in Utah. They exist in some of the most hostile climatic conditions ranging from the hot, dry canyonlands of southern Utah to the cold, snowy alpine regions of Utah's northern mountains. Bighorns are sometimes referred to as a wilderness species because of the naturally remote and inaccessible areas they inhabit. Bighorns prefer open habitat types with adjacent steep rocky areas for escape and safety. Habitat is characterized by rugged terrain including canyons, gulches, talus cliffs, steep slopes, mountaintops, and river benches (Shackleton et al. 1999). The diet of mountain sheep is comprised primarily of grasses and forbs, although sheep may also utilize shrubs depending on season and availability. Most Rocky Mountain bighorns have seasonal migrations with established winter and summer ranges, whereas desert bighorns generally do not migrate. Extensive historical bighorn habitat occurs throughout Utah. However, not all habitat is currently suitable for reestablishment of bighorn populations. Vegetative changes, human encroachment, and continued domestic sheep grazing make some areas unsuitable for bighorn restoration. Habitat management practices include conversions of domestic sheep grazing permits, vegetative treatments, and water developments. Utah FNAWS and other conservation groups have been extremely helpful in negotiating, funding, and participating in habitat projects.

III. ISSUES AND CONCERNS

A. Disease

Parasites and diseases are a major concern for bighorn sheep management in Utah. Parasites such as those that cause Psoroptic mange (Boyce and Weisenberger 2005) and respiratory diseases such as those caused by Pasteurellosis have resulted in large-scale population declines in short periods of time (Jessup 1985, Foreyt 1990).

Pasteurellacae are a wide array of bacteria that have been associated with respiratory disease, death, and reduced fecundity in bighorn sheep (Miller et al. 2012). Currently, there are 23 known Pasteurellacae isolates from bighorn sheep, and of these, 3 appear to be associated with severe disease. These include *Pasteurella multocida*, *Mannheimia haemolytica* (formerly *P. haemolytica*) and *Bibersteinia trehalosi* (formerly *P. trehalosi*). Within each species there are several biovariants and subtypes that may be further classified by virulence, or ability to produce leukotoxin, which may cause enzyme production, cell lysing, and extensive tissue damage during a pneumonia event (Miller et al. 2012).

Pasteurella multocida is the most widely distributed of the 3 genera and has been associated with epidemic disease outbreaks in both domestic and wild mammals. *P. multocida* is rarely found or isolated from bighorn sheep and is not typically linked to disease outbreaks. However, it has been associated with large die-offs of Rocky Mountain bighorn sheep in the Hells Canyon area of Idaho, Washington, and Oregon (Weiser et al. 2003) and Colorado (Spraker et al. 1984). *P. multocida* was one of the primary isolates from bighorn sheep collected during an all ages pneumonia die-off in Utah's Goslin Mountain bighorn sheep herd during winter 2010.

Mannheimia haemolytica and *P. trehalosi* appear to be the genera that primarily affect both wild and domestic ruminants and are the most studied in bighorn sheep. Both can cause pneumonia or septicemia; however, they are also considered common commensal organisms in the upper respiratory tract. As commensal organisms, they likely act as opportunistic pathogens to animals under environmental stress or with lowered immunities (Foryet and Jessup 1982, U-C Davis 2007).

Other bacterium such as *Mycoplasma* spp. that have been associated with respiratory disease in many different mammal and avian species, including domestic sheep (Weiser et al, 2012), may contribute or lead to pneumonia events in bighorn sheep by allowing the overgrowth of Pasteurellacae (Besser et al. 2008, Dassanyake et al. 2010, Besser et al. 2012, Weiser et al. 2012). For example, research in bighorn sheep that were exposed to leukotoxin producing *M. haemolytica* did not develop fatal respiratory disease until after exposure to *M. ovipneumonia* (Dassanayake et al. 2010).

As mentioned above, many mammals can carry one or more of these bacterium as commensal flora in their upper respiratory system (Dunbar et al 1990, Miller 2001, U-C Davis 2007). Exposure of naïve bighorn sheep to domestic sheep and goats carrying strains of these bacteria can have devastating results and examples of epizootic outbreaks of respiratory disease in relation to contact with domestic sheep or goats exist in the literature (Jessup 1985, Foreyt 1990,

Martin et al. 1996, Rudolph et al. 2003). Conversely, respiratory disease attributed to Pasteurellosis has occurred in the apparent absence of contact with domestic sheep or goats. The cause of those die-offs have been attributed to various forms of stress including overcrowding, poor nutrition, human disturbance, loss of habitat, weather conditions, infection with parasites such as lungworm (*Protostrongylus* spp) or mites (*Psoroptes ovis)* (Lange et al. 1980, DeForge 1981, Foreyt and Jessup 1982, Spraker et al. 1984, Clark and Jessup 1992, Bunch et al. 1999, Monello et al. 2001).

It is believed that wild sheep to wild sheep interactions may also lead to respiratory disease when exposure of naïve bighorn sheep to other bighorn sheep carrying different strains of bacterium occurs (Monello et al. 2001, Weiser et al. 2003, U-C Davis 2007). Therefore proximity of bighorn sheep to domestic sheep grazing areas and the connectivity of habitats between other herds and seasonal ranges play a critical role in management of respiratory disease (Monello et al. 2001). For those reasons it is critical for future management that we understand the distribution and dynamics of disease and their pathogens in Utah bighorn sheep.

Because of the aforementioned disease concerns, the Western Association of Fish and Wildlife Agencies (WAFWA) Wild Sheep Working Group published the "Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat" in 2007. Those guidelines clearly outline steps that should be taken by state wildlife agencies, federal land management agencies, wild sheep conservation organizations, domestic sheep and goat producers/permittees, and private landowners to reduce conflicts between wild sheep and domestic sheep and goats. The guidelines were updated in 2010 and once again in 2012. The 2012 WAFWA Wild Sheep Working Group recommendations for state wildlife agencies can be found in Appendix A of this plan. The complete and most updated version of the guidelines can be found at http://www.wafwa.org/html/wswg.shtml.

The Utah Division of Wildlife Resources recognizes the economic importance of the domestic sheep industry, and it is not the intent of this plan or the UDWR to force domestic sheep operators off of their ranges or out of business. Rather, the intent is to look for opportunities that will protect bighorn sheep populations while working with the domestic sheep industry. Utah FNAWS has been instrumental in resolving bighorn/domestic sheep issues, and their efforts have resulted in protection of many bighorn sheep populations by reducing the potential for the transmission of disease.

Response and control of a disease outbreak will be conducted using standardized current protocols for sampling and testing (Foster 2004, WAFWA Wildlife Health Committee (WHC), UC-Davis 2007). Accurate cause of death should be determined through a full necropsy when possible. All bighorn sheep that are exhibiting signs or symptoms of illness should be considered for removal from the population and the impacts of stressors on populations experiencing a disease outbreak should be determined and if possible lessened. The isolation of an affected sheep herd from other unaffected sheep herds should also be ensured.

B. Predation

Predators have played an important role in the evolution and development of adaptive strategies

in bighorn sheep (Geist 1999). However, predation can be a serious limiting factor to bighorn herd establishment or expansion. In some states excessive predation has resulted in substantial herd reductions (Wehausen 1996, Creeden and Graham 1997, Rominger et al. 2004). Mountain lions are the most significant predators of bighorns in Utah. Coyotes, bobcats, and golden eagles may occasionally take bighorn sheep but are not considered to be a serious threat to bighorn sheep herds.

Mountain lion populations should be managed at levels which will allow for the establishment of viable bighorn populations and allow bighorn population objectives to be met. That may require removal of mountain lions which are negatively impacting bighorn populations until herds are well established. In established small herds where mountain lion harvest is typically low or non-existent because of topography and access, a consistent effort to improve mountain lion harvest opportunity may need to be considered. These efforts could include not closing sheep units to harvest (i.e., no quotas) and maintaining a liberal policy of removing lions on sheep units when there is opportunity. In some cases, the use of USDA Wildlife Services or other contracted personnel may also be needed to help control cougar populations. Bighorn sheep unit management plans and predator management should specify conditions for predator management in bighorn areas.

C. Habitat Degradation or Loss

Bighorn habitat can be degraded, fragmented, or lost to a variety of causes including human disturbance, mineral development, and natural succession. Reductions in the quality or quantity of habitat can result in corresponding losses to bighorn populations (Deforge 1972, Hamilton et al. 1982). Human disturbance in bighorn sheep habitat is an increasing concern in many areas of Utah. Those disturbances include outdoor recreation activities such as off-road vehicle use, mountain biking, river running, and others. Bighorn sheep may change use areas and abandon certain habitats because of those disturbances. Human disturbance is also thought to be a possible stress inducer, which may lead to disease problems in some populations (DeForge 1981, Bunch et al. 1999).

Mineral development in bighorn habitat, if not properly regulated and mitigated, can result in direct loss of habitat. Mineral exploration for oil, gas, uranium, and other minerals has been extensive in bighorn areas. Habitat managers for the Bureau of Land Management and U.S. Forest Service need to carefully monitor and regulate those activities to avoid impacts on bighorn sheep.

Plant succession can also dramatically affect habitat quality. Encroachment by pinyon-juniper and other shrubs has resulted in the fragmentation and loss of large expanses of bighorn habitat. Vegetative treatments including fire management can restore and improve bighorn habitat to its condition prior to settlement times.

D. Wilderness and Park Management

Administration of wilderness areas and national parks has presented problems for bighorn sheep managers in some states (Arizona Game and Fish 1989 and Bleich 1999). Utah currently has a

good working relationship with federal land management agencies, which has allowed and promoted good bighorn sheep management programs. Future wilderness designation and park expansions should specifically allow for activities required for proper management of bighorn populations including the use of aircraft for surveys, transplants, research projects, and the ability to access and maintain water developments constructed specifically for bighorn sheep. It is critical to the future of bighorn sheep in those areas to maintain the use of those valuable management tools.

E. Poaching

Although poaching is not a problem for overall bighorn populations, it can have a detrimental effect on hunter harvest opportunities. Bighorn sheep are highly prized by hunters and legal hunting permits are difficult to obtain. Bighorns often inhabit very remote areas which are difficult to monitor and patrol. Thus, the incentives and opportunities for poaching exist.

F. Competition

Competition for forage and space by domestic livestock, feral animals, and other wild ungulates can impact bighorn populations (Bailey 1980). Competition is most likely to occur in crucial habitats such as winter ranges and lambing areas and during periods of extreme weather such as droughts or heavy snow. Competition with livestock for forage is minimal for most bighorn populations in Utah since bighorns utilize steep, rugged terrain generally not used by livestock. However, some feral animals, such as burros and goats, and some wild ungulates may use the same ranges as bighorn sheep making competition possible. Bighorn habitat should be monitored to assure proper range management and minimize competition.

G. Transplants

Transplanting bighorn sheep is a primary tool for restoration and management of bighorn populations. All bighorn sheep transplants in Utah will be done in accordance with Utah Code 23-14-21. Several issues need to be considered prior to releasing bighorns in new areas or into existing herds, and those issues are clearly stated in the 2012 WAFWA guidelines (Appendix A). Bighorns should only be released in areas where there is a good probability of success as determined by GIS modeling and habitat evaluations. Furthermore, a disease profile should be established for the source stock and any existing herds where those sheep may be released. Sufficient numbers should be released to assure genetic diversity and to help new herds reach self-sustaining levels as soon as possible. Additionally, source stocks should come from the nearest available source with similar habitat and disease profiles as the release site animals.

Utah has 32 units/subunits for bighorn sheep that serve as potential augmentation or reintroduction sites for bighorn sheep (Table 8). All suitable bighorn sheep habitat found within those units/subunits will be available for augmentation/reintroduction. The exact release site for transplanted sheep depends on accessibility and weather conditions and will be determined closer to the time of release.

Currently, the DWR obtains bighorn sheep for transplants from source herds within Utah as well

as surrounding western states and Canadian provinces. As Utah's bighorn sheep populations continue to grow, the DWR will work towards transplanting more sheep from Utah populations and reduce the reliance on sheep coming from out of state, with the ultimate goal of only using Utah bighorn sheep populations with known disease profiles as transplant source herds. This practice will also be important to minimize the number of bighorn sheep in thriving populations. Monello et. al (2001) found that 88% of pneumonia induced die-offs occurred at or within 3 years of peak population estimates. By using growing bighorn populations in Utah as source herds, the DWR will minimize the risk introducing a new disease to naïve populations and decrease the chances of having population die offs in both source and release herds.

As part of the reintroduction/transplant program within Utah, all bighorn sheep brought into Utah from other states will be tested for pathogens and antibodies for disease and must meet health requirements established by UDWR and the state veterinarian for the Utah Department of Agriculture and Food. All bighorn sheep relocated from source herds within the state will also be monitored for those same diseases to prevent the introduction of disease into wild or domestic sheep populations. Moreover, to prevent disease introduction, only wild sheep herds with known disease profiles will serve as source stock for intra and inter-jurisdictional transplants. The mixing of wild sheep from various sources will be evaluated and current protocols for sampling, testing, and responding to disease outbreaks will be used as a standard for Utah transplants (Foster 2004, WAFWA Wildlife Health Committee (WHC), UC-Davis 2007).

For all sheep used in relocation efforts, nasal and oro-pharyngeal swabs will be collected to test for *Pasteurella* spp. and *Mycoplasma* spp. Additionally, blood samples will be collected for brucellosis testing, antibody testing for various diseases of concern, and serum banking. Sheep used for all relocation efforts will be treated with the appropriate antibiotics, wormers, and vaccinations prior to release. Sheep exhibiting signs or symptoms of Psoroptic mange or contagious ecthyma will not be relocated and, instead, will be released at their capture site.

IV. USE AND DEMAND

Bighorn sheep are considered one of the most sought after and highly prized big game animals in North America. Demand for bighorn sheep hunting opportunities far exceeds the current availability of hunting permits (Table 4, Table 5). Currently in Utah, applications exceed available permits by 124:1 for residents and 2376:1 for nonresidents. Additionally, applications for both resident and nonresidents have increased every year since the initiation of Utah's draw system.

Great demand also exists for information concerning bighorn sheep and bighorn viewing opportunities. Many people who have no interest in hunting bighorns are very interested in learning more about bighorn sheep and observing them in the wild. Informational programs and viewing opportunities currently offered for bighorn sheep include DWR sheep viewing days and guided hikes at Antelope Island State Park.

Finally, public interest and legal mandates require management of bighorn sheep for their intrinsic value. Bighorn sheep are an important part of fragile ecosystems throughout Utah and should be properly managed regardless of recreational uses.

V. CONCLUSION

A fitting conclusion to this section of the plan is found in the book *Mountain Sheep of North American* by Raul Valdez and Paul Krausman (1999). It states:

> **"***Mountain sheep, like all other native fauna and flora, are part of the structure and heritage of North America. Despite all of the efforts exerted toward their conservation, wild sheep face a precarious future. They are an ecologically fragile species, adapted to limited habitats that are increasingly fragmented. Future conservation efforts will only be successful if land managers are able to minimize fragmentation. According mountain sheep their rightful share of North America and allowing them to inhabit the wilderness regions they require is a responsibility all Americans must shoulder. It is our moral and ethical obligation never to relent in the struggle to ensure their survival."*

VI. STATEWIDE MANAGEMENT GOALS AND OBJECTIVES

A. Population Management Goal: Establish optimum populations of bighorn sheep in all suitable habitat within the state.

Objective 1: Increase bighorn sheep populations within the state as conditions allow and bring all populations to at least the minimum viable level of 125 bighorns.

Strategies:

a. Develop or revise management plans for individual units with population goals and objectives.
b. Survey all herd units by helicopter every 2–3 years to monitor population size and composition.
c. Use population or sightability models to determine the relationship between population surveys and population size.
d. Augment existing populations where needed to improve herd distribution, link small populations, and improve genetic diversity (Table 8).
e. Transplant bighorn sheep to establish new populations in accordance with Utah Code 23-14-21 (Table 8).
f. Develop an annual transplant plan based on availability of bighorn sheep, release sites, and consistent with Table 8.
g. Reduce bighorn numbers in specific areas of concentration through trapping and transplanting programs to help reduce potential for disease problems.
h. In areas where transplants are not an option, explore the possibility of establishing ewe hunts to help reduce population densities or remove sheep in areas of high risk of contracting disease.
i. Establish a monitoring rotation for all bighorn sheep herds to establish background disease profiles for each herd. This information will be used to determine overall herd health and the compatibility of each herd for transplants.
j. Continue to document instances of interaction between wild sheep and domestic sheep and goats so that it allows conflicts to be evaluated and dealt with in a timely manner.
k. Follow established guidelines for dealing with domestic sheep and goats that wander into bighorn sheep units.
l. Participate in research efforts to find solutions to disease problems and low lamb survival.
m. Initiate predator management as specified in predator and bighorn sheep unit management plans. On remote or hard to access units, USDA Wildlife Services or other contracted personnel may be needed to help reduce cougar numbers.
n. Support law enforcement efforts to reduce illegal taking of bighorn sheep.

B. Habitat Management Goal: Provide good quality habitat for healthy populations of bighorn sheep.

Objective: Maintain or improve sufficient bighorn sheep habitat to allow herds to reach population objectives.

Strategies:

a. Identify crucial bighorn sheep habitats and work with land managers and private landowners to protect and enhance these areas.

b. Assist land management agencies in monitoring bighorn sheep habitat.
c. Work with land managers to minimize and mitigate loss of bighorn habitat due to human disturbance and development.
d. Initiate vegetative treatment projects to improve bighorn habitat lost to natural succession or human impacts.
e. Encourage land management agencies to use fire as a management tool to improve bighorn sheep habitat. When possible, allow fires that can have beneficial effects for bighorn sheep to burn.
f. Improve or maintain existing water sources and develop new water sources as needed to improve distribution and abundance of bighorn sheep.
g. Support research and monitoring efforts to evaluate bighorn sheep use of water sources to ensure the water sources are having the desired effect.
h. Work with land management agencies and private landowners to implement agency guidelines for management of domestic sheep and goats in bighorn areas similar to those proposed by the WAWFA Wild Sheep Working Group.
i. Support conservation groups' efforts to pursue conversions of domestic sheep grazing allotments by working with willing permittees in bighorn areas to minimize the risk of disease transmission.
j. Inform and educate the public concerning the needs of bighorn sheep including the effects of human disturbance and the need for habitat improvements.

C. Recreation Goal: Provide high quality opportunities for hunting and viewing bighorn sheep.

Objective 1: Increase hunting opportunities as populations allow while maintaining high quality hunting experiences.

Strategies:

a. Recommend permit numbers based on 12-15% of the counted ram population (yearling and older) or 30-40% of the counted rams 6 years of age or older.
b. When feasible, use subunits and multiple seasons to maximize hunting opportunities, distribute hunters, and minimize hunter conflicts.
c. Recommend hunting seasons to provide maximum recreational opportunity while not imposing on DWR management needs.
d. Maintain high hunter success rates (> 90%) and/or high hunter satisfaction on all units.
e. Monitor size and age class of all harvested rams.

Objective 2: Increase public awareness and expand viewing opportunities of bighorn sheep.

Strategies:

a. Evaluate existing public viewing areas and identify potential new sites.
b. Install interpretive signs in bighorn sheep areas for public information.
c. Produce written guides or brochures to help educate the public and provide viewing opportunities which will not impact bighorn sheep.
d. Continue and expand bighorn sheep viewing events for interested publics.

Figure 1. Current management units and bighorn sheep habitat/distribution, Utah 2013.

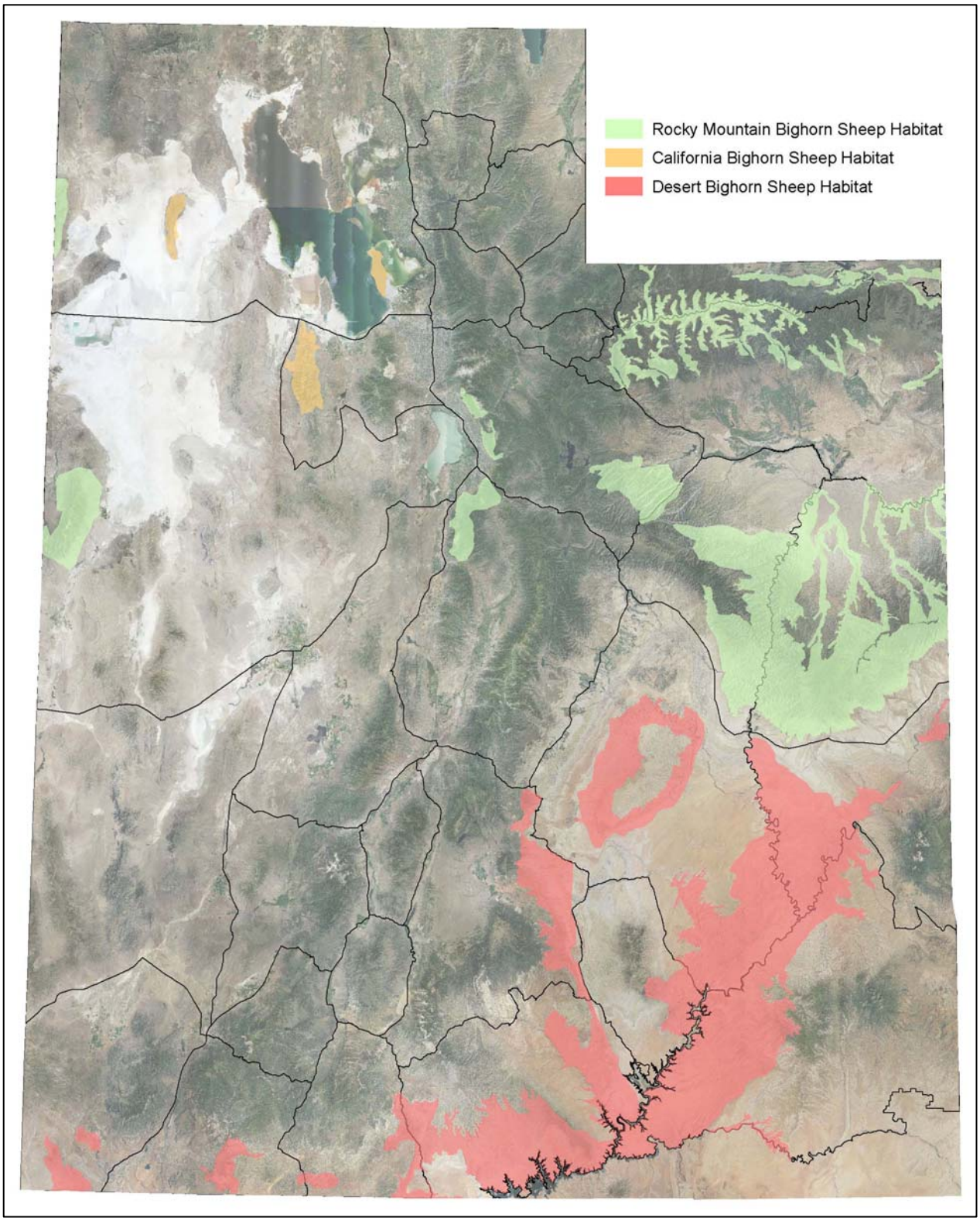

Figure 2. Statewide bighorn sheep population trends, Utah 2013.

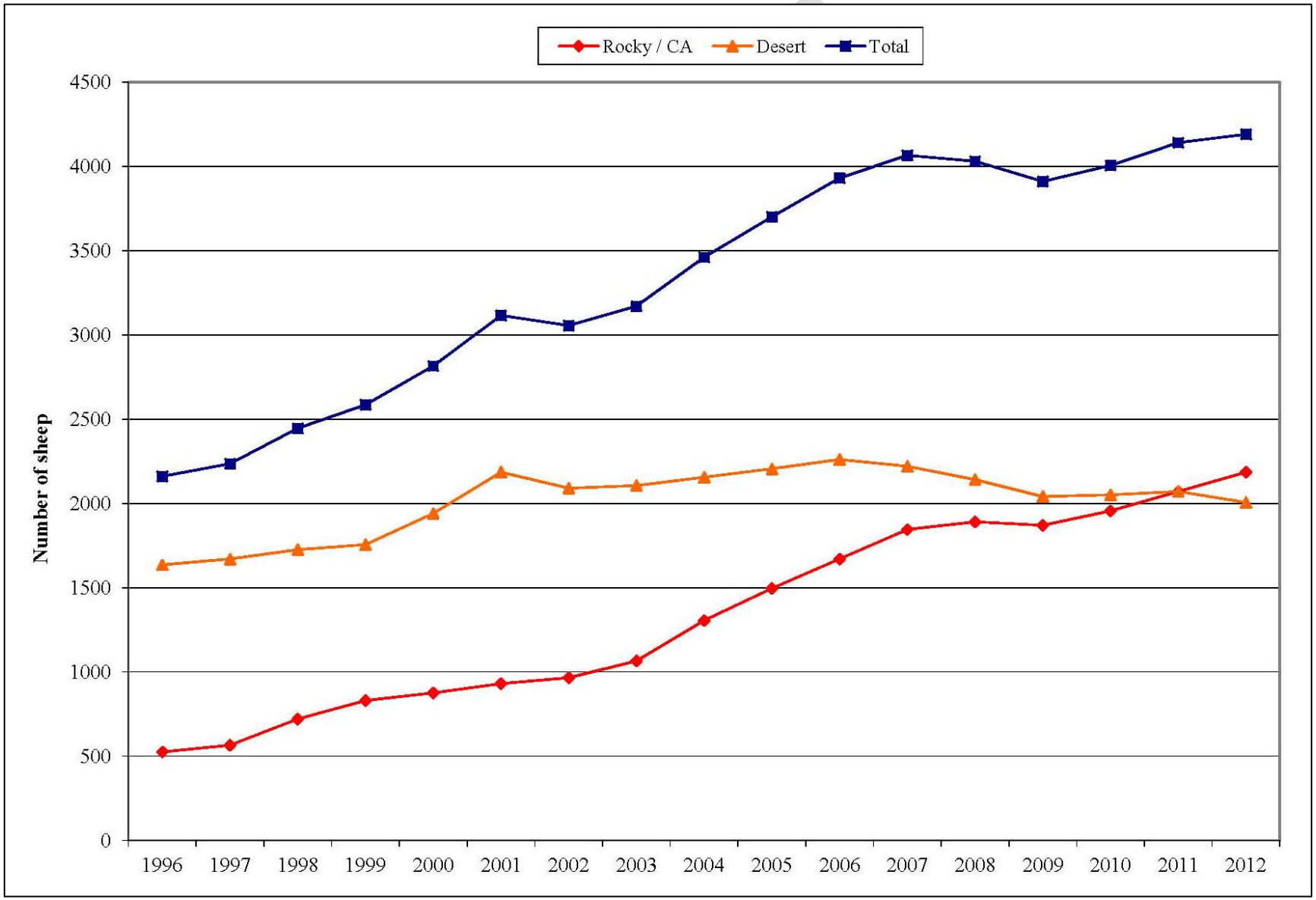

Table 1. Trend counts for Rocky Mountain and California bighorn sheep populations managed by UDWR, Utah 2007-2012.

Unit #	Unit name						
		2007	2008	2009	2010	2011	2012
1	Box Elder, Antelope Island	190	—	125	—	—	164
1	Box Elder, Newfoundland Mountains	135	—	173	—	—	198
8	North Slope, Bare Top Mountain	84	99	76*	104	72*	52*
8	North Slope, Goslin Mountain	79	33	0**	—	—	—
8	North Slope, Sheep Creek	37	53	32*	55	48*	61*
8	North Slope, Carter Creek/Red Canyon	27	20	32*	40	36*	39*
10	Book Cliffs, Rattlesnake	235	—	174	—	182	—
11	Nine Mile, Bighorn Mountain	346	—	384	—	418	—
16	Central Mountains, Nebo	35	26	22	—	—	—
17	Wasatch Mountains, Timpanogos	51	45	49	—	—	—
17	Wasatch Mountains, Provo Peak	41	12	7	—	—	—
17	Wasatch Mountains, Avintaquin	—	—	35	—	30	—
18	Oquirrh-Stansbury, Stansbury Mountains	70	137	—	—	—	163

*Incomplete count
**Population culled due to disease issues

Table 2. Trend counts for desert bighorn sheep populations managed by UDWR, Utah 2007-2012.

Unit #	Unit name						
		2007	2008	2009	2010	2011	2012
12	San Rafael, Dirty Devil	—	115	—	67	—	66
12	San Rafael, North	167	150	—	—	86	101
12	San Rafael, South	259	—	183	—	220	—
13	La Sal, Potash	—	105	—	118	—	69
14	San Juan, Lockhart	—	59	—	46	—	40
14	San Juan, North	—	—	—	17	—	13
14	San Juan, South	—	122	—	57	—	39
15	Henry Mountains, Little Rockies	—	54	—	24	—	63
26	Kaiparowits, Escalante	—	115	—	87	—	71
26	Kaiparowits, East / West	110	—	139	—	200	—
29	Zion	—	—	131	—	200	—
30	Pine Valley, Beaver Dam	38	23	—	73	—	72

Table 3. Summary of bighorn sheep hunting opportunities, Utah 1967–2012.

Year	Rocky Mountain Bighorns		Desert Bighorns	
	Hunters afield	Rams harvested	Hunters afield	Rams harvested
1967	No hunt	—	9	9
1968	No hunt	—	10	3
1969	No hunt	—	10	6
1970	No hunt	—	10	4
1971	No hunt	—	10	1
1972	No hunt	—	8	1
1973	No hunt	—	No hunt	—
1974	No hunt	—	No hunt	—
1975	No hunt	—	5	2
1976	No hunt	—	10	4
1977	No hunt	—	25	10
1978	No hunt	—	23	7
1979	No hunt	—	18	3
1980	No hunt	—	19	10
1981	No hunt	—	18	5
1982	No hunt	—	11	6
1983	No hunt	—	10	9
1984	No hunt	—	14	5
1985	No hunt	—	15	12
1986	No hunt	—	14	10
1987	No hunt	—	12	7
1988	No hunt	—	15	12
1989	No hunt	—	12	10
1990	No hunt	—	15	12
1991	3	3	13	10
1992	3	3	11	10
1993	6	6	17	17
1994	6	6	19	18
1995	6	6	30	30
1996	6	5	29	28
1997	3	3	29	28
1998	5	5	31	31
1999	4	4	32	31
2000	9	9	33	33
2001	12	12	30	30
2002	13	12	40	39
2003	13	13	44	43
2004	12	12	42	40
2005	13	13	40	39
2006	20	19	41	37
2007	22	22	45	40
2008	27	27	41	39
2009	28	28	41	37
2010	34	34	50	46
2011	37	37	54	46
2012	42	42	49	41

Table 4. Drawing odds of obtaining a Rocky Mountain bighorn sheep permit, Utah 1998–2012.

Year	Residents			Nonresidents		
	Applicants	Permits	Odds	Applicants	Permits	Odds
1998	283	3	1 in 94.3	0	0	—
1999	332	3	1 in 110.7	0	0	—
2000	414	6	1 in 69.0	0	0	—
2001	568	11	1 in 51.6	0	0	—
2002	831	10	1 in 83.1	0	0	—
2003	1063	10	1 in 106.3	932	1	1 in 932.0
2004	1166	9	1 in 129.6	0	0	—
2005	1354	11	1 in 123.1	0	0	—
2006	1793	15	1 in 119.5	0	0	—
2007	2192	16	1 in 137.0	1131	1	1 in 1131.0
2008	2381	21	1 in 113.4	1015	1	1 in 1015.0
2009	2547	21	1 in 121.3	4323	1	1 in 4323.0
2010	2828	25	1 in 113.1	4776	2	1 in 2388.0
2011	3205	26	1 in 123.3	5001	2	1 in 2500.5
2012	3603	30	1 in 120.1	5400	2	1 in 2700.0

Table 5. Drawing odds of obtaining a desert bighorn sheep permit, Utah 1998–2012.

Year	Residents			Nonresidents		
	Applicants	Permits	Odds	Applicants	Permits	Odds
1998	866	22	1 in 39.4	712	2	1 in 356.0
1999	1033	25	1 in 41.3	1026	2	1 in 513.0
2000	1292	27	1 in 47.9	1320	2	1 in 660.0
2001	1473	26	1 in 56.7	1583	2	1 in 791.5
2002	1997	33	1 in 60.5	2118	3	1 in 706.0
2003	2253	35	1 in 64.4	2266	3	1 in 755.3
2004	2653	32	1 in 82.9	3139	3	1 in 1046.3
2005	3051	32	1 in 95.3	3731	3	1 in 1243.7
2006	3467	33	1 in 105.1	3897	3	1 in 1299.0
2007	3814	35	1 in 109.0	4201	3	1 in 1400.3
2008	3827	33	1 in 116.0	3599	2	1 in 1799.5
2009	4042	33	1 in 122.5	5592	2	1 in 2796.0
2010	4386	40	1 in 109.7	6004	3	1 in 2001.3
2011	4367	39	1 in 112.0	6124	3	1 in 2041.3
2012	4607	36	1 in 128.0	6480	3	1 in 2160.0

Table 6. History of Rocky Mountain and California bighorn sheep transplants, Utah 1966–2013.

Unit #	Release Unit / Area	Year	# Released	Source
1	Box Elder, Antelope Island	1997	23	Kamloops, BC
1	Box Elder, Antelope Island	2000	6	Winnemucca NV
1	Box Elder, Newfoundland Mountains	2001	15	Antelope Island, UT
1	Box Elder, Newfoundland Mountains	2001	20	Antelope Island, UT
1	Box Elder, Newfoundland Mountains	2003	16	Antelope Island, UT
1	Box Elder, Newfoundland Mountains	2008	18	Antelope Island, UT
1	Box Elder, Pilot Mountain	1987	24	Basalt, CO
1	Box Elder, Pilot Mountain	1993	2	Bare Top Mountain., UT
1	Box Elder, Pilot Mountain	1998	13	Wells, NV
1	Box Elder, Pilot Mountain	1998	19	Contact, NV
3	Ogden, Box Elder Canyon	1966	14	Whiskey Basin, WY
3	Ogden, Box Elder Canyon	1966	20	Waterton, AB
3	Ogden, Box Elder Canyon	1969	12	Banff, AB
3	Ogden, Box Elder Canyon	1970	14	Banff, AB
8	North Slope, Bare Top Mountain	1983	19	Whiskey Basin, WY
8	North Slope, Bare Top Mountain	1984	17	Whiskey Basin, WY
8	North Slope, Sheep Creek	1989	21	Whiskey Basin, WY
8	North Slope, Sheep Creek	2000	6	Almont Triangle, CO
8	North Slope, Hoop Lake	1989	23	Whiskey Basin, WY
8	North Slope, Carter Creek / S Red Canyon	2000	10	Almont Triangle, CO
8	North Slope, Carter Creek / S Red Canyon	2001	18	Basalt, CO
8	North Slope, Carter Creek / S Red Canyon	2003	6	Desolation Canyon, UT
8	North Slope, Goslin Mountain	2005	34	Thompson Falls, MT
8	North Slope, Goslin Mountain	2007	42	Bonner, MT
10	Book Cliffs, Hill Creek	1970	9	Whiskey Basin, WY
10	Book Cliffs, Hill Creek	1973	12	Alberta, Canada
10	Book Cliffs, Hill Creek	1998	44	Kaleden, BC
10	Book Cliffs, Hill Creek	1998	20	Fowler, CO
11	Nine Mile, Bighorn Mountain	1993	26	Estes Park, CO
11	Nine Mile, Bighorn Mountain	1995	28	Georgetown, CO
11	Nine Mile, Jack Creek	2000	15	Bare Top Mountain., UT
11	Nine Mile, Jack Creek	2002	15	Sula, MT
11	Nine Mile, Trail Canyon	2009	40	Green River, UT
16	Central Mountains, Nebo	1981	27	Whiskey Basin, WY
16	Central Mountains, Nebo	1982	21	Whiskey Basin, WY
16	Central Mountains, Nebo	2004	18	Augusta, MT
16	Central Mountains, Nebo	2007	25	Augusta, MT
17a	Wasatch Mountains, Timpanogos	2000	25	Rattlesnake, UT
17a	Wasatch Mountains, Timpanogos	2001	10	Hinton, AB
17a	Wasatch Mountains, Timpanogos	2002	9	Sula, MT
17a	Wasatch Mountains, Timpanogos	2007	20	Sula, MT
17a	Wasatch Mountains, Timpanogos	2007	18	Forbes, CO
17a	Wasatch Mountains, Provo Peak	2001	22	Hinton, AB
17a	Wasatch Mountains, Provo Peak	2007	10	Sula, MT / Augusta, MT
17c	Wasatch Mountains, Lake Canyon	2009	30	Augusta, MT
17c	Wasatch Mountains, Indian Canyon	2009	30	Augusta, MT
18	Oquirrh-Stansbury, Stansbury Mountains	2005	12	Antelope Island, UT
18	Oquirrh-Stansbury, Stansbury Mountains	2006	44	Antelope Island, UT
18	Oquirrh-Stansbury, Stansbury Mountains	2008	36	Antelope Island, UT
19	West Desert, Deep Creek Mountains	1984	16	Whiskey Basin, WY
19	West Desert, Deep Creek Mountains	1989	14	Whiskey Basin, WY

Table 7. History of desert bighorn sheep transplants, Utah 1966–2013.

Unit #	Release Unit / Area	Year	# Released	Source
12	San Rafael, Dirty Devil	1991	22	North San Rafael, UT
12	San Rafael, Dirty Devil	1994	15	Potash, UT
12	San Rafael, Dirty Devil	1996	17	Potash, UT
12	San Rafael, Dirty Devil	2003	25	San Rafael, South, Chimney Cyn, UT
12	San Rafael, Dirty Devil	2007	15	San Rafael, South, UT
12	San Rafael, Dirty Devil	2007	15	Escalante, Steven's Canyon, UT
12	San Rafael, Maze (CNP)	1983	23	Island in the Sky, CNP, UT
12	San Rafael, Maze (CNP)	1985	2	Canyonlands NP, UT
12	San Rafael, North	1979	12	San Juan Unit, UT
12	San Rafael, North	1982	11	Island in the Sky, CNP, UT
12	San Rafael, North	1986	6	Canyonlands NP, UT
12	San Rafael, North	1986	18	Canyonlands NP, UT
12	San Rafael, North	1988	10	Coal Wash, UT
12	San Rafael, North Wash	1996	21	South San Rafael, UT
12	San Rafael, North Wash	1997	13	Escalante, UT
12	San Rafael, South	1983	12	Island in the Sky, CNP, UT
12	San Rafael, South	1984	16	Potash, UT
12	San Rafael, South	1985	12	Island in the Sky, CNP, UT
12	San Rafael, South	1997	4	Escalante, UT
12	San Rafael, South	1998	6	Escalante, UT
13	La Sal Potash	1991	10	Potash, UT
13	La Sal, Arches National Park	1985	6	Canyonlands NP, UT
13	La Sal, Arches National Park	1986	19	Canyonlands NP, UT
13	La Sal, Dolores Triangle	1979	7	San Juan Unit, UT
13	La Sal, Dolores Triangle	1990	20	River Mountains, NV
14	San Juan, Johns Canyon	2008	19	San Juan, South, Hite, UT
14	San Juan, Johns Canyon	2008	11	La Sal, Potash, Crystal Geyser, UT
14	San Juan, Johns Canyon	2013	16	Big Bend, Moab, UT
14	San Juan, North	1998	6	Escalante, UT
14	San Juan, North	1999	12	Lake Mead, NV
14	San Juan, North	1999	13	Lake Mead, NV
15	Henry Mountains, Little Rockies	1985	18	Canyonlands NP, UT
15	Henry Mountains, Little Rockies	1985	12	Red Canyon / White Canyon, UT
25/26	Capitol Reef National Park	1984	21	Island in the Sky, CNP, UT
25/26	Capitol Reef National Park	1985	10	Canyonlands NP, UT
25/26	Capitol Reef National Park	1996	20	Island in the Sky, CNP, UT
25/26	Capitol Reef National Park	1997	20	Island in the Sky, CNP, UT
26	Kaiparowits, East	1980	20	Cataract/White Canyons, UT
26	Kaiparowits, East	1982	12	Canyonlands NP, UT
26	Kaiparowits, East	1993	13	Escalante, UT
26	Kaiparowits, East	1995	17	Escalante, UT
26	Kaiparowits, East	2009	20	Lake Mead, NV
26	Kaiparowits, East	2012	25	River Mountains, NV
26	Kaiparowits, East	2012	25	Muddy Mountains, NV

Table 7. History of desert bighorn sheep transplants, Utah 1966–2013 (cont.).

Unit #	Release Unit / Area	Year	# Released	Source
26	Kaiparowits, Escalante	1975	4	Gypsum Canyon, UT
26	Kaiparowits, Escalante	1976	12	Gypsum Canyon, UT
26	Kaiparowits, Escalante	1978	7	Cataract Canyon, UT
26	Kaiparowits, Escalante	1986	4	Canyonlands NP, UT
26	Kaiparowits, Escalante	1995	6	Escalante, UT
26	Kaiparowits, Escalante	1998	7	Escalante, UT
26	Kaiparowits, Escalante	1995	18	Escalante, UT
26	Kaiparowits, West	1995	21	Black Mountains, AZ
26	Kaiparowits, West	1995	2	Escalante, UT
26	Kaiparowits, West	1999	21	Lake Mead, AZ
26	Kaiparowits, West	2000	20	Lake Mead, NV
26	Kaiparowits, West	2006	20	Fallon, NV
26	Kaiparowits, West	1995	2	Escalante, UT
26	Kaiparowits, West	1996	20	Lake Mead, NV
29	Zion	2013	19	Zion, UT
29	Zion National Park	1973	12	Lake Mead, NV
30	Pine Valley, Beaver Dam	1994	25	Lake Mead, AZ

Table 8. Potential bighorn sheep transplant sites. Utah 2013.[1] All suitable bighorn sheep habitat within the following units/subunits will be considered for augmentation/reintroduction.

Rocky Mountain / California Bighorn Sheep

Augment existing populations/management units to meet population management objectives, including:

Book Cliffs
Central Mountains – Nebo
Ninemile – Range Creek
North Slope – Summit, Three Corners, West Daggett
Oquirrh-Stansbury – Stansbury Mountains
Wasatch Mountains – Avintaquin, Rocky Canyon, Timpanogos
West Desert – Deep Creek Mountains

Reintroduction areas to establish new populations:

Beaver – Mineral Mountains
Book Cliffs – South
Fillmore – Oak Creek
South Slope – Diamond Mountain, Vernal, Yellowstone

Desert Bighorn

Augment existing populations/management units to meet population management objectives, including:

San Rafael – Dirty Devil, North, South
San Juan – Lockhart, North, South
Henry Mountains
La Sal – Potash, Dolores Triangle
Kaiparowits – East, Escalante, West
Paunsaugunt – Paria River
Zion
Pine Valley

Reintroduction areas to establish new populations:

Paunsaugunt
San Juan – San Juan River

[1] In accordance with Utah Code 23-14-21.

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APPENDIX A. WAFWA Wild Sheep Working Group "Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat"

Recommendations to WAFWA Agencies

- Historic and suitable but currently unoccupied wild sheep range should be identified, evaluated, and compared against currently-occupied wild sheep distribution and existing or potential areas where domestic sheep or goats may occur.

- Risk assessments should be completed at least once per decade (more often if warranted) for existing and potential wild sheep habitat. These assessments should specifically identify where and to what extent wild sheep could interface with domestic sheep or goats, and the level of risk within those areas.

- Following completion of site or herd-specific risk assessments, any translocations, population augmentations, or other restoration and management strategies for wild sheep should minimize the likelihood of association between wild sheep and domestic sheep or goats. Agencies should:

    - Avoid translocations of wild sheep into areas with no reasonable likelihood of effective separation from domestic sheep or goats.

    - Re-evaluate planned translocations of wild sheep to historical ranges as potential conflicts, landscape conditions, and habitat suitability change.

    - Recognize that augmentation of a wild sheep herd from discrete source populations poses a risk of pathogen transfer (CAST 2008) and thus, only use source stock verified as healthy through a proper health assessment (WAFWA 2009) for translocations. Source herds should have extensive health histories and be regularly monitored to evaluate herd health. Wild sheep managers should evaluate tradeoffs between anticipated benefits such as demographic, behavioral and genetic interchange, and the potential consequences of mixing wild sheep from various source herds.

    - Develop and employ mapping or modeling technology as well as ground based land use reviews prior to translocations to compare wild sheep distribution and movements with distribution of domestic sheep or goats. If a translocation is implemented and association with domestic sheep or goats occurs, or is likely to occur beyond an identified timeframe or pre-determined geographic area, domestic sheep or goat producers should be held harmless.

- The higher the risk of association between wild sheep and domestic sheep or goats, the more intensively wild sheep herds should be monitored and managed. This is particularly important when considering "new" vs. "augmented" wild sheep populations.

    - Site-specific protocols should be developed when association with domestic sheep or goats is probable. For example, decisions concerning percentage of translocated wild

sheep that must be radio-collared for achieving desired monitoring intensities should in part, be based upon the subsequent level of risk of association with domestic sheep or goats.

  - Intensive monitoring provides a mechanism for determining proximity of wild sheep to domestic sheep or goats and for evaluating post-release habitat use and movements.

  - Budgets for wild sheep translocation projects should include adequate funding for long-term monitoring.

- Wild sheep managers should identify, analyze, and evaluate the implications of connectivity and movement corridors between largely insular herds comprising a meta-population against opportunities for increased association with domestic sheep or goats. Analyses should include distribution and continuity (Mack 2008) among populations of wild sheep and the anticipated frequency of movement among or within wild sheep range. In doing so, the benefits of genetic interchange and its resultant implications for population viability, must be weighed against the risks of disease transmission (Bleich et al. 1990), especially if dispersing or wandering wild sheep could travel across domestic sheep or goat grazing allotments or trailing routes, private land holdings or other areas where the potential transfer of endemic pathogens from an infected wild herd to a naïve herd could occur.

- Removal of wild sheep known, or suspected to have closely associated with domestic sheep or goats is considered to be an effective management tool. Atypical movements by wild sheep can heighten risk of association with domestic sheep or goats. Additional measures to achieve effective separation should be implemented if such association occurs. However, removal of wild sheep from occupied, normally-anticipated wild sheep range is not always the best management option. Continuous risk of association exists during active grazing seasons when domestic sheep or goats are grazed within normally-anticipated wild sheep range. Thus, removal of individual wild sheep is an ineffective method for maintaining separation, and has potentially negative consequences for population viability. Removal of wild sheep should occur only after critical evaluation and further implementation of measures designed to minimize association and enhance effective separation.

- Wild sheep populations should have pre-determined population objectives, and should be managed at agreed-upon densities to minimize the potential for dispersal. Because some dispersal occurs regardless of population density, some risk of association is always present if domestic sheep or goats are within range of dispersing wild sheep.

- Agencies should develop a written protocol to be implemented when association between wild sheep and domestic sheep or goats is confirmed. Notification requirements, appropriate response and post-contact monitoring options for both domestic sheep and goats and dispersing or wandering wild sheep should be included. Moreover, wildlife agencies should collaborate with agricultural agencies, land management agencies, producers and permittees, grazing industry representatives, and wild sheep advocates to develop an effective, efficient, and legal protocol to be implemented when feral or abandoned domestic sheep or goats threaten to associate with wild sheep but for which no owner can be identified. Written

protocol examples are provided in Appendix B (British Columbia Fish, Wildlife and Habitat Management Branch) and Appendix C (Wyoming Game and Fish Department).

- Wildlife agencies should develop databases as a system to report, record, and summarize association between wild sheep and domestic sheep or goats and its outcome; the WAFWA WSWG website (http://www.wafwa.org/html/wswg.shtml) would be a logical host. Further, wildlife managers and federal/crown land managers should encourage prompt reporting by the public of observed proximity between wild sheep and domestic sheep or goats.

- Wild sheep managers should coordinate with local weed or pest management districts, or other applicable agencies or organizations involved with weed or vegetation management, to preclude the use of domestic sheep or goats for noxious weed or vegetation control in areas where association with wild sheep is likely to occur. Agencies should provide educational information and offer assistance to such districts regarding disease risks associated with domestic sheep or goats. Specific guidelines (Pybus et al. 1994) have already been developed and implemented in British Columbia, and are available at: http://www.for.gov.bc.ca/hfp/publications/00006/.

- Specific protocols for sampling, testing prior to translocation, and responding to disease outbreaks should be developed and standardized to the extent practical across state and federal jurisdictions. Several capture and disease-testing protocols have been developed and are available to wild sheep managers (Foster 2004, UC-Davis 2007, WAFWA 2009). Protocols should be reviewed and updated as necessary by the WAFWA Wildlife Health Committee (WHC) and presented to WAFWA Directors for endorsement. Once endorsed, agencies should implement the protocols, and the WHC should lead an effort to further refine and ensure implementation of said protocols.

- Agencies should coordinate and pool resources to support the ongoing laboratory detection and interpretation of important diseases of wild sheep. Furthermore, wild sheep managers should support data sharing and development and use of standardized protocols (WAFWA 2009). Interagency communication between wildlife disease experts such as the WAFWA Wildlife Health Committee (WHC) should be encouraged to enhance strategies for monitoring, managing and improving health of wild sheep populations through cooperative efforts.

- Wild sheep management agencies should develop educational materials and outreach programs to identify and interpret the risk of association between wild sheep and domestic sheep or goats for producer groups, owners of small and large farm flocks, animals used for packing and 4-H animals. In some cases, regulation may be necessary to maintain separation.

UTAH MOUNTAIN GOAT
STATEWIDE MANAGEMENT PLAN

UTAH DIVISION OF WILDLIFE RESOURCES
DEPARTMENT OF NATURAL RESOURCES

UTAH DIVISION OF WILDLIFE RESOURCES
STATEWIDE MANAGEMENT PLAN FOR MOUNTAIN GOAT

I. PURPOSE OF THE PLAN

A. General

This document is the statewide management plan for mountain goats in Utah. The plan will provide overall guidance and direction to Utah's mountain goat management program. The plan assesses current information on mountain goats, identifies issues and concerns relating to mountain goat management in Utah, and establishes goals and objectives for future mountain goat management programs. Strategies are also outlined to achieve the goals and objectives. This plan will be used to help determine priorities for mountain goat management and provide the overall direction for management plans on individual mountain goat management units throughout the state.

B. Dates Covered

The mountain goat plan will be in effect for 5 years upon approval of the Wildlife Board. (Expected dates covered: June 2013 – June 2018).

II. SPECIES ASSESSMENT

A. Natural History

Mountain goats (*Oreamnos amreicanus*) are not true goats as the name suggests, but share the family Bovidae with true goats (*Capra* spp.), gazelles (*Gazella* spp.) and cattle (*Bos* spp.). They are in the subfamily Caprinae along with 32 other species including sheep (*Ovis* spp.) and muskoxen (*Ovibos* spp.). Mountain goats are the only living species in the genus *Oreamnos*.

Mountain goat males, females, and young are known as billies, nannies, and kids, respectively. Kids are born after a gestation period of approximately 190 days most often as singles, but twins are not uncommon. Kids are normally born in mid-May to early-June. Compared to similarly sized ungulates, mountain goats have a surprisingly late age of first reproduction. In established populations, females often do not give birth until 4 or 5 years old (Festa-Bianchet et al. 1994). In newly translocated populations, females can reproduce as early as 2 or 3 years old (Bailey 1991, Festa-Bianchet and Cote 2008).

Like many ungulates, mountain goats put on weight and fat reserves during the spring and summer months for use during winter. As such, weights vary greatly depending on when they are taken. In late summer, a typical mature male will weigh about 175-225 pounds. Females are smaller and typically average between 125 and 150 pounds. Both males and females continue to gain body mass until about 6 years old when they are considered fully grown. The maximum life span of mountain goats is typically around 15 years old for males and 18–20 years old for females (Festa-Bianchet and Cote 2008).

Both male and female mountain goats have horns. For both sexes, horn growth begins at birth and the vast majority of horn growth occurs during the first 3 years of life. Horn growth for mature adult goats (4+) is minimal. There is little sexual dimorphisms exhibited in mountain goats. Horn length of males and females is similar, but male horns tend to be 10-20% thicker at the base than females (Festa-Bianchet and Cote 2008).

The mating period for mountain goats peaks in mid-November and individual females come into estrus for about 2 days. During this time, males seek out females in estrus and defend them from other males. Unlike most ungulates where males fight by clashing or locking horns or antlers, mountain goats have an antiparallel fighting style. During these interactions, males circle each other with each goats head aligned with the others rump. Outside the mating season, males and females remain segregated.

B. Management

1. DWR Regulatory Authority

The Utah Division of Wildlife Resources presently operates under authority granted by the Utah Legislature in Title 23 of the Utah Code. The Division was created and established as the wildlife authority for the state under Section 23-14-1 of the Code. This Code also vests the Division with its functions, powers, duties, rights, and responsibilities. The Division's duties are to protect, propagate, manage, conserve, and distribute protected wildlife throughout the state.

The Utah Division of Wildlife Resources is charged to manage the state's wildlife resources and to assure the future of protected wildlife for its intrinsic, scientific, educational, and recreational values. Protected wildlife species are defined in code by the Utah Legislature.

2. Population Status

Mountain goats currently inhabit several mountain ranges in Utah including numerous peaks along the Wasatch Front, Uinta Mountains, and Tushar Mountains (Figure 1). All populations are the result of introductions; the first of which occurred in 1967 when 6 mountain goats (2 billies, 4 nannies) were released in the Lone Peak area (Table 1). Within Utah, 24 separate transplant events have occurred and 185 mountain goats have been released. Initial transplants used mountain goats from Olympic National Park in Washington as the source herd. After those transplanted herds became established, they became source herds for future transplants. The Tushar Mountains population has been the most common Utah source herd because of its rapidly growing population and relative ease of accessibility. As a result of the transplants, mountain goat populations in Utah have steadily increased since 1967 to their current population of more than 2000 estimated animals (Figure 2).

3. Past and Current Management

In Utah, mountain goat populations are surveyed via helicopter every 2-3 years (Table 2). During these flights, biologists survey all potential mountain goat habitat in August or September and classify all observed animals as billies, nannies, or kids. Previous studies have shown that

sightability is usually around 80-85% for mountain goats (Rice et al. 2009). In addition to the helicopter surveys, most biologists conduct ground-based or fixed-wing classification counts on units during years when they are not surveyed with a helicopter. This provides biologists with data on annual production and greatly improves our population models for those units.

Mountain goats are managed as an once-in-a-lifetime species in Utah. The first mountain goat hunt in Utah was held on Lone Peak in 1981 where 1 permit was issued. Since 1981, permits have steadily increased as populations of mountain goats increased reaching a high of 175 in 2012 (Table 3). From 1981 to 2012, a total of 1231 permits have been issued resulting in the harvest of 1176 mountain goats (794 billies, 382 nannies). Success rates for mountain goats in Utah are high and average 97%. In 2012, mountain goat hunting was allowed on 11 of the 12 areas where goats are present. The only unit without hunting was the Central Mountains - Loafer Mountain/Mount Nebo Unit, where mountain goats were initially transplanted in 2007. On the Beaver and Ogden units, where we are attempting to control goat populations, we have issued nanny-only permits in addition to any-goat permits. These permits require taking an online course to help differentiate males from females. On units where population control is not needed, any goat permits have been issued to harvest any adult goat. Historically, 79 percent of mountain goat hunters with any-goat permits have harvested billies. The average age of mountain goats harvested in Utah is 4.4 years old in 2012 (Table 4). Demand for permits is extremely high making these permits difficult to draw (Table 5). In 2012, a total of 7999 hunters applied for the 161 public draw permits available resulting in drawing odds of 1 in 50.

C. Habitat

Mountain goats are obligate occupants of the highest alpine environments in Utah. Elevations of up to 13,000 feet are frequented in summer, and winter habitat may be high as 12,000 feet on windblown ridges of some units. Exposed, precipitous cliffs are an essential component of mountain goat habitat. Mountain goats typically prefer sites that are close to escape terrain with an intermediate slope typically between 20 and 50 degrees (Gross et al. 2002). Suitable sites encompass most aspects of mountain goat habitat needs including escape terrain, feeding sites, and birthing and nursery areas.

Food habits of goats are extremely variable among different geographic populations. In general, summer diets are typically dominated by succulent grasses and forbs. Winter diets may include a much higher browse or shrub component, and may even include Ponderosa pine, lodgepole pine, or alpine fir. Other components of goat habitat that may be locally important include mineral licks and dusting areas used to alleviate heat or ectoparasite load.

III. ISSUES AND CONCERNS

A. Native Status

The native status of mountain goats in Utah is debatable and subject to controversy. An analysis of available information is included as an appendix to this document (Appendix A). Regardless of their native status to Utah, they are certainly native to the North American continent and the Northern Rocky Mountains. The DWR's position is that mountain goat habitat exists in Utah, as

indicated by the success of introduced populations. As such, the DWR believes mountain goats are a valuable addition to our wildlife resource diversity and are a legitimate part of our modern Utah faunal landscape. As with any other ungulate species in our now pervasively human-altered ecosystem, they require pro-active management.

B. Habitat Impacts

Given the fragile nature of alpine habitats, mountain goat utilization of the available forage must be closely monitored. Although goat densities are typically low, local areas may exhibit heavier use and cause resource damage. If mountain goat use is demonstrated to be excessive, the Division must work cooperatively with the Forest Service to manage goat populations to acceptable numbers. As part of this plan, target population sizes for individual goat herd units will be reviewed for existing management units or developed for new units. Public input, cooperation with the Forest Service, and habitat monitoring data will all be used to determine the target population size.

In addition to their direct utilization of forage, the creation of dust bowls by mountain goats has been identified as a potential habitat concern. In Olympic National Park, large concentrations of goats have created extensive dusting areas. However, this occurred in an unmanaged and unhunted population, and those goat densities have never been observed outside the Park. As such, it is likely that this issue only arises in unregulated populations. Under most conditions, goats disturb far less area than that observed in Olympic National Park. Where localized disturbance occurs, it is considered normal goat behavior. Comparable disturbance is observed at elk wallows and on bighorn sheep lambing and wintering cliffs, even at low population densities. Livestock use of salt blocks or water developments can also result in similar disturbance on a larger scale.

C. Disease

Little information is available relative to disease in mountain goats (Cote and Festa-Bianchet 2003). However, there are some documented occurrences of disease that may be of concern for mountain goats in Utah including contagious ecthyma, Johnes disease, and respiratory pneumonia. Contagious ecthyma is a highly contagious parapox virus that causes blister-like sores to form on the face and muzzle of infected animals. The virus can lay dormant in soil for long periods of time and enters the host through skin abrasions. Lesions can be extremely painful causing an animal to not feed, leading to emaciation and ultimately death. It is believed that mountain goats may suffer severely from this disease with documented outbreaks resulting in deafness, blindness, and ultimately death (Samuel et al. 1975). Lesions typically last about 2-4 weeks after which an animal may recover. This disease has been observed in domestic sheep flocks for over 200 years (Lance et al. 1981).

Between 1972 -1978, the Colorado Division of Wildlife collected several bighorn sheep and a sympatric mountain goat carcass with lesions consistent with infection from the bacteria *Mycobacterium avium*, commonly referred to as Johnes disease or paratuberculosis (Williams et al. 1979). Mountain goats are believed to be highly susceptible to the disease, leading to severe gastrointestinal distress, emaciation, dry or rough hair coat, and death (Williams et al. 1983).

The disease primarily affects lambs and transmission of the disease may occur *in utero* or in the first few months of life through ingestion of contaminated food, water, dust, or feces (Kimberling 1988). This disease is most commonly associated with cattle; however adult sheep, goats, and llamas can be carriers (Garde et al. 2005).

Respiratory pneumonia associated with *pasteurella* spp. and *mannheimia* spp. of bacterium have been reported sporadically in mountain goats, but large scale die-offs have rarely been documented (Garde et al 2005). Several strains of the bacteria are carried as common commensals in the upper respiratory tract. Transmission of these bacteria can occur through direct contact or aerosolization (Garde et al. 2005). In 2010, the Nevada Department of Wildlife documented a pneumonia related die-off in mountain goats and sympatric bighorn sheep in the Ruby Mountains (Peregrine Wolff, personal communication Nevada Department of Wildlife). Other concerns include myopathy that may result from selenium deficiency (Cote and Festa-Bianchet 2003) and possibly some parasites such as lungworm.

D. Predation

Predation does not seem to be a limiting factor to mountain goat population growth in Utah. This is likely due to the absence of many mountain goat predators from Utah. Festa-Bianchet and Côté (2008) found that grizzly bears (*Ursus arctos*), wolves (*Canis lupus*) and cougars (*Puma concolor*) were the most effective predators of mountain goat in British Columbia. Cougars are potential predators of mountain goats in Utah, but are more likely to target easier prey such as mule deer, elk, and bighorn sheep. If predation is shown to be an issue on a particular unit, the DWR can increase predator hunting pressure in specific areas or establish a predator management plan for that unit.

E. Wilderness and Park Management

Many wilderness areas in Utah currently have populations of goats resulting from transplant efforts. These areas include the High Uintas, Lone Peak, Mt. Olympus, Twin Peaks, and Mt. Timpanogos. In order to properly manage mountain goat populations in these areas, it is critical that biologists have all possible management tools available to them if needed. These include but aren't limited to the use of aircraft for surveys, transplants (captures and releases), and research projects. Any future wilderness designations or park expansions should also allow for these activities. The Division must continue to work cooperatively with the U.S. Forest Service to ensure the proper management of mountain goats in these areas.

F. Competition with Bighorn Sheep

Mountain goats and Rocky Mountain bighorn sheep typically occur in broadly similar habitats, at similar elevations, and consume many of the same forages. Thus, the potential exists for competition between these two species, particularly when seasonal habitat overlap occurs (Hobbs et al. 1990, Laundre 1994, Gross 2001). However, even where both are present, resource partitioning appears to minimize conflicts (Laundre 1994). Specifically, there is enough disparity in site selection, seasonal use, and forage preference such that range overlap does not

result in as much direct competition as expected when each species' habitat requirements are considered separately.

In Utah, sympatric bighorn sheep and goat populations are found only in the eastern Uinta Mountains and to a lesser extent along the Wasatch Front. In this area, the abundance of alpine habitat combined with the low densities of mountain goats and bighorn sheep, greatly minimizes any interspecies competition. Range overlap of mountain goats and bighorn sheep does not currently occur in other areas of Utah, largely due to domestic and wild sheep disease issues that prohibit wild sheep. In some areas, there is also a general lack of suitable bighorn sheep wintering areas.

G. Poaching

Poaching of mountain goats is less common than other ungulate species due to the remote nature of their habitat. There are some documented cases of mountain goat poaching in Utah, but they are rare. Poaching likely has no population level effect, but does reduce hunting opportunity for law abiding hunters. Mountain goat populations are small and due to their low reproductive rate, only a small proportion of the population can be harvested. With less than 200 permits currently issued, one poached animal is proportionately a large loss in opportunity.

Most poaching cases of mountain goats occur when a hunter with a female-only permit mistakenly identifies an animal and accidentally harvest a male. Typically, the hunters report their mistake, but this situation can lead to overharvesting males if this becomes too prevalent. Other poaching incidents usually occur when a hunter cannot access the goat he shot due to the rugged terrain or the animal was damaged from falling after it was shot. The Division investigates all reported poaching cases. The high profile nature of mountain goats and their limited distribution adds concern to these investigations.

H. Transplants

All of the mountain goat populations that currently exist in Utah are a result of transplants. Although mountain goats can pioneer to new areas when densities are sufficiently high, transplants continue to be the preferred method used to establish new mountain goat populations and supplement existing ones. Mountain goat transplants in Utah have typically been successful provided the habitat on the site is suitable and a sufficient number of goats have been released. Although most suitable mountain goat habitat in Utah is already occupied, several potential sites for new transplants still exist (Table 6). Additionally, some existing units may need to be augmented to bolster population growth. It is critical that the Division work closely with the U.S. Forest Service to ensure the success of any future relocation efforts. Careful monitoring of vegetation will be needed to make sure habitat damage is not occurring and to alleviate any concerns.

There are a number of mountain goat populations in Utah that could serve as source herds for augmentation or to start new populations within Utah or for other states. On many of these populations, wilderness designated lands are one of the largest barriers to catching animals. The

Division and U.S. Forest Service will need to work cooperatively to determine the suitability of helicopter access for possible transplant projects.

IV. USE AND DEMAND

In Utah mountain goats are one of the easier to draw permits for an once-in-a-lifetime species, likely due to the extremely rugged terrain they inhabit. Even so, the demand for these permits is still high and far exceeds permit supply. In Utah for 2012, applications exceeded available permits by 29:1 for residents and 222:1 for nonresidents. Applications for both resident and nonresidents have increased every year since the initiation of Utah's draw system. In recent years, draw odds have improved because the growing populations have allowed the DWR to issue more permits while still providing a quality hunting experience.

In addition to hunting, viewing mountain goats is one of the most exhilarating and memorable experiences available to users of high alpine areas in Utah. The closeness of some of Utah's mountain goat populations to the Wasatch front helps contribute to the interest of wildlife viewers in watching mountain goats. Public perception of goat viewing opportunities is overwhelmingly positive, and the Watchable Wildlife events for mountain goats are some of the most popular events hosted by the DWR. The Division's goal is to foster and promote these opportunities wherever possible and enable people to see this unique species.

V. CONCLUSION

Mountain goats personify the high lonesome reaches of western North America. Goats are adapted to live in the highest, coldest, snowiest and most precipitous reaches of our classic western mountain ranges. The image of a solitary goat on a ridiculously narrow rock ledge on a seemingly inaccessible cliff is one that once seen is never forgotten. For nearly 50 years, the Division of Wildlife Resources has carefully managed Utah's mountain goat populations so herds are productive and balanced with available habitat. The Division plans to continue this management approach, while also establishing new mountain goat populations where possible. This will allow the Division to expand both hunting and viewing opportunities for mountain goats while ensuring their long-term viability in Utah.

VI. STATEWIDE MANAGEMENT GOALS AND OBJECTIVES

A. Population Management Goal: Establish optimum populations of mountain goats in all suitable habitat within the state.

Objective 1: Increase mountain goat populations within the state as conditions allow. Once unit objectives are established, bring all populations to objective.

Strategies:

a. Develop or revise all management plans for individual units making sure to include population goals and objectives.
b. Survey all herd units by helicopter every 1–3 years to monitor population size and composition.
c. Use population or sightability models to determine the relationship between population surveys and population size.
d. Harvest nannies from populations where habitat damage is occurring due to high goat densities or where populations are above objective.
e. Augment existing populations where needed to improve herd distribution, link small populations, and improve genetic diversity (Table 6).
f. Transplant mountain goats to establish new populations in accordance with Utah Code 23-14-21 (Table 6).
g. Participate in research efforts to monitor adult and kid survival and determine reasons for poor kid recruitment and population declines.
h. Support law enforcement efforts to reduce illegal taking of mountain goats.

B. Habitat Management Goal: Provide good quality habitat for healthy populations of mountain goats.

Objective: Maintain or improve sufficient mountain goat habitat to allow herds to reach population objectives.

Strategies:

a. Identify mountain goat habitats and work with land managers to protect and enhance these areas.
b. Assist land management agencies in monitoring mountain goat habitat.
c. Work with land managers to minimize and mitigate loss of mountain goat habitat.
d. Inform and educate the public concerning the needs of mountain goats.

C. Recreation Goal: Provide high quality opportunities for hunting and viewing of mountain goats.

Objective 1: Increase hunting opportunities as populations allow while maintaining high quality hunting experiences.

Strategies:

a. Recommend any-goat permits to harvest 5%–15% of the counted population. Populations that have slow rates of growth or are stable should be harvested near the low end of the range, whereas populations with rapid growth potential should be

harvested near the top end of the range.

b. Recommend nanny goat permits in accordance with population objectives.
c. Use subunits to maximize hunting opportunities and improve hunter distribution.
d. When feasible, use multiple seasons to maximize hunting opportunities and minimize hunter conflicts.
e. Maintain high hunter success (>90%) on all units.

Objective 2: Increase public awareness and expand viewing opportunities of mountain goat.

Strategies:

a. Evaluate existing public viewing areas and identify potential new sites.
b. Install interpretive signs in mountain goat areas for public information.
c. Produce written guides or brochures to help educate the public and provide viewing opportunities which will not impact mountain goats.
d. Continue and expand mountain goat viewing events for interested publics.

Figure 1. Mountain goat distribution, Utah 2013.

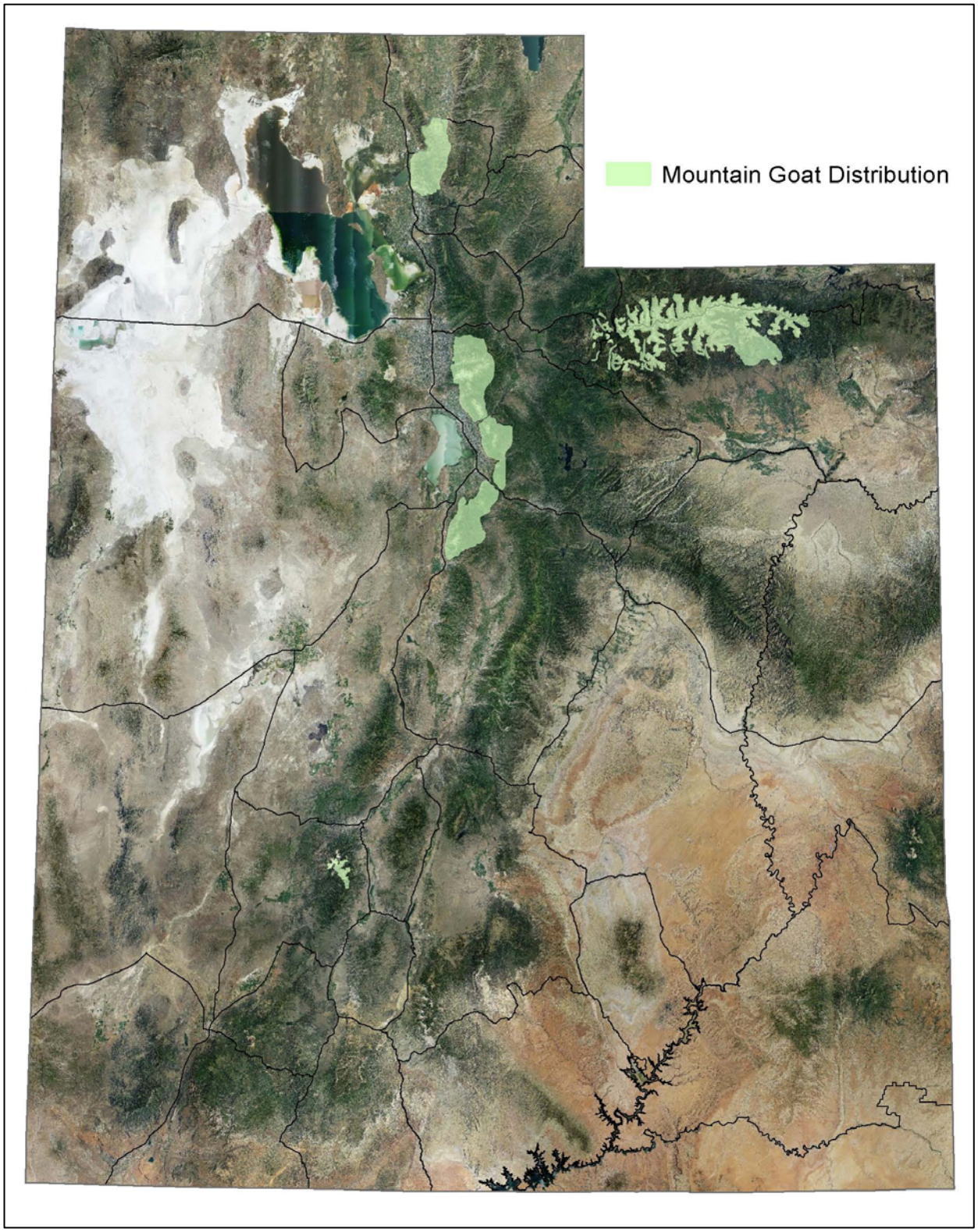

Figure 2. Mountain goat population trends, Utah 1975–2012.

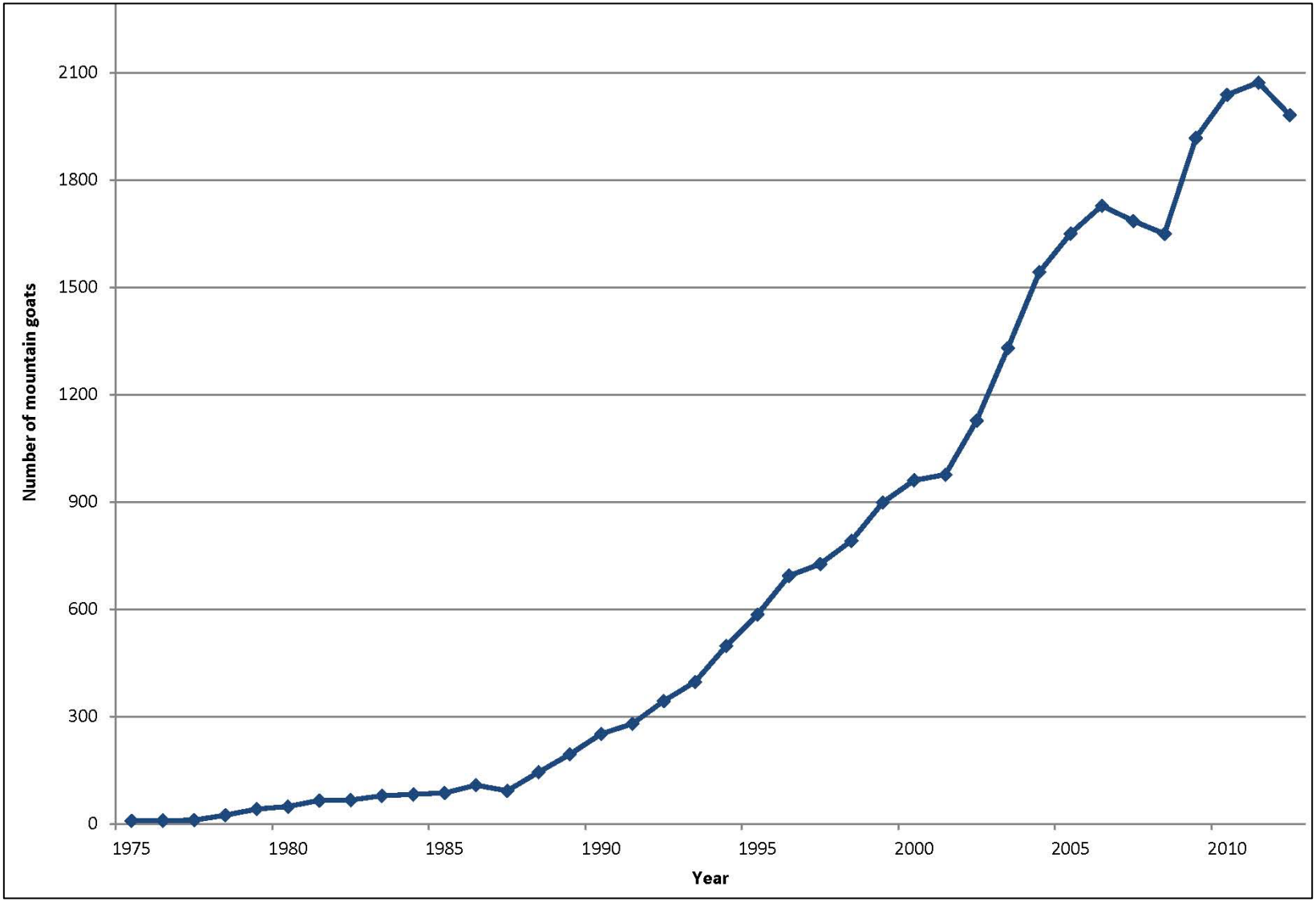

Table 1. History of mountain goat transplants, Utah 1967–2012.

Unit #	Unit	Area released	Year	# of mountain goats released				Source
				Total	Billies	Nannies	Kids	
3	Ogden	Willard Peak	1994	5	1	4	0	Lone Peak, UT
3	Ogden	Willard Peak	2000	4	—	—	—	Provo Peak, UT
7	Kamas	Bald Mountain, Uintas	1987	7	2	5	0	Lone Peak, UT
7	Kamas	Bald Mountain, Uintas	1988	16	—	—	—	Olympic NP, WA
8 / 9	North Slope/South Slope	Whiterocks Canyon, Uintas	1989	9	5	4	0	Olympic NP, WA
8 / 9	North Slope/South Slope	Whiterocks Canyon, Uintas	1989	1	1	0	0	Kamas, UT
8 / 9	North Slope/South Slope	Whiterocks Canyon, Uintas	1992	13	4	9	0	Lone Peak, UT
8 / 9	North Slope/South Slope	Chepeta Lake, Uintas	1996	7	1	6	0	Tushar Mountains, UT
8 / 9	North Slope/South Slope	Liedy Peak, Uintas	1996	3	0	3	0	Tushar Mountains, UT
8 / 9	North Slope/South Slope	Marsh Peak, Uintas	1996	5	1	4	0	Tushar Mountains, UT
8 / 9	North Slope/South Slope	Brown Duck Peak, Uintas	1997	7	1	6	0	Tushar Mountains, UT
8 / 9	North Slope/South Slope	South Fork of Rock Creek, Uintas	1997	5	1	4	0	Tushar Mountains, UT
8 / 9	North Slope/South Slope	Center Park, Uintas	2000	8	0	6	2	Tushar Mountains, UT
8 / 9	North Slope/South Slope	Jefferson Park, Uintas	2000	9	2	7	0	Tushar Mountains, UT
16	Central Mountains	Loafer Mountain	2007	20	5	15	0	Tushar Mountains, UT
17	Wasatch Mountains	Lone Peak	1967	6	2	4	0	Wantachee, WA
17	Wasatch Mountains	Mount Olympus	1981	10	3	4	3	Olympic NP, WA
17	Wasatch Mountains	Mount Olympus	1981	4	0	2	2	Unknown
17	Wasatch Mountains	Mount Timpanogos	1981	10	4	6	0	Olympic NP, WA
17	Wasatch Mountains	Provo Peak	1989	7	2	5	0	Olympic NP, WA
17	Wasatch Mountains	Provo Peak	1990	5	1	4	0	Mount Timpanogos, UT
22	Beaver	Tushar Mountains	1986	6	1	5	0	Lone Peak, UT
22	Beaver	Tushar Mountains	1986	1	1	0	0	Mount Timpanogos, UT
22	Beaver	Tushar Mountains	1988	17	—	—	—	Olympic NP, WA
—	Idaho	Lemhi Mountains	2007	24	5	18	1	Tushar Mountains, UT

Table 2. Mountain goat trend counts by unit, Utah 2003–2012.

Unit	Year established	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Beaver	1986	160	166	191	—	225	—	258	—	300	—
Central Mountains, Loafer Mountain	2007	—	—	—	—	20*	—	—	—	—	26
Central Mountains, Nebo	2007	—	—	—	—	—	—	—	—	—	22
Kamas / Chalk Creek	1987	—	43	—	30	—	46	135	—	114	—
North / South Slope, High Uintas Central	1989	—	229	—	285	—	191	263	—	246	—
North / South Slope, High Uintas East	1996	—	174	—	208	—	119	101	—	111	—
North / South Slope, High Uintas Liedy Peak	1996	—	120	—	139	—	73	96	—	51	—
North / South Slope, High Uintas West	1987	—	164	—	211	—	295	368	—	550	—
Ogden, Willard Peak	1994	—	131	189	—	229	—	241	273	315	—
Wasatch Mountains, Box Elder Peak	1967	—	63	—	—	71	—	—	68	—	30
Wasatch Mountains, Lone Peak	1967	—	206	—	—	85	—	—	84	—	13
Wasatch Mountains, Provo Peak	1989	—	110	—	—	119	—	—	130	—	99
Wasatch Mountains, Timpanogos	1981	—	136	—	—	141	—	—	148	—	80

*Initial transplant

Table 3. Mountain goat harvest statistics, Utah 1981–2012.

Year	Permits issued	Billy harvest	Nanny harvest	Total harvest	Hunters afield	Success rate (%)	Mean days hunted
1981	1	1	0	1	1	100	2
1982	1	0	1	1	1	100	2
1983	3	3	0	3	3	100	4.3
1984	4	2	1	3	4	75	4
1985	3	3	0	3	3	100	5.3
1986	4	2	2	4	4	100	6.5
1987	4	3	1	4	4	100	3.8
1988	4	3	1	4	4	100	3.5
1989	5	4	1	5	5	100	3.6
1990	6	4	0	4	6	67	4.8
1991	6	3	3	6	6	100	7
1992	8	8	0	8	8	100	5.8
1993	7	6	1	7	7	100	4.3
1994	10	10	0	10	10	100	—
1995	12	10	2	12	12	100	—
1996	19	16	2	18	19	95	4.2
1997	19	17	2	19	19	100	—
1998	19	18	0	18	19	95	3.5
1999	20	18	2	20	20	100	—
2000	29	19	9	28	29	97	3.2
2001	30	21	9	30	30	100	—
2002	36	25	10	35	36	97	—
2003	41	32	9	41	41	100	2.3
2004	46	31	15	46	46	100	2.6
2005	68	42	21	63	65	97	3.5
2006	94	48	38	86	93	92	3.3
2007	96	55	36	91	96	95	3.3
2008	95	58	30	88	93	95	2.9
2009	108	77	30	107	107	100	2.8
2010	115	70	41	111	114	97	3.0
2011	143	91	42	133	142	94	3.4
2012	175	94	73	167	174	96	2.6

Table 4. Mountain goat average age of harvest, Utah 2005–2012.

Management unit	Average age								3-year average
	2005	2006	2007	2008	2009	2010	2011	2012	
Beaver	6.1	6.2	5.2	5.5	4.3	4.9	4.9	5.0	4.9
Kamas/Chalk Creek	6.5	3.5	5.0	5.5	—	4.6	6.5	3.3	4.8
North / South Slope, High Uintas Central	4.0	3.3	4.8	4.4	—	5.8	4.0	3.6	4.5
North / South Slope, High Uintas East	10.0	2.7	6.8	4.5	6.0	5.0	11.0	7.0	7.7
North / South Slope, High Uintas Liedy Peak	6.0	4.5	2.5	4.3	4.0	3.5	3.8	7.5	4.9
North / South Slope, High Uintas West	4.8	2.8	4.8	3.3	3.6	3.0	4.8	4.8	4.2
Ogden, Willard Peak	2.5	3.7	4.7	3.5	3.2	3.7	4.1	3.9	3.9
Wasatch Mountains, Box Elder Peak	4.0	3.7	3.0	6.0	5.0	9.0	—	6.0	7.5
Wasatch Mountains, Lone Peak	6.0	3.4	4.2	1.0	3.0	10.0	3.0	3.5	5.5
Wasatch Mountains, Provo Peak	4.0	—	3.0	5.3	4.0	5.8	4.0	4.0	4.6
Wasatch Mountains, Timpanogos	4.5	5.0	7.3	4.0	4.0	6.4	4.5	3.0	4.6
Statewide average	5.3	3.9	4.8	4.3	3.7	4.7	4.5	4.4	4.3

Table 5. Resident and nonresident drawing odds of obtaining mountain goat hunting permits, Utah 1998–2012.

Year	Residents			Nonresidents		
	Applicants	Permits	Odds	Applicants	Permits	Odds
1998	568	18	1 in 31.6	44	1	1 in 44
1999	748	20	1 in 37.4	93	1	1 in 93
2000	904	24	1 in 37.7	142	2	1 in 71
2001	1103	27	1 in 40.9	194	2	1 in 97
2002	1505	33	1 in 45.6	244	2	1 in 122
2003	1793	37	1 in 48.5	275	3	1 in 92
2004	2072	40	1 in 51.8	333	3	1 in 111
2005	2384	59	1 in 40.4	464	5	1 in 93
2006	2747	83	1 in 33.1	660	6	1 in 110
2007	3351	84	1 in 39.9	683	5	1 in 137
2008	3405	83	1 in 41.0	732	7	1 in 105
2009	3577	91	1 in 39.3	2869	9	1 in 319
2010	3911	97	1 in 40.3	3194	10	1 in 319
2011	4005	118	1 in 33.9	3446	11	1 in 313
2012	4220	144	1 in 29.3	3779	17	1 in 222

Table 6. Potential mountain goat transplant sites by region, Utah 2013.[1]

Region	Unit	Transplant Site	Transplant Type
Central	Central Mountains	Loafer Mountain	Augmentation
	Central Mountains	Mount Nebo	Augmentation
	Wasatch Mountains	Box Elder Peak	Augmentation
	Wasatch Mountains	Lone Peak	Augmentation
	Wasatch Mountains	Provo Peak	Augmentation
	Wasatch Mountains	Timpanogos	Augmentation
	West Desert	Deep Creek Mountains	Initial transplant
Northeastern	North / South Slope	High Uintas East	Augmentation
	North / South Slope	High Uintas Liedy Peak	Augmentation
Northern	Cache	Wellsville Mountains	Augmentation
	Ogden	Farmington Peak	Initial transplant
	Ogden	Ogden Peak	Augmentation
Southeastern	La Sal	La Sal Mountains	Initial transplant
Southern	Mount Dutton	Mount Dutton	Augmentation

[1] In accordance with Utah Code 23-14-21.

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Appendix A

MOUNTAIN GOATS IN UTAH: AN OVERVIEW

History

The mountain goat of western North America is one of two known members from the genus *Oreamnos*. The other member of the genus, *Oreamnos harringtoni*, is extinct. The closest extant relative is the chamois of Europe. Because of the harsh sites that mountain goats inhabit, the fossil record is not extensive. The genus likely derived from parent stock in Asia and entered North America sometime during the Pleistocene. It was likely completely isolated from that parent stock by the late Pleistocene (18,000 years ago).

During and since the Pleistocene, the distribution and status of goat populations likely varied widely since mountain goats specialized to occupy a narrow range of habitats. These habitats are tied closely to alpine cliffs, which means any glacial encroachment or retreat would have likely changed habitat suitability on all mountain ranges in western North America. This would have also caused an altitudinal shift in habitats within individual mountain ranges. During the full glacial period of the late Pleistocene, Harrington's mountain goats were present farther south than any mountain goats live today. This is documented by fossils recovered from the San Josecito Cave site, in Nuevo Leon, Mexico, at an altitude of 2300 meters. There were likely no goats present in much of Canada and Alaska because suitable cliff sites were buried by glaciers. With the end of the Pleistocene and the associated glacial retreat, suitable habitats for mountain goats would have become available northward and upward from the southern terminus in Mexico. As these habitat changes progressed, Utah would have provided a major pathway for goat redistribution from south to north. The central mountain ranges of Utah, along with the Rocky Mountains of Colorado, would have provided appropriate habitats for goat redistribution in response to changing climate. A strong case can be made that Utah would have been intermediate between both extremes. Given the variety and extent of mountain ranges through the length of the state, habitat at some elevation could have been provided during most if not all of the Pleistocene, and evidence from fossil sites in nearby areas support that premise. Pleistocene goat remains have been identified from the Smith Creek Cave site on the Utah-Nevada border near Baker, Nevada; at three sites in the Laramie Mountains in southeastern Wyoming; and at Rampart Cave and the Stanton site along the Colorado River corridor in northern Arizona. As conditions became warmer and drier in the Intermountain region after the Pleistocene, a dramatic restructuring of goat distributions could have occurred.

Recent Distribution

The distribution of mountain goats at the time of European contact with western mountain ranges is very poorly documented. This is likely a byproduct of the remote habitats used by mountain goats. Given the climatic conditions of the past 200 years, goat habitat would have been limited to the highest and most inaccessible alpine expanses in the Intermountain region. Only in Alaska and Northwest Canada would goats have been found near the valleys and basins that provided access for Europeans. Even early trappers would have been unlikely to encounter goats in their normal pursuit of beaver, since goats persist yearlong at high elevations in most ranges.

By the early part of the 20th century, European settlement and an interest in wildlife had set the stage for increasing recorded knowledge of the status and distribution of goats. By mid-century, a well documented analysis of goat distributions had emerged. A Forest Service report that was published in the Twelfth Biennial Report of the Fish and Game Commissioner of the State of Utah in 1917-1918, estimated 25 mountain goats on the Wasatch Forest. This figure was listed in addition to mountain sheep numbers. The Wasatch Forest at that time also included the Uinta Mountains; site locations, unfortunately, were not listed. A separate report from a District Ranger in Kamas stated that both mountain sheep and goats were present in the High Uintas. By the middle of the 20th century no native goat populations were known to persist in Utah, Colorado, Nevada, or Wyoming.

Currently, however, there are populations of mountain goats in all these states. All are the result of introductions of goats by state wildlife departments during the last 50+ years. Many, if not all, of these populations are healthy and viable, indicating that these populations all occupy habitat suitable for mountain goats. The status of these areas at the time of European settlement is not fully known.

The Intermountain Region Since the Pleistocene

The most recent glacial age ended about 14,000 years ago, and the interglacial period that we currently occupy had gained primacy. Conditions became significantly warmer and in many cases drier. Mountain goat habitat, which once existed as far south as Mexico was no longer suitable. The progression from full glacial advance to present day conditions was far from linear. Small scale returns to colder and snowier conditions occurred as recently as the 1800's. During the Middle Holocene, there was a period of several thousand years (from about 7,000 to 4,500 years ago) when climatic conditions were substantially warmer and probably drier than those today. Data indicate this period was pervasive enough that the Great Salt Lake may have been nearly dry.

Based on our knowledge of goat habitat requirements and climatic conditions in the early Holocene, goats could have found suitable habitat in many mountain ranges of Utah and the Intermountain area after the end of glaciation. These habitats were likely similar to those present today, though perhaps more extensive, given the cooler temperatures. During the Middle Holocene, however, the dramatic warming would have shifted goat habitat much higher on occupied mountain ranges. Data from the Snowbird Bog pollen sites indicate that timberline may have been 1000 feet or more higher in altitude than that found today. Given the observed altitudinal depth of current habitats, this compression would have eliminated suitable sites on most Intermountain ranges, and restricted those found in larger and more northerly ranges. Thus goat populations surviving after the Pleistocene in high elevation habitats may have been eliminated or restricted.

Since that period, however, conditions have reverted to a cooler and wetter pattern. Suitable goat habitat exists on many mountain ranges in Utah and surrounding states, as demonstrated by the survival of transplanted populations. If these ranges were devoid of goats at the time of European contact, why had goats not re-colonized there? Certainly goat populations had

followed the ebb and flow of glacial periods for perhaps millions of years. However, one new factor was inserted at the end of the Pleistocene; humans. Humans became for the first time a member of the North American ecosystem. After that time, aboriginal people were widespread and important modifiers of both vegetative and animal communities. Although the extent and type of modifications are debated, the conclusion of nearly all recent research has been that impacts by aboriginal people were greater than previously thought. Some of the most obvious and dramatic impacts would have been extensive and widespread burning, transportation of propagules of plant species beyond the range of "natural" movement, and manipulation or even elimination of populations and even species of large vertebrates.

It is known that goats were contemporaneous with aboriginal hunters at the end of the Pleistocene. The loss of goats during the Holocene may have been directly aided by opportunistic hunting of goats. It is well documented that native peoples hunted mountain sheep in alpine areas throughout the Intermountain area. Goats would have been an appropriate alternative prey item for these big game hunters.

Whatever the extent of this aboriginal pressure, it is obvious that recolonization of suitable habitats by goats had to be accomplished through the barrier of a thriving culture of big game hunters. These big game hunters likely only killed goats opportunistically, since their survival was dependent upon the vast array of other ungulates available to them. Given their highly selective habitat requirements, relatively low densities, and low fecundity, it would have been difficult for goats to recolonize these now suitable habitats. Currently, with a vast ocean of human habitation surrounding islands of goat habitat, the prospects for natural expansion of goat populations, except for unoccupied habitats immediately adjacent to existing populations, is unlikely.

An interesting footnote to this scenario can be added for the current status of moose. This species has since the turn of the century greatly extended its range southward into the Intermountain Area. The prospects for moose pioneering after the Pleistocene should have been as poor as for goats in the face of a thriving big game hunting culture. However, the encroachment of Europeans eliminated the two prime predators of moose - wolves and aboriginal big game hunters. After the turn of the century, wildlife laws and enforcement reduced the killing of moose by early settlers. As such, moose, with their higher mobility and broader habitat requirements than mountain goats, were able to colonize areas far to the south of what had been considered its historically occupied range.

Oreamnos speciation

The relationship between the two known species of *Oreamnos* (Harrington's goat and mountain goat) warrants some discussion. Essentially, the largest difference between the two species is size. Harrington's goat is up to 30% smaller than the existing mountain goat species and has minor skull variances. This difference is derived from skulls from a few well-documented sites in Arizona, Mexico, California, and Nevada. Overall, though, the fossil record is poor because of the low probability of preservation in the harsh sites frequented by goats. The existing fossils all came from protected cave sites which are rare. Nearly all such sites are from isolated areas at the southern extreme of past mountain goat range and were likely in areas isolated from other

goat populations after the end of the Pleistocene. Caution must be exercised in projecting the importance of a character such as relative size in assessing its evolutionary significance and the relationship between the two *Oreamnos* species. Body size may be one of the most labile of morphological traits, especially in extremes of climatic conditions. Purdue and Reity (1993) have demonstrated tremendous shifts in body size in white-tailed deer during the past 4,400 years in Georgia and South Carolina. They consider climate changes with resultant habitat quality to be the driving factor for this change. They indicate that body size tends to be quite responsive to changes in certain environmental factors that in turn serve as the ultimate source of selection. This is dramatically demonstrated by ungulates on islands, which may frequently be dwarfed in response to reduced food resources.

A careful consideration of these factors will generate caution in inferring about the relationship between *O. harringtoni* and *O. americanus*. The fossil records are non-existent between isolated southerly sites and the range of "modern" goats. It is possible that the Harrington population documented by cave sites were "islands" by the late Pleistocene. Kurten (1980) postulates that Harrington's goat was in fact an extension of *O. americanus* that became isolated at the end of the Pleistocene, and body size would have been driven by limited resources. Since their habits were probably like those of modern goats, they would have been subjected to resource limitations in their peripheral occurrences.

R657. Natural Resources, Wildlife Resources.

R657-65. Urban Deer Control

R657-65-1. Authority and Purpose.

(1) This rule is promulgated under authority of Sections 23-14-3, 23-14-18, and 23-14-19.

(2) The purpose of this rule is to establish and evaluate a two year pilot program with Bountiful City, Utah and Highland City, Utah that enables each to design and administer a control plan for the lethal and non-lethal removal of resident deer damaging private property or threatening public safety within the municipality.

R657-65-2. Definitions.

(1) Terms used in this rule are defined in Section 23-13-2.

(2) In addition:

(a) "Deer" means wild mule deer (*Odocoileus hemionus*) living in nature and does not include privately owned, captive deer.

(b) "Division" means the Utah Division of Wildlife Resources.

(c) "Municipality" means Bountiful City in Davis County, Utah and Highland City in Utah County, Utah.

(d) "Urban deer control plan" means a document designed, created, and administered by an authorized municipality that establishes the protocols and methodologies it will pursue to control and mitigate private property damage or public safety threats caused by mule deer within its incorporated boundaries.

R657-65-3. Authorization to Create and Administer an Urban Deer Control Plan.

(1) A municipality with a resident mule deer population that is significantly damaging private property or threatening public safety within its boundaries may request the Division for a certificate of registration ("COR") to design, create, and administer an urban deer control plan.

(2) The Division may issue an urban deer control plan COR to a municipality, provided:

(a) the application is filed by a municipality;

(b) resident mule deer are collectively causing significant damage to private property or threatening public safety within the municipality's incorporated boundaries;

(c) it has enacted an ordinance prohibiting the feeding of deer, elk, and moose;

(d) it has general liability insurance in the amount of $1,000,000.00 or more that covers liability claims that may arise from designing, creating, and administering an urban deer control plan; and

(e) it agrees, without waiving immunity or any other limitation or provision in the Utah Governmental Immunity Act, Utah Code §§ 63G-7-101 through 63G-7-904, to hold harmless and indemnify the Division against any claims or damages arising from its

deer removal activities undertaken pursuant to the urban deer control plan COR, except for any allocated share of fault and damages attributable to the Division's actual involvement in deer removal activities on the ground.

R657-65-4. COR Authorities and Limitations.

(1) An urban deer control plan COR issued to a municipality authorizes it to design, create, and administer an urban deer control plan consistent with the following authorities and limitations.

(2) The COR authorizes the municipality to:

(a) prescribe and employ lethal and non-lethal methods of take to control deer, provided the methods are otherwise in compliance with state and federal law;

(b) utilize baiting to facilitate safe and effective deer removal activities;

(c) select and supervise individuals to perform specified deer removal activities, provided the municipality:

(i) issues to each individual authorized to remove deer a written authorization and tag that:

(A) is on a form prescribed by the Division;

(B) is signed by the city manager and recipient;

(C) identifies the recipient's name, address, date of birth, gender, height, weight, and eye color;

(D) describes the locations, time periods, methods of take, and related activities authorized by the municipality; and

(E) includes a detachable tag consistent with the requirements in Section 23-20-30;

(d) allow a single individual to take more than one deer; and

(e) permit spotlighting to facilitate non-lethal deer removal or carcass recovery efforts.

(3) The municipality will:

(a) require individuals authorized to lethally remove deer to:

(i) tag the carcass consistent with Section 23-20-30; and

(ii) comply will all federal, state, and local laws pertaining to the possession, use, and discharge of a dangerous weapon; and

(b) take measures to ensure that:

(i) deer carcasses are salvaged consistent with Section 23-20-8 and disposed of as provided by law;

(ii) viscera is removed from the kill site and disposed of as provided by law; and

(iii) antlers of lethally removed deer are promptly surrendered to the Division and not retained by the municipality or the person that takes the animal.

(4) The municipality will not:

(a) capture a deer for release outside municipal boundaries without a written capture and relocation plan prepared in coordination with and approved by the Division;

(b) sell or barter a deer carcass or otherwise use it for pecuniary gain without prior written approval from the Division;

(c) collect a fee or compensation from a person or entity it authorizes to remove deer from its incorporated boundaries, unless the fee or compensation is:

(i) $20 or less;

(ii) used exclusively to recoup the actual costs incurred by the municipality in selecting and qualifying the person; and

(iii) approved by the Division in writing;

(d) undertake or authorize deer removal activities outside:

(i) incorporated municipal boundaries or any unincorporated areas approved by the Division and the county; or

(ii) the general time frame imposed by the Division;

(e) remove more deer, collectively or by gender, than authorized by Division; or

(f) authorize the discharge of firearms or archery equipment for deer removal:

(i) between one half hour after official sunset and one half hour before official sunrise; or

(ii) in violation of federal, state, or local laws.

R657-65-5. Urban Deer Control Plan.

(1) Upon receipt of an urban deer control plan COR, the municipality must prepare an urban deer control plan consistent with this Subsection prior to undertaking any deer removal activities.

(2) The urban deer control plan will address and prescribe, at a minimum, the:

(a) lethal and non-lethal methods of take that may be used to remove deer and the conditions under which each may be employed;

(b) conditions and restrictions under which baiting and spotlighting may be used to facilitate deer removal;

(c) persons eligible to perform deer removal activities and the requirements imposed on them;

(d) locations and time periods where specified types of deer removal activities may be employed or authorized;

(e) requirements for tagging deer carcasses;

(f) protocols for carcass removal and disposal;

(g) procedures for promptly returning to the Division all antlers of lethally removed deer; and

(h) procedures for obtaining Division input and approval on live capture and relocation projects.

(3) All aspects of the plan must be consistent with the authorizations and limitations imposed in this rule and the COR.

(4)(a) The municipality will solicit and consider input in the formulation and development of the urban deer control plan from:

(i) the Division;

(ii) the public;

(iii) interested businesses and organizations; and

(iv) local, state, and federal governments.

(b) The Division may provide technical assistance to the municipality in preparing the urban deer control plan.

(c) After formulating a draft plan, the municipality will hold a public meeting to take and consider input on the draft before finalizing or implementing it.

(5) The municipality will assume full responsibility for:

(a) all costs associated with designing, establishing, implementing, and operating the urban deer control plan and all its associated activities; and

(b) for the acts and omissions of its officers, employees, agents, contractors, and licensees in designing, preparing, and implementing its urban deer control plan and undertaking the activities authorized thereunder.

R657-65-6. COR Term and Termination.

(1) An urban deer control plan COR issued under this rule will remain valid for two years from the date of issuance or until August 31, 2015, whichever is less.

(2)(a) A municipality may unilaterally withdraw an urban deer control plan and terminate the COR without cause upon 30 days advance written notice to the Division.

(b) Upon termination of the COR, the municipality and its officers, employees, agents, contractors, and licensees must cease all deer removal activities formally authorized by the COR.

R657-65-7. Violations.

Pursuant to Section 23-19-9, the division may suspend, restrict, or deny an urban deer control plan COR for any intentional, knowing, or reckless violation of the Wildlife Code, this rule, or the terms of the COR.

R657-65-8. Sunset.

This rule sunsets on August 31, 2015 and all COR's and other authorizations issued hereunder will terminate by operation of law and cease having further legal effect.

DEER HERD UNIT MANAGEMENT PLAN
Deer Herd Unit # 1
(Box Elder)
March 2013

BOUNDARY DESCRIPTION

Box Elder, Tooele, Salt Lake, Davis and Weber counties - Boundary begins at the Utah-Idaho state line and Interstate 15; then west along this state line to the Utah-Nevada state line, south along this state line to Interstate 80, east on I-80 to I-15, north on I-15 to the Utah-Idaho state line.

Subunit 1 A: Consists of the western half of Box Elder county.
Subunit 1 B: Consists of the eastern half of Box Elder county (Kelton - east).
Subunit 1 C: Consists of Tooele, Salt Lake and Weber counties north of I-80 and west of I-15.

LAND OWNERSHIP

RANGE AREA AND APPROXIMATE OWNERSHIP

	Yearlong range		Summer Range		Winter Range	
Ownership	**Area (acres)**	**%**	**Area (acres)**	**%**	**Area (acres)**	**%**
Forest Service	0	0%	47,174	6%	25,491	4%
Bureau of Land Management, Dept. of Defense	35,185	22%	57,466	8%	243,074	37%
Utah State Institutional Trust Lands	2,387	2%	17,752	2%	40,309	6%
Native American Trust Lands	0	0%	0	0%	0	0%
Private	115,756	73%	638,378	84%	341,858	53%
USFWS Refuge	0	0%	0	0%	0	0%
National Parks	0	0%	2,263	<1%	0	0%
Utah State Parks	0	0%	0	0%	0	0%
Utah Division of Wildlife Resources	4,796	3%	0	0%	0	0%
TOTAL	158,124	100%	763,033	100%	650,732	100%

UNIT MANAGEMENT GOALS

Manage for a population of healthy animals capable of providing a broad range of recreational opportunities, including hunting and viewing. Balance deer herd impacts on human needs, such as private property rights, agricultural crops and local economies. Maintain the population at a level that is within the long-term capability of the available habitat to support.

POPULATION MANAGEMENT OBJECTIVES

Target Winter Herd Size - The short term objective is to achieve 20,000 wintering deer (13,000 for subunits 1A & 1C and 7,000 for subunit 1B) which are viewed as obtainable by regional biologists.

Subunit 1 A West Box Elder – The past objective was 13,000 deer. This number has not been reached since 1988, when a 12 year wet cycle culminated. Over the last 14 years, this area reached a peak population of around 11,000 deer in the year 2000; the population averaged less than 7,000 animals during that period. Based on this population performance, DWR recommends maintaining the objective of 13,000 animals.

Subunit 1 B- East Box Elder - This area reached and exceeded 8,000 deer in 1999. A severe winter range fire on the Promontory peninsula occurred in 2001 and has reduced the ability of the range to support as many animals. Therefore we have reduced the objective by approximately 1,000 animals. Consequently, the objective is maintained at 7,000 deer.

We will recommend revisions of the short term objective if review of habitat conditions or the next range trend monitoring period indicates that changes are needed.

Herd Composition – General Hunt portion of Box Elder Unit: Maintain a 3-year average postseason buck to doe ratio of 15-17:100 in accordance with the statewide plan.

Unit 1

1994-2005 Objective:	24,000
2006-2013 Objective:	20,000
2013-2018 Objective:	20,000
Change from last plan	0

POPULATION MANAGEMENT STRATEGIES

Monitoring

- Population Size - Using harvest data, postseason and spring classifications and mortality estimates, a computer model has been developed and used to estimate winter population size. Over winter mortality estimates will be determined using observations of mortality, and change-in-ratios from classification data.

- Buck Age Structure - Estimates of the age class structure of the buck population will be determined primarily (directly) through the use of hunter harvested bucks at checking stations and field bag checks, and secondarily (indirectly) using post-season classification observations.

- Harvest - The primary technique used to estimate harvest over the unit is the statewide uniform harvest surveys. Data collected at checking stations will also be used to compare with the uniform survey. Buck harvest strategies will be developed through the RAC and Wildlife Board process to achieve management objectives for buck:doe ratios. Antlerless harvest will be achieved, as needed, using a variety of methods and seasons to maintain a wintering population and to address depredation conflicts.

Limiting Factors (May prevent achieving management objectives)

- Crop Depredation - Address depredation issues as prescribed by state law and DWR policy. Some geographic populations may be maintained at lower levels due to conflicts with crop production and private landscapes.

- Habitat - Two-thirds of the Promontory peninsula critical winter range on subunit 1B burned in 2001. This loss will correspond to a 1,000 deer reduction in subunit 1B's short term objective. Subunit 1A has very little summer range and the DWR's range trend site's indicate that it is in good condition. Pinyon-juniper encroachment on summer and winter range in Unit 1A is increasing resulting in less forage and increased fire risk. Excessive habitat utilization will be addressed by antlerless harvests.

- Predation –
  - Refer to DWR predator management policy.
  - Assess need for control by species, geographic area and season of year.
  - Seek assistance from ADC when deer populations are depressed and where there is a reasonable chance of gaining some relief through a predator control effort. Predator control efforts will be focused just before and during the spring fawning period. Coyote removal through a bounty system is currently underway and future fawn/doe ratios will be used to determine if the removal was effective.
  - Recommend cougar harvest to benefit deer while maintaining the cougar as a valued resource in its own right.

- Highway Mortality - The cooperation with the Utah Department Of Transportation to prevent vehicle collisions in terms of highway fences, underpasses, and earthen ramps along Interstates 15 and 84, and warning signs as needed throughout the unit is greatly appreciated. A significant number of highway mortalities may tend to reduce deer populations in the following areas: I-15 and I-84 from Tremonton to the Idaho border and SR-30 from Kelton to Rosette. Reduced speed limits in these areas should be considered by the Department Of Transportation.

- Illegal Harvest, Crippling Loss, Disease and Parasites, White-tailed Deer - Although poaching losses appear insignificant in the Box Elder Unit, due primarily to a highly visible law enforcement effort, crippling losses are a concern, especially under buck-only hunting. Hunter survey studies (Austin, D.D. 1992. Great Basin Naturalist 52:364-372) suggests as many as 18 deer may be left in the field per 100 hunters. Disease is very difficult to evaluate, but high mortality in the spring is often associated with disease. The animal disease diagnostic facility associated with Utah State University acts as the laboratory to identify disease problems. Chronic Wasting disease is of further concern though it has not yet been detected on the unit. Surveillance will be implemented by testing hunter harvested animals as well as targeted surveillance of symptomatic animals.

HABITAT

Habitat Description

The Box Elder Management Unit is one of the largest in the state. However, big game range accounts for less than one-third of the unit. The Box Elder Subunit 1B (Promontory region) is located in the east side and consists primarily of private land. The Pilot Mountain Subunit 1C is made up of the most southern portion of the unit, and the Raft River Subunit 1A is located in the western portion of the unit. The land area of this subunit is comprised mostly of the Raft River, Grouse Creek, and Goose Creek Mountains.

The Raft River Mountains run east-west, parallel to the Utah-Idaho border. Slopes on this mountain range are moderately steep on the south and east, and gentler on the north and west. The highest point is 9,925 feet on Dunn Benchmark peak at the head of the Clear Creek drainage. The Grouse Creek Mountains are

relatively narrow and steep, and run north-south. At 9,000 feet, Red Butte is the highest point in the Grouse Creek Range. The topography of the Goose Creek Mountains is generally more nominal, the highest point being 8,584 feet on Twin Peaks. The Dove Creek Mountains are rougher, but the terrain becomes gentler near the Three Corners area.

Seasonal migration consists mainly of elevational and north to south migrations from summer range to winter range. A substantial number of deer spend their summers in Idaho then migrate south onto Unit 1 winter ranges. Summer range is located in the upper portions of the Raft River, Goose Creek and Grouse Creek Mountains. Areas specifically listed as summer concentration areas for deer are the uppermost elevations of the Raft River Mountains, Johnson Creek Drainage, the head of Lynn Valley, the crest of the Grouse Creek Mountains, and Hardister Creek Plateau.

Winter range mostly follows the foothills of the major mountain ranges within the sub-unit. The upper limit of normal deer winter range varies from 6,000 to 8,000 feet over the sub-unit based on the mountain range on which it occurs. The lower limit of normal deer winter range typically follows the line of Hwy 30 from Curlew Junction to the Nevada border, with further deer winter range occurring in Nevada and Idaho. This sub-unit has a unique situation during severe winters. The limits for the severe deer winter range are not only lowered at the upper limit, but are also raised at the lower limit. This is because the low growing vegetation at the lower limits of normal deer winter range are easily covered by heavy snowfall, making them unavailable for big game use.

Seven general vegetation types appear to dominate the big-game range. Sagebrush makes up 55% of the winter range and 58% of the summer range. Black sagebrush occupies ridge tops within the summer range and the upper reaches of the winter range. On the summer range, the black sagebrush type has the highest abundance of grasses and forbs. Within the summer range, the browse type is dominated by curlleaf mountain mahogany on the drier sites and by maple on the more mesic sites. This type provides a good variety of spring-fall forage, yet makes up less than 1% of the winter range. The sagebrush-juniper and juniper types, together account for 31% of the winter range. In these vegetation types, juniper trees are more important for the thermal cover than for forage. Although small amounts of the aspen-timber and forb-grass types are found along the upper edges of winter range, their primary value is as summer range. A more detailed description and vegetation maps of the different vegetation types for Wildlife Management Unit 1 can be found in the 1970 Range Inventory Report published in 1971 by King and Muir.

HABITAT CONCERNS

Summer range on the Box Elder Unit is mostly at higher elevations in the Sawtooth National Forest and Grouse Creek Mountain Range. Summer range habitat concerns are mainly the loss of forbs and shrubs due to pinyon-juniper encroachment.

Higher elevation summer range and water resources are the major limiting factors for mule deer populations in the Western portion of the Box Elder unit. Lower elevation winter range is at risk of becoming a limiting factor on the Eastern portion of the unit due to the potential for development and urbanization, especially along the West Hills north of I-84 and west of I-15, and Thatcher Mountain west of SR-102.

Additional threats and losses to deer summer and winter range in the West Box Elder area is the reduction in habitat quality due to the loss of critical browse species (sagebrush, bitterbrush etc). This loss has been attributed to a number of factors such as fire, agriculture, drought etc. However, the abundance of weedy annual grasses and the increase of other invasive weeds are the more likely causes of sagebrush decline. These weedy species can form dense mats of cover that compete with seedling and young sagebrush plants, which limits establishment of new sagebrush plants into the population. As the sagebrush population matures, decadence increases and density decreases as old plants begin to die. These annual grasses can also increase fuel loads and increase the chance of a catastrophic fire event.

Mule deer winter range habitat has seen a decrease in sagebrush density. Causes of sagebrush decline are varied and multiple causes may have compounded effects on the low potential studies in this unit. The moderate drought in recent years has likely caused increased stress on plants, and negatively impacted them. Sagebrush age structure across the area is generally old and one age class. The lack of regeneration of the stand through establishment of young sagebrush is a concern. Annual grass species are present but not prevalent through most of the areas. However, the range trend does show increases of weedy species such as cheatgrass and bulbous bluegrass in many of the low potential studies in this unit. Perennial grass and forb species have increased on many of the studies as browse species decline, and may compete with browse establishment. This is especially the case for the seeded perennial species crested wheatgrass which is prevalent throughout West Box Elder County.

Crucial mule deer habitat in all areas on the Box Elder Unit is also being lost and degraded through Pinyon-Juniper expansion. In certain areas where Pinyon-Juniper stands occur, the spread and invasion of young juniper have had a dramatic negative impact on existing browse and other understory species.

HABITAT MANAGEMENT

Contributing factors to the loss of browse species such as the impact of the increase in weedy species, particularly annual grasses, juniper expansion, lack of browse regeneration and other variables are all of concern in the habitat management of the Box Elder Unit. Maintenance and/or enhancement of forage production through direct range improvements throughout summer range on sub-unit 1A and on winter range portions of the southern Promontory peninsula on sub-unit 1B must be continued to achieve population management objectives. Working with private and federal agencies to maintain and protect critical and existing summer and winter range from future losses, and providing improved habitat security and escapement opportunities for deer must also be continued to achieve population management objectives.

Loss of critical winter ranges to development is the highest cause of loss of mule deer habitat on the East Box Elder area. The loss of sagebrush and other browse species on the remaining winter range is important when considering habitat quality. Contributing factors to the loss of browse species such as the impact of the increase in weedy species, particularly annual grasses, juniper expansion, lack of browse regeneration and other variables are all of a concern in the habitat management of the Box Elder Unit.

To address the direct loss of habitat, efforts will be made towards the protection and conservation of remaining mule deer habitat. Efforts must be made to work with counties, cities, private landowners and federal agencies to maintain and protect critical and existing winter range from future losses. Through existing partnerships and developing new conservation partners efforts are being made to identify and prioritize critical habitat areas. Conservation easements will be an important part of this effort, and other conservation efforts will be ongoing throughout the unit.

To address habitat quality and degradation, habitat improvement projects have been, and will continue to be planned throughout the unit. Habitat projects have been and are being done on UDWR Wildlife Management Areas, private lands, US Forest Service lands, and Bureau of Land Management lands throughout the unit. The habitat projects are designed to address the specific issues within each project area. Recent past projects have included prescribed aspen burning on the Sawtooth National Forest, annual grass control and shrub plantings on Promontory Mountain, and pinyon-juniper thinning/removal on summer, winter, and transitional range in West Box Elder.

In critical winter range habitat, Pinyon-Juniper expansion is a crucial aspect of winter browse species loss. Projects that address the removal of P/J from these areas are of high importance and should be addressed whenever possible. These projects should be done on public and private lands when the opportunity is available. Addressing these needs on private land is crucial as a large majority of winter range falls on private lands. All tools that are available should be considered, such as chaining, lop and scatter, bullhog removal, and chemical removal as well. In accomplishing the removal of P/J on private land, private landowners' needs should also be considered.

On the Promontory Range, any opportunity to increase browse components on the range should be looked at closely. Hundreds of wintering mule deer have been observed utilizing the range on the Promontory, and any disturbance that could be beneficial to a browse enhancement project should be taken advantage of for the benefit of wintering mule deer.

The following are some of the areas that have been targeted for habitat projects within the unit over the next five years:

- Straight Fork Creek, Etna Reservoir, Keg Springs. Projects on the west side of the Grouse Creek Range should be focused on removal of encroaching pinyon-juniper, and reestablishing understory with summer and winter browse species as well as species of plants that can be used in the spring by wintering deer.
- Winter range enhancement on Promontory Mountain.
- Prescribed burning of aspen and removal of encroaching pinyon-juniper on the Sawtooth National Forest.
- Devil's Playground, Emigrant Pass, and Warm Springs Hill, Park Valley and Rosette. Projects on the east side of the Grouse Creek Range and south slope of the Raft River range should be focused on removal of encroaching pinyon-juniper, and reestablishing understory with summer and winter browse species as well as species of plants that can be used in the spring by wintering deer.
- Riparian area protection near Kimball Creek and Straight Fork Creek.

HABITAT MANAGEMENT STRATEGIES

Vegetative data collected by the UDWR Range Trend Studies crew is an additional component that will be used to address range restoration needs. The Range Trend Data is collected every five years on the 24 permanent trend transects on the Box Elder unit. These data will also be evaluated as related to deer management by the biologist.

In addition to these data, annual range utilization transects will be evaluated and enumerated.

Re-vegetation of poor condition rangeland and winter ranges damaged by wildfire will be accomplished as time and materials are available.

PERMANENT RANGE TREND DATA

Purpose of Range Trend Studies-The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Division's big game management program. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas.

The majority of the permanent range trend studies are located on deer and elk winter ranges. Range trend data are used for habitat improvement planning purposes.

Objective

Monitor, evaluate, and report range trend at designated key areas throughout the state, and inform Division biologists, public land managers, and private landowners of significant changes in plant community composition in these areas.

Expected Results and Benefits

Range trend studies are resurveyed every five years, and vegetation condition and trend assessments are made for key areas.

Summary and Excerpts of 2011 Range Trend Result

Unit 1 Box Elder

Nineteen interagency range trend studies were sampled in Unit 1 during the summer of 2011. A total of twenty-four studies have been established within Unit 1. Five studies were suspended due to lack of use by wildlife. If the need arises in the future these studies can be sampled again.

The mid-level potential deer DCI has remained fairly stable since 1996, with rankings ranging from fair to fair-good throughout the sample years. Attributes of preferred browse species have decreased slightly since 1996, but perennial grass cover has increased and annual grass cover has decreased. The decline of big sagebrush populations on winter ranges gives reason for concern, but big sagebrush remains prevalent on most of the mid-level potential studies on the unit. The Chokecherry Springs, Bovine Exclosure, Broad Hollow, Cedar Hills, and Patterson Pass studies have driven the pattern of big sagebrush decline for mid-level potential studies on the unit. Wildfires occurred on the Broad Hollow and Cedar Hills studies in 1996 and 2000, respectively. The wildfire on the Broad Hollow study occurred following the sample in 1996, and burned just part of the transect. The wildfire on the Cedar Hills study was larger and burned the entire study area, removing nearly all of the browse species. Decreases in density due to the fires on these sites comprised much of the decrease in the mean density of big sagebrush in 2001, but density of big sagebrush has continued to decrease on the Broad Hollow study and many of the other mid-level potential studies in subsequent sample years.

Causes of sagebrush decline are varied and multiple causes may have compounded effects on the mid-level potential studies in this unit. Drought has been a predominant factor in this area over the course of the study years, but these mid-level potential studies are at higher elevations and drought was likely not as acute as lower elevation studies. While lack of precipitation may have caused some stress on plants, it does not appear to be the primary cause of the decline on the mid-level potential studies. The abundance of the annual grass species cheatgrass is a more likely primary cause of sagebrush decline. This weedy species can form dense mats of cover that compete with seedling and young sagebrush plants, which thereby limits establishment of new sagebrush plants into the population. As the sagebrush population matures, decadence increases and density decreases as old plants begin to die. Cheatgrass can also increase fuel loads and increase the chance of a catastrophic fire event. Cheatgrass has been especially prevalent on the Chokecherry Springs, Bovine Exclosure, Red Butte Exclosure, Broad Hollow, and Sheep Range Spring studies. However, cheatgrass has decreased on each of these studies since 1996. It appears that cheatgrass is having the largest impact on the big sagebrush populations on the Chokecherry Springs, Bovine Exclosure, and Broad Hollow studies.

The low potential deer DCI steadily decreased from good in 1996 to fair in 2006, but increased again in 2011, returning to 2001 levels. Much of the change in the DCI score is due to fluctuations in annual grass cover, but there has also been a decrease in preferred browse cover and recruitment of young preferred browse plants since 1996. Increases in perennial grass cover has compensated for some of the loss in preferred browse. The decline in density of Wyoming big sagebrush and black sagebrush is a cause of concern for these important deer winter ranges, though cover has remained relatively stable over the course of the study years. The Rosette, Mud Springs Basin, Raft River Narrows, and Bedke Springs studies have driven the pattern of Wyoming big sagebrush decline for low potential studies on the unit. A wildfire occurred on the Raft River Narrows study in 2000. The wildfire burned just part of the study transect, but reduced density onthe study. Decreases in density due to the fire on this site comprised much of the decrease in the mean density of Wyoming big sagebrush in 2001, but density has continued to decrease on the Raft River Narrows study and many of the other low potential studies in subsequent sample years. The Devils Playground, Kimber Ranch, and Dake Pass studies have driven the pattern of decline of black sagebrush for the low potential studies on the unit.

Causes of sagebrush decline are varied and multiple causes may have compounded effects on the low potential studies in this unit. Drought has been a predominant factor in this area over the course of the study years (Figure 1 and Figure 2), and has likely negatively impacted these low elevation studies. The abundance of the annual grass species, especially the weedy species cheatgrass, is also likely a primary cause of sagebrush decline. Cheatgrass has been especially prevalent on the Rosette, Devils Playground, Mud Springs Basin, Kilgore Basin, Kimber Ranch, Raft River Narrows, Bedke Spring, and Dake Pass studies. It appears that cheatgrass is having the largest impact on the sagebrush populations

on the Rosette, Mud Springs Basin, Kimber Ranch, Raft River Narrows, Bedke Springs, and Dake Pass studies.

Desirable Components Index: The desirable components index (DCI) for deer was created as a tool to address condition and/or value of winter ranges for mule deer. This index was designed to score mule deer winter range based upon several important vegetation components (ie., preferred browse cover, shrub decadence, shrub young recruitment, cover of perennial grasses, cover of perennial forbs, cover of annual grasses and cover of noxious weeds). Although the index may be useful for assessing habitat for other species (ie. sage grouse and elk), the rating system was devised to specifically address mule deer winter range requirements.

This index is used primarily to determine if a particular site has the vegetation components necessary to be a good winter range for mule deer. It can also be used to identify areas where habitat restoration projects may be needed and assist land managers in determining possible rehabilitation options. Because it does not take into account factors such as soil stability, hydrologic function, and other environmental factors, it should not be used to assess a sites function and/or condition as typically used by the Federal land management agencies. Desirable mule deer winter range provides 12-20% of preferred browse cover, 20% or less shrub decadency, and 10% or more of the shrub population is young. The herbaceous understory contains 8-15% perennial grasses cover, 5% perennial forb cover, and less than 5% annual grass cover.

Condition of deer winter range on Unit 1, as indicated by DWR range trend surveys.

Year	Mean DCI score for Unit	Classification	Unit-specific DCI score range: Poor	Unit-specific DCI score range: Fair	Unit-specific DCI score range: Good
2001	53	Fair-Good	27 - 41	42 – 58	59 - 74
2006	47	Fair			
2011	54	Fair-Good			

CURRENT POPULATION STATUS

Year	Buck Harvest	Post-Season F/100 D	Post-Season Buck/100 D	Post-Season Population	Objective	% of Objective
2010	1,115	64	21	17,100	20,000	85.5%
2011	1,101	70	20	15,000	20,000	75%
2012	1299	56	15	13,000	20,000	65%

Duration of Plan

This unit management plan was approved by the Wildlife Board on _____ and will be in effect for five years from that date, or until amended.

DEER HERD UNIT MANAGEMENT PLAN
Deer Herd Unit # 2
(Cache)
January 2013

BOUNDARY DESCRIPTION

Cache, Rich, Weber, and Box Elder counties - Boundary begins at the Utah-Idaho state line and I-15; south on I-15 to US-91; northeast on US-91 to SR-101; east on SR-101 to Hardware Ranch and USFS Road 054 (Ant Flat); south on USFS 054 to SR-39; east on SR-39 to SR-16; southeast on SR-16 to the Utah-Wyoming state line; north along this state line to the Utah-Idaho state line; west along this state line to I-15.

LAND OWNERSHIP

RANGE AREA AND APPROXIMATE OWNERSHIP

	Yearlong range		Summer Range		Winter Range	
Ownership	**Area (acres)**	**%**	**Area (acres)**	**%**	**Area (acres)**	**%**
Forest Service	0	0%	273346	55%	52358	16%
Bureau of Land Management	845	<1%	46126	9%	94909	29%
Utah State Institutional Trust Lands	245	<1%	25001	5%	28933	9%
Native American Trust Lands	0	0%	0	0%	0	0%
Private	104662	99%	146362	30%	133488	41%
Department of Defense	0	0%	0	0%	0	0%
USFWS Refuge	0	0%	0	0%	0	0%
National Parks	0	0%	0	0%	0	0%
Utah State Parks	0	0%	0	0%	17	<1%
Utah Division of Wildlife Resources	81	<1%	4552	1%	11823	4%
TOTAL	105833	100%	495387	100%	321528	100%

UNIT MANAGEMENT GOALS

The primary goal is to maintain the proper balance between the number of animals in the deer herd and the habitat available on the limited winter range, thereby sustaining physiologically healthy deer. Also, to provide public hunting and non-consumptive opportunities, promote additional harvest opportunities for landowners, recommend measures for highway safety, and consider private property values.

POPULATION MANAGEMENT OBJECTIVES

Target Winter Herd Size - Maintain a target population size of 25,000 wintering deer. This population objective remains for both the short-term (5-year life of this plan) and long term, barring significant changes in range conditions.

Herd Composition –. General Hunt portion of Cache Unit: Maintain a 3-year average postseason buck to doe ratio of 15-17:100 in accordance with the statewide plan. Crawford Mountain subunit, managed under Limited Entry hunting: Maintain a 3-year average post-season buck: doe ratio of 15-17:100.

1994-2005 Objective: 25,000
2006-2013 Objective: 25,000
2013-2018 Objective: 25,000

Change from last plan 0

POPULATION MANAGEMENT STRATEGIES

Monitoring

Population Size - Utilizing harvest data, postseason and spring classifications and mortality estimates, a computer model will be used to estimate winter population size. Annual mortality will be estimated based on survival of radio collared animals on this unit.

Buck Age Structure - Estimates of the age class structure of the buck population will be determined primarily (directly) through the use of hunter harvested bucks at checking stations and field bag checks, and secondarily (indirectly) using post-season classification observations.

Harvest - The primary technique used to estimate harvest over the unit is the statewide uniform harvest surveys.

Limiting Factors (May prevent achieving management objectives)

Crop Depredation - Address depredation issues as prescribed by state law and DWR policy. Some geographic populations may be maintained at lower levels due to conflicts with crop production and private landscapes.

Habitat - Winter range is the major limiting factor on the Cache. Not only is winter range less than 30 % of the total range, but much of the winter range is in poor condition due to past fires, competition from introduced weedy species, and the lack of spring livestock grazing, as described by "Clements and Young. 1997. A viewpoint: Rangeland health and mule deer habitat. J. Range Manage. 50:129-138." Excessive habitat utilization will be addressed by antlerless harvests.

Predation – Consistently high fawn/doe ratios seem to indicate that predation is not a primary limiting factor for deer on the Cache WMU. Coyote removal through a bounty system is currently underway and future fawn/doe ratios will be used to determine if the removal was effective.

Highway Mortality - The cooperation of the Utah Department Of Transportation to prevent vehicle

collisions in terms of highway fences, underpasses, and earthen ramps in Wellsville Canyon, and warning signs as needed throughout the unit is greatly appreciated. A significant number of highway mortalities may tend to reduce deer populations in the following areas: Wellsville Canyon, Highway 91 between Smithfield and Richmond, and Logan Canyon. Reduced speed limits in these areas should be considered by the Department Of Transportation.

Illegal Harvest, Crippling Loss, Disease and Parasites - Although poaching losses appear insignificant on the Cache, due primarily to a highly visible law enforcement effort, crippling losses are a concern, especially under buck-only hunting. Hunter survey studies (Austin, D.D. 1992. Great Basin Naturalist 52:364-372) suggests as many as 18 deer may be left in the field per 100 hunters. Disease is very difficult to evaluate, but high mortality in the spring is often associated with disease. The animal disease diagnostic facility associated with Utah State University acts as the laboratory to identify disease problems. Chronic Wasting disease is of further concern though it has not yet been detected on the unit. Surveillance will be implemented by testing hunter harvested animals as well as targeted surveillance of symptomatic animals.

HABITAT

Habitat Description

The Cache Management Unit can be divided into three main areas which are isolated, to some extent, from one another (Wellsville, Cache and Rich Areas). The first part is the Wellsville Mountains and their northern extension, Clarkston Mountain. The second area is Cache Valley with its crucial winter range alone the east side of the valley on the foothills and west slope of the Wasatch Mountain Range along with summer range on the Cache National Forest to the east. Big game summer on the forest and use the winter ranges in the canyons and upper benches of the valley. The third area is Rich County, which includes a vast area of private and public range land on the east side of the Cache National Forest, extending to the Wyoming state line. Prior to 1993, these three areas were managed as separate deer herd units. In 1993, these areas were combined into Wildlife Management Unit 2 and managed as sub-units.

The Wellsville Mountains have remained relatively inaccessible because of the steep topography. Rising abruptly from the valley floor, the ridge of the Wellsville Mountains reaches over 9,300 feet in elevation. The upper limit for normal winter range is generally 7,000 feet, but in severe winters that limit drops to about 6,000-6,500 feet. In some canyons the upper limit drops to 6,000 feet and excludes the north slopes. Box Elder Canyon reaches a low limit at 5,400 feet. The lower limit follows an elevation of 4,400 feet. Most deer summer on the east side of the Wellsville Mountains and migrate to the west side each fall for winter range. Coldwater Canyon is the most notable concentration area for deer, and there is some migration from the Mantua-Willard herd unit. Most of the deer that winter on Clarkston Mountain range, also summer on the Caribou National Forest in Idaho. Land development and associated habitat loss is still a critical problem facing wildlife management in this area.

The majority of the deer range, along with the largest deer herd, is within the Cache County portion of the unit. Most of this herd summers at higher elevations in the Wasatch-Cache National Forest west of the Wasatch Range summit. The majority of the winter range is also on Forest Service land. The south-facing slopes of Blacksmith Fork, Logan, Dry, Providence, and Millville canyons are all important wintering areas. The lower winter range limits are restricted by the upper limits of the towns and cities of Cove, Richmond, Smithfield, Hyde Park, North Logan, Logan, Providence, Millville, Nibley, and Hyrum. These limits to the winter range also include the deer-proof fence above agricultural land between Hyrum and Logan. Between Hyde Park and the Idaho border, the lower third of the winter range is located on private land and is threatened by increased cultivation and subdivision developments.

The Rich County portion of the Cache deer herd unit, located on the east face of the Wasatch Range, is topographically similar to the west face. However, the drainages of Swan Creek, Garden City Canyon, Jebo Canyon, Cottonwood Canyon, and Temple Canyon are not as deep as those on the west face. Elevation ranges between 5,900 feet at Bear Lake and 9,114 feet on Swan Peak. Randolph and Woodruff

are the principle municipalities located in Rich County. These towns are located on a strip of private land along the Bear River. Much of the lower country is privately owned and is grazed or farmed. Estimates are that 74,560 acres (33%) of the winter range is private land (Jense et al. 1985). A much higher percentage of the severe winter range is private. The Bureau of Land Management (BLM) owns a majority of the winter range, controlling much of the land in the central part of the unit and the Crawford Mountains to the east. The upper limit of the winter range begins at about 8,000 feet at the Idaho border and gradually descends to 6,000 feet at Cottonwood Canyon. The lower limit generally follows the 6,000-foot contour.

Habitat concerns

Mule deer habitat on the Cache Unit is fairly abruptly divided between summer range and winter range. The summer range is mostly at higher elevations in the Wasatch-Cache National Forest. Summer range habitat concerns are mainly the loss of Aspen stands due to conifer encroachment.

Lower elevation winter range is the major limiting factor for mule deer populations on the Cache unit. The winter range areas are also those areas that are most at risk. The largest threat to mule deer habitat on the Wellsville and Cache areas is the direct loss of crucial winter range acres due to development and urbanization; Particularly in Cache Valley along the east side from Hyrum, north to Richmond. Cache County has had an increase in population from 42,000 residents in 1970 to 112,656 in 2010. The concomitant increase is homes followed the trend from 12,000 homes in 1970 to 35,915 in 2010. Most of the increase in home building is occurring on the foothills in what was historic deer winter range.

Additional threats and losses to deer winter range on the Wellsville and Cache areas is the reduction in habitat quality due to the loss of critical browse species (sagebrush, bitterbrush etc). This loss has been attributed to a number of factors, fire, agriculture, drought etc. However, the abundance of weedy annual grass species, and the increase of the exotic, weedy, perennial grass bulbous bluegrass are the more likely causes of sagebrush decline. These weedy species can form dense mats of cover that compete with seedling and young sagebrush plants, which limits establishment of new sagebrush plants into the population. As the sagebrush population matures, decadence increases and density decreases as old plants begin to die. Annual grass species such as cheatgrass can also increase fuel loads and increase the chance of a catastrophic fire event.

The Rich area of the Cache Unit shares the same summer range as the Cache area. The winter range of the Rich area has also experienced loss due to development. The area around Bear Lake, from Garden City south to Lake town has seen recreation home development increases over the last few decades. The majority of the Rich area, through Randolph and Woodruff has not experienced significant development.

Mule deer winter range habitat has seen a decrease in sagebrush density. Causes of sagebrush decline are varied and multiple causes may have compounded effects on the low potential studies in this unit. The moderate drought in recent years has likely caused increased stress on plants, and negatively impacted them. Sagebrush age structure across the area is generally old and one age class. The lack of regeneration of the stand through establishment of young sagebrush is a concern. Annual grass species are present but not prevalent through most of the areas. However, the range trend does show increases of weedy species such as cheatgrass and bulbous bluegrass in many of the low potential studies in this unit. Perennial grass and forb species have increased on many of the studies as browse species decline, and may compete with browse establishment. This is especially the case for the seeded perennial species crested wheatgrass which is prevalent throughout Rich county.

Crucial mule deer habitat in all areas on the Cache Unit is also being lost and degraded through Juniper expansion. In certain areas where Juniper stands occur, the spread and invasion of young juniper have had a dramatic negative impact on existing browse and other understory species.

HABITAT MANAGEMENT

Loss of critical winter ranges to development is the highest cause of loss of mule deer habitat on the Wellsville and Cache areas. The loss of sagebrush and other browse species on the remaining winter range is important when considering habitat quality. Contributing factors to the loss of browse species such as the impact of the increase in weedy species, particularly annual grasses, juniper expansion, lack of browse regeneration and other variables are all of a concern in the habitat management of the Cache Unit.

To address the direct loss of habitat, efforts will be made towards the protection and conservation of remaining mule deer habitat. Efforts must be made to work with counties, cities, private landowners and federal agencies to maintain and protect critical and existing winter range from future losses. Through existing partnerships and developing new conservation partners efforts are being made to identify and prioritize critical habitat areas. Conservation easements will be an important part of this effort. For example, recent efforts have included securing a conservation easement in crucial winter range at the mouth of Smithfield Dry Canyon, from an existing partner to the UDWR. Other conservation efforts are ongoing throughout the unit.

Encourage conservation easements in all ownership sectors, and additional acquisitions for DWR.

To address habitat quality and degradation, habitat improvement projects have been and will continue to be planned throughout the unit. Habitat projects have been and are being done on UDWR Wildlife Management Areas, private lands, US Forest Service lands and Bureau of Land Management lands throughout the unit. The habitat projects are designed to address the specific issues within each project area. Recent past projects have included prescribed aspen burning on the National Forest, annual grass control and shrub plantings on the Millville face WMA. Prescribed burns of transitional range on the Curtis Plateau, crested wheatgrass conversion to increase sagebrush, Juniper removal, shrub transplants, etc.

The following are some of the areas that have been targeted for habitat projects within the unit over the next three to four years.

- Logan, Green, Providence and Blacksmith Fork Canyons. Projects should be focused on removal of encroaching juniper, and reestablishing understory with winter browse species as well as species of plants that can be used in the spring by wintering deer.
- Birch Creek area west of Woodruff, UT. Projects should focus on removal of encroaching juniper, and reestablishing understory with winter browse species as well as species of plants that can be used in the spring by wintering deer.
- Winter range enhancement on all wintering WMA's on the unit including Hardware Ranch, Millville Face, Richmond, and Coldwater. Prescribed burning of aspen on the National Forest
- Juniper removal and reseeding in Blacksmith Fork Canyon and on Hardware Ranch WMA.
- Transitional Range burn on Hardware Ranch WMA.
- Juniper removal and reseeding in the Birch Creek west of Woodruff, UT.
- Winter range enhancement through browse establishment on SFW property east of Smithfield, know as the Weeks property.
- Cold Water WMA

PERMANENT RANGE TREND DATA

Purpose of Range Trend Studies-The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Division's big game management program. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas.

The majority of the permanent range trend studies are located on deer and elk winter ranges. Range trend data are used for habitat improvement planning purposes.

Objective
Monitor, evaluate, and report range trend at designated key areas throughout the state, and inform Division biologists, public land managers, and private landowners of significant changes in plant community composition in these areas.

Expected Results and Benefits
Range trend studies are resurveyed every five years, and vegetation condition and trend assessments are made for key areas.

Summary and Excerpts of 2011 Range Trend Result

Unit 2 Cache

Twenty-nine permanently marked study sites were established in 1984 on the Cache unit. During the 1990 survey season, 5 new sites were added, and in 1996, 6 additional sites were added for a total of 40. Data are available in: Davis et al. 1996, Volume 1. Utah big game range trend studies. Ut. Div. Wildl. Res. Publ. No. 98-9. Since 1996 additional sites have been added, especially on State Wildlife Management Areas, but these data are unpublished. Data analyzed from the 29 available sites between 1984 and 1996 indicated a downward trend in shrub density. Specifically, big sagebrush decreased from about 3,300 to 2,700 plants/acre, antelope bitterbrush decreased from about 600 to 550 plants/acre, and rabbitbrush decreased from about 1900 to 1600 plants/acre. Decrease in shrub density is believed to have mostly occurred between 1984 and 1990 during periods of high deer population and unfavorable climatic conditions. Between 1990 and 1996, the number of sites per browse trend category were: down = 6, slightly down = 2, stable = 21, slightly up = 7, up = 4. These data suggest a mostly stable browse trend over the unit, 1990-1996. Between 1996 and 2001, the browse trend is considered to be stable or slightly up, due to favorable winter climatic conditions and decreased deer populations. Beginning in 1996, the 100 foot individual transect lines used for vegetal measurement, and not just the 500 foot location line, were permanently - marked to increase the accuracy of data collection.

Desirable Components Index: The desirable components index (DCI) for deer was created as a tool to address condition and/or value of winter ranges for mule deer. This index was designed to score mule deer winter range based upon several important vegetation components (ie., preferred browse cover, shrub decadence, shrub young recruitment, cover of perennial grasses, cover of perennial forbs, cover of annual grasses and cover of noxious weeds). Although the index may be useful for assessing habitat for other species (ie. sage grouse and elk), the rating system was devised to specifically address mule deer winter range requirements.

This index is used primarily to determine if a particular site has the vegetation components necessary to be a good winter range for mule deer. It can also be used to identify areas where habitat restoration projects may be needed and assist land managers in determining possible rehabilitation options. Because it does not take into account factors such as soil stability, hydrologic function, and other environmental factors, it should not be used to assess a sites function and/or condition as typically used by the Federal land management agencies. Desirable mule deer winter range provides 12-20% of preferred browse cover, 20% or less shrub decadency, and 10% or more of the shrub population is young. The herbaceous understory contains 8-15% perennial grasses cover, 5% perennial forb cover, and less than 5% annual grass cover.

Condition of deer winter range on Unit 2, as indicated by DWR range trend surveys

Year	Mean DCI score for Unit	Classification	Unit-specific DCI score range: Poor	Unit-specific DCI score range: Fair	Unit-specific DCI score range: Good
1996	47	Fair	27 - 41	42 – 58	59 - 74
2001	49	Fair			
2006	45.8	Fair			
2011	38.1	Poor			

Current Population Status

Year	Buck Harvest	Post-Season F/100 D	Post-Season Buck/100 D	Post-Season Population	Objective	% of Objective
2010	1,056	81	23	16,500	25,000	66%
2011	950	72	12	16,000	25,000	64%
2012	1,597	85	16	18,500	25,000	74%

Duration of Plan

This unit management plan was approved by the Wildlife Board on _____ and will be in effect for five years from that date, or until amended.

DEER HERD UNIT MANAGEMENT PLAN
Deer Herd Unit # 3
(Ogden)
April 2012

BOUNDARY DESCRIPTION

Weber, Box Elder, Cache, and Morgan counties - Boundary begins at Hyrum and SR-101; east on SR-101 to the Ant Flat Road (at Hardware Ranch); south on this road to SR-39; west on SR-39 to SR-167 (Trappers Loop Road); south on SR-167 to I-84; west on I-84 to I-15; north on I-15 to Exit 364 and U.S.-91: northeast on US-91 to SR-101; east on SR-101 to Hyrum.

LAND OWNERSHIP

RANGE AREA AND APPROXIMATE OWNERSHIP*

	Yearlong range		Summer Range		Winter Range	
Ownership	**Area (acres)**	**%**	**Area (acres)**	**%**	**Area (acres)**	**%**
Forest Service	0	--	19859	10%	12011	9%
Bureau of Land Management	0	--	0	0%	76	<1%
Utah State Institutional Trust Lands	0	--	8216	5%	0	0%
Native American Trust Lands	0	--	0	0%	0	0%
Private	0	--	139478	70%	112589	80%
Department of Defense	0	--	0	0%	5	<1%
USFWS Refuge	0	--	0	0%	0	0%
National Parks	0	--	0	0%	0	0%
Utah State Parks	0	--	0	0%	20	<1%
Utah Division of Wildlife Resources	0	--	30516	15%	15206	11%
TOTAL	0	--	198069	100%	139,907	100%

UNIT MANAGEMENT GOALS

Manage for a population of healthy animals capable of providing a broad range of recreational opportunities, including hunting and viewing. Balance deer herd impacts on human needs, such as private property rights, agricultural crops and local economies. Maintain the population at a level that is within the long-term capability of the available habitat to support.

POPULATION MANAGEMENT OBJECTIVES

- Target Winter Herd Size – Maintain a target population size of 11,000 wintering deer. This population objective remains both the short-term (5 year life of this plan) and long term, barring significant changes in range conditions.

- Herd Composition – Maintain a minimum 3-year average postseason buck to doe ratio of 18-20:100 in accordance with the statewide plan.

	Unit 3
1994-2005 Objective:	15,000
2006-2013 Objective:	11,000
2013-2018 Objective:	11,000
Change:	0

POPULATION MANAGEMENT STRATEGIES

Monitoring

Population Size - Utilizing harvest data, postseason and spring classifications and mortality estimates, a computer model will be used to estimate winter population size. Annual mortality will be estimated based on survival of radio collared animals on a nearby representative unit.

Buck Age Structure - Estimates of the age class structure of the buck population will be determined primarily (directly) through the use of hunter harvested bucks at checking stations and field bag checks, and secondarily (indirectly) using post-season classification observations.

Harvest - The primary technique used to estimate harvest over the unit is the statewide uniform harvest surveys.

Limiting Factors (May prevent achieving management objectives)

Crop Depredation - Address depredation issues as prescribed by state law and DWR policy. Some geographic populations may be maintained at lower levels due to conflicts with crop production and private landscapes.

Habitat – Winter range condition is the major limiting factor on the Ogden unit. Range condition is currently poor due to past fires, and competition from introduced weedy species. Excessive habitat utilization will be addressed by antlerless harvests.

Predation - Consistently high fawn/doe ratios seem to indicate that predation is not a primary limiting factor for deer on the Cache WMU. Coyote removal through a bounty system is currently underway and future fawn/doe ratios will be used to determine if the removal was effective.

Highway Mortality - Cooperate with the Utah Dept. of Transportation in construction of highway fences, passage structures and warning signs.

Illegal Harvest, Crippling Loss, Disease and Parasites, White-tailed Deer - Although poaching losses appear insignificant on the Ogden Unit, due primarily to a highly visible law enforcement effort, crippling losses are a concern, especially under buck-only hunting. Hunter survey studies (Austin, D.D. 1992. Great Basin Naturalist 52:364-372) suggests as many as 18 deer may be left in the field per 100 hunters. Disease is very difficult to evaluate, but high mortality in the spring is often associated with disease. The animal disease diagnostic facility associated with Utah State University acts as the laboratory to identify disease problems. Chronic Wasting disease is of further concern though it has not yet been detected on the unit. Surveillance will be implemented by testing hunter harvested animals as well as targeted surveillance of symptomatic animals.

HABITAT

Habitat Description

The Ogden Management Unit is located within Weber, Cache, Box Elder, and Morgan counties. Municipalities located within or along the unit boundaries include: Hyrum, Wellsville, Mantua, Perry, Willard, Ogden, Mountain Green and Huntsville. The major drainages are the Little Bear River, Ogden River and Box Elder Creek. Smaller drainages are Davenport Creek, Paradise Dry Canyon, Hyrum Dry Canyon, Hyrum Green Canyon, Perry Canyon and Willard Canyon. The topography is steep and rough on the western face of the Wasatch Mountains above Willard, Perry, Ogden, east of Avon and Paradise, and more gentle in-between.

Elevation ranges from 4,400 feet near Willard to 9,764 feet on Willard Peak. According to the most recent Utah Big Game Management Plan (2006) for the unit, there is approximately 139,907 acres of deer winter range in the unit. Summer range totals 198,069 acres. A majority of the winter range (80%) and summer range (70%) is on private land. The U.S. Forest Service administers 10% of the summer range and 9% of the winter range. The Division of Wildlife Resources maintains 15% of the deer summer range and 11% of the winter range on the unit. Major deer wintering areas are found between 4,600 feet and 7,000 feet on the Wasatch face above Willard and Perry; between 5,100 to 7,000 feet north and east of Mantua Reservoir; from 5,600 to 7,000 feet in Threemile Canyon; and between 5,400 and 7,000 feet along the slopes on the southeast side of Cache Valley above Paradise and Avon. During severe winters, snow restricts deer use to Threemile Canyon, the East Fork of the Little Bear River, the area south of Porcupine Reservoir, Paradise Dry Canyon, Hyrum Dry Canyon, Perry Canyon and the southeast corner of the unit south of Willard (King and Muir 1971). In addition, Deer winter regularly in the Middle Fork and SouthFork drainages of Ogden Valley, and on foothills from Brigham Face to Weber Canyon.

Habitat concerns

Mule deer habitat on the Ogden Unit is fairly abruptly divided between summer range and winter range. The summer range is mostly at higher elevations. Summer range habitat concerns are mainly the loss of Aspen stands due to conifer encroachment and the continued expansion and development of summer home and subdivisions in the Monte Cristo, Ant Flat and Powder Mountain areas.

Lower elevation winter range is the major limiting factor for mule deer populations on the Ogden unit. The winter range areas are also those areas that are most at risk to vegetative changes and development. The largest threat to mule deer habitat in the Ogden Valley areas is the direct loss of crucial winter range acres due to development and urbanization.. Most of the increase in home building is occurring on the foothills in what was historic deer winter range.

Additional threats and losses to deer winter range is the reduction in habitat quality due to the loss of critical browse species (sagebrush, bitterbrush etc). This loss has been attributed to a number of factors, fire, agriculture, drought etc. However, the abundance of weedy annual grass species, and the increase of the exotic, weedy, perennial grass, andbulbous bluegrass are also a likely causes of sagebrush decline. These weedy species can form dense mats of cover that compete with seedling and young sagebrush plants, which limits establishment of new sagebrush plants into the population. As the sagebrush population matures, decadence increases and density decreases as old plants begin to die.

Annual grass species such as cheatgrass can also increase fuel loads and increase the chance of a catastrophic fire event.

Mule deer winter range habitat has seen a decrease in sagebrush density. Causes of sagebrush decline are varied and multiple causes may have compounded effects on the low potential studies in this unit. The moderate drought in recent years has likely caused increased stress on plants, and negatively impacted them. Sagebrush age structure across the area is generally old and one age class. The lack of regeneration of the stand through establishment of young sagebrush is a concern. Annual grass species are present but not prevalent through most of the areas. However, the range trend does show increases of weedy species such as cheatgrass and bulbous bluegrass in many of the low potential studies in this unit. Perennial grass and forb species have increased on many of the studies as browse species decline, and may compete with browse establishment.

Habitat Management

Loss of critical winter ranges to development is the highest cause of loss of mule deer habitat in the Ogden unit. The loss of sagebrush and other browse species on the remaining winter range is important when considering habitat quality. Contributing factors to the loss of browse species such as the impact of the increase in weedy species, particularly annual grasses, lack of browse regeneration and other variables are all of a concern in the habitat management of the Ogden Unit.

To address the direct loss of habitat, efforts will be made towards the protection and conservation of remaining mule deer habitat. Efforts must be made to work with counties, cities, private landowners and federal agencies to maintain and protect critical and existing winter range from future losses. Through existing partnerships and developing new conservation partners efforts are being made to identify and prioritize critical habitat areas. Conservation easements will be an important part of this effort. Other conservation efforts are ongoing throughout the unit.

Encourage conservation easements in all ownership sectors, and additional acquisitions for DWR.

To address habitat quality and degradation, habitat improvement projects have been and will continue to be planned throughout the unit. Habitat projects have been and are being done on UDWR Wildlife Management Areas, and private lands throughout the unit. The habitat projects are designed to address the specific issues within each project area. Recent past projects have included annual grass control and shrub plantings on the Middle Fork WMA.

The following are some of the areas that have been targeted for habitat projects within the unit over the next three to four years.

- Middle Fork WMA winter range rehabilitation and enhancement.
- FF&SL Forest Legacy projects on private lands on the north end of the unit.
- Brigham Face

PERMANENT RANGE TREND SUMMARIES

Purpose of Range Trend Studies-The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Division's big game management program. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas.

The majority of the permanent range trend studies are located on deer and elk winter ranges. Range trend data are used for habitat improvement planning purposes.

Objective

Monitor, evaluate, and report range trend at designated key areas throughout the state, and inform Division biologists, public land managers, and private landowners of significant changes in plant community composition in these areas.

Expected Results and Benefits

Range trend studies are resurveyed every five years, and vegetation condition and trend assessments are made for key areas.

Summary and Excerpts of 2011 Range Trend Result

Unit 3 Ogden

Six interagency range trend studies were sampled in Unit 3 during the summer of 2011. A total of 19 studies have been established within Unit 3since 1984. The studies were established in mountain big sagebrush, antelope bitterbrush, a juniper community, a smooth sumac community, basin big sagebrush and one samples a perennial grass community. Of the 19 studies all but 6 were suspended for various reasons and if the need arises in the future these studies can be sampled again. (To access maps, discussions, and data tables for suspended studies see: http://www.wildlife.utah.gov/range.)

The mid-level potential site cumulative median browse trend for the unit has decreased since the outset of the studies in 1984. Most of the decrease in trend came in the 2006 and 2011 sample years. The dominant browse species on the majority of the mid-level potential studies is mountain big sagebrush. The mean density of mountain big sagebrush has steadily decreased since 1996, from 1,200 plants/acre to just over 600 plants/acre in 2011. The mean bitterbrush density and cover has remained similar since 1996, at around 250 to 300 plants/per acre on the range trend sites.

Desirable Components Index: The desirable components index (DCI) for deer was created as a tool to address condition and/or value of winter ranges for mule deer. This index was designed to score mule deer winter range based upon several important vegetation components (ie., preferred browse cover, shrub decadence, shrub young recruitment, cover of perennial grasses, cover of perennial forbs, cover of annual grasses and cover of noxious weeds). Although the index may be useful for assessing habitat for other species (ie. sage grouse and elk), the rating system was devised to specifically address mule deer winter range requirements.

This index is used primarily to determine if a particular site has the vegetation components necessary to be a good winter range for mule deer. It can also be used to identify areas where habitat restoration projects may be needed and assist land managers in determining possible rehabilitation options. Because it does not take into account factors such as soil stability, hydrologic function, and other environmental factors, it should not be used to assess a sites function and/or condition as typically used by the Federal land management agencies. Desirable mule deer winter range provides 12-20% of preferred browse cover, 20% or less shrub decadency, and 10% or more of the shrub population is young. The herbaceous understory contains 8-15% perennial grasses cover, 5% perennial forb cover, and less than 5% annual grass cover.

Deer Desirable Components Index (DCI): The mid-level potential deer DCI has remained fairly stable since 1996, with rankings ranging from poor to poor-fair throughout the sample years. Attributes of preferred browse species have decreased slightly since 1996, but perennial grass cover has increased and annual grass cover has decreased.

Condition of deer winter range on Unit 3, as indicated by DWR range trend surveys.

Year	Mean DCI score for Unit	Classification	Unit-specific DCI score range: Poor	Unit-specific DCI score range: Fair	Unit-specific DCI score range: Good
1996	43.3	Poor	35-49	50-64	65-79
2001	51.4	Poor to Fair			
2006	48.4	Poor to Fair			
2011	48.9	Poor to Fair			

Current Population Status

Year	Buck Harvest	Post-Season F/100 D	Post-Season Buck/100 D	Post-Season Population	Objective	% of Objective
2010	507	87	12	6,600	11,000	60%
2011	407	67	20	7,200	11,000	65%
2012	815	78	20	8,600	11,000	78%

Duration of Plan

This unit management plan was approved by the Wildlife Board on _____ and will be in effect for five years from that date, or until amended.

DEER HERD UNIT MANAGEMENT PLAN
Deer Herd Unit # 4
(Morgan-South Rich)
March 2013

BOUNDARY DESCRIPTION

Morgan, Rich, Summit and Weber counties – Boundary begins at the junction of I-80 and I-84 near Echo, Utah; east on I-80 to the Utah-Wyoming State line; north along this State line to SR-16; north on SR-16 to SR39 near Woodruff, Utah; west along SR-39 to SR-167 (Trappers Loop Road); south on SR-167 to SR-30 at Mountain Green, Utah; west on SR-30 to I-84; east on I-84 to I-80.

LAND OWNERSHIP

RANGE AREA AND APPROXIMATE OWNERSHIP*

	Yearlong range		Summer Range		Winter Range	
Ownership	**Area (acres)**	**%**	**Area (acres)**	**%**	**Area (acres)**	**%**
Forest Service	0	0%	35429	9%	3217	2%
Bureau of Land Management	8142	19%	4695	1%	15803	9%
Utah State Institutional Trust Lands	701	2%	5876	2%	4967	3%
Native American Trust Lands	0	0%	0	0%	0	0%
Private	34386	79%	322364	86%	133812	80%
Department of Defense	0	0%	0	0%	0	0%
USFWS Refuge	0	0%	0	0%	0	0%
National Parks	0	0%	0	0%	0	0%
Utah State Parks	0	0%	0	0%	0	0%
Utah Division of Wildlife Resources	37	<1%	6084	2%	11322	6%
TOTAL	43266	100%	374448	100%	169121	100%

UNIT MANAGEMENT GOALS

Manage for a population of healthy animals capable of providing a broad range of recreational opportunities, including hunting and viewing. Balance deer herd impacts on human needs, such as private property rights, agricultural crops and local economies. Maintain the population at a level that is within the long-term capability of the available habitat to support.

POPULATION MANAGEMENT OBJECTIVES

Target Winter Herd Size – Maintain a target population size of 18,000 wintering deer. This population objective remains both the short-term (5 year life of this plan) and long term, barring significant changes in range conditions.

Herd Composition – Maintain a minimum 3-year average postseason buck to doe ratio of 18-20:100 in accordance with the statewide plan.

	Unit 4
1994-2003 Objective:	10,750
2003 Objective:	12,500
2003-2013 Objective:	12,000
2013-2018 Objective:	18,000
Change since 2003:	+6,000

Change to population objective is based primarily on new data and models available beginning in 2006. New estimates of actual population numbers have been taken into account and the new objective should reflect the numbers of deer that are currently on the unit.

POPULATION MANAGEMENT STRATEGIES

Monitoring

Population Size - Utilizing harvest data, postseason and spring classifications and mortality estimates, a computer model will be used to estimate winter population size. Annual mortality will be estimated based on survival of radio collared animals on a nearby representative unit.

Buck Age Structure - Estimates of the age class structure of the buck population will be determined primarily (directly) through the use of hunter harvested bucks at checking stations and field bag checks, and secondarily (indirectly) using post-season classification observations.

Harvest - The primary technique used to estimate harvest over the unit is the statewide uniform harvest surveys.

Limiting Factors (May prevent achieving management objectives)

Crop Depredation - Address depredation issues as prescribed by state law and DWR policy. Some geographic populations may be maintained at lower levels than the range can support due to conflicts with crop production and private landscapes.

Habitat – Winter range condition is the major limiting factor on the Morgan-South Rich unit. Range condition ranges from Poor to Good depending on where you are on the unit.. Limiting factors could include habitat loss and degradation, increasing numbers of elk utilizing what was once reserved for mule deer winter range, and reduced browse by competition from introduced weedy species. Excessive habitat utilization will be addressed by antlerless harvests.

Predation - Consistently high fawn/doe ratios seem to indicate that predation is not a primary limiting factor for deer on the Morgan/South Rich WMU. Coyote removal through a bounty system is currently underway and future fawn/doe ratios will be used to determine if the removal was effective.

Highway Mortality - Cooperate with the Utah Dept. of Transportation in construction of highway fences, passage structures and warning signs.

Illegal Harvest, Crippling Loss, Disease and Parasites - Although poaching losses appear insignificant on the Morgan-South Rich Unit, due primarily to a highly visible law enforcement effort, crippling losses are a concern, especially under buck-only hunting. Hunter survey studies (Austin, D.D. 1992. Great Basin Naturalist 52:364-372) suggests as many as 18 deer may be left in the field per 100 hunters. Disease is very difficult to evaluate, but high mortality in the spring is often associated with disease. The animal disease diagnostic facility associated with Utah State University acts as the laboratory to identify disease problems. Chronic Wasting disease is of further concern though it has not yet been detected on the unit. Surveillance will be implemented by testing hunter harvested animals as well as targeted surveillance of symptomatic animals.

HABITAT

Habitat Description

The Morgan-South Rich Management Unit 4 incorporates a section of Weber county southeast of Huntsville, the northern halves of Morgan and Summit counties, and the southern portion of Rich county southwest of Woodruff. The unit is dominated by private land in both summer and winter range areas.
Most deer winter range is located in the major drainages and on the slopes north of the Weber River. A detached, smaller wintering area is found on the south-facing slopes above Cottonwood Creek. These areas are becoming highly developed. Highway I-80 and I-84, which run through Echo Canyon and along the Weber River, form the unit's southern boundary. There are several towns along the highways. Surrounding Croydon, the majority of the Lost Creek bottoms have been converted to alfalfa fields Two areas of land in the unit are managed by the Division of Wildlife Resources. The Round Valley WMA is north of I-84, just east of Morgan. The Henefer-Echo WMA is located east of Henefer and is managed primarily as a big game habitat. Controlled grazing, vehicle restrictions, and revegetation projects are major management tools in this area.

Earlier inventory studies described six vegetation types. The sagebrush type is most common and is found over the whole area. It forms part of a continuum, based on moisture conditions, between the mountain browse/sagebrush and mountain browse types. The lower elevation sagebrush and mountain browse/sagebrush types are productive and utilized heavily by deer, while the mountain browse type mostly provides cover and is unavailable in many winters. The other vegetation types occupy comparatively little area, but have the potential to increase. Burns occur frequently in the unit and, unless seeded, production of desirable species is very low. Deer use the burned areas infrequently, possibly because of lack of cover. A small population of mahogany is in Cottonwood Canyon, but it is important to wintering deer. The scattered juniper areas are also important in providing thermal cover, but provide little forage.

In severe winters, the area of available winter range is greatly reduced. The upper limit is 6,500 feet on most of the unit. The available acreage of all vegetation types, except agricultural land, is reduced during severe winters. All range trend studies in the unit were established on winter range. Most studies sample crucial and/or heavily used areas.

The Lost Creek, Weber River, and Echo Canyon areas are traditional deer wintering areas. There is considerable migration both from higher elevations in the unit and from other herd units to this area, especially during severe winters. The largest numbers of deer probably come from the East Canyon Unit, where deer summer on the east side of the Wasatch Mountains. Development in Morgan Valley is disrupting this migration route. Deer also come from the Ogden and Chalk Creek Units which also have adequate summer range, but limited winter range.

Habitat concerns

The summer mule deer habitat is mostly at higher elevations across the unit. Many deer summer on the adjacent East Canyon, Chalk Creek and Ogden units.

Lower elevation winter range is the major limiting factor for mule deer populations on the Morgan-South

Rich unit. The winter range areas are also those areas that are most at risk. Development and urbanization continues to be an ever increasing issue. Habitat loss in the Morgan County area is due to increased urbanization and home development. Most of the increase in home building is occurring on the foothills in what was historic deer winter range. More wide spread habitat concerns on the Morgan-South Rich unit is the reduction in habitat quality due to the loss of critical browse species (sagebrush, bitterbrush etc). This loss has been attributed to a number of factors, fire, agriculture, drought etc. However, the abundance of weedy annual grass species, and the increase of the exotic, weedy, perennial grass bulbous bluegrass are the more likely causes of sagebrush decline. With the majority of the unit being private lands, conversion of browse to grass for cattle grazing has been a long standing effort. The grasses and other weedy species can form dense mats of cover that compete with seedling and young sagebrush plants, which limits establishment of new sagebrush plants into the population. As the sagebrush population matures, decadence increases and density decreases as old plants begin to die. Annual grass species such as cheatgrass can also increase fuel loads and increase the chance of a catastrophic fire event. One of the factors in re-establishment of browse species is dealing with an overabundance of introduced perennial grass species such as crested wheatgrass and intermediate wheatgrass. Due to grazing practices, the grasses tend to dominate an aggressively grazed area where they are present. dealing with the perennials with herbicide seems to limit competition and aids in browse establishment. This challenge needs to be dealt with on projects where these grasses are present.

In addition to the continual stresses put on the winter range by development, there is an increasing number of elk congregating on the unit. The elk are occupying the areas that were once reserved for mule deer, while the mule deer are forced to less productive areas. Overuse on remaining winter range is a serious threat to the health and productivity of the winter browse species contained in the heavily utilized ranges. In heavy winter years, these ranges are overwhelmed and have in the past been the cause of high winter mortality during deep snow years.

The Rich area of the Morgan-South Rich Unit shares the same summer range as the Cache area. The area around Randolph and Woodruff has not experienced significant development and is not likely to in the future.

Mule deer winter range habitat has seen a decrease in sagebrush density. Causes of sagebrush decline are varied and multiple causes may have compounded effects on the low potential studies in this unit. The moderate drought in recent years has likely caused increased stress on plants, and negatively impacted them. Sagebrush age structure across the area is generally old and one age class. The lack of regeneration of the stand through establishment of young sagebrush is a concern. Annual grass species are present but not prevalent through most of the areas. However, the range trend does show increases of weedy species such as cheatgrass and bulbous bluegrass in many of the low potential studies in this unit. Perennial grass and forb species have increased on many of the studies as browse species decline, and may compete with browse establishment. Grazing practices have an impact on browse species recruitment, both positive and negative. Working with private landowners and Federal agencies to promote positive grazing practices that are appropriate to specific areas will be beneficial for browse re-establishment and enhancement. A diverse browse component is essential to healthy and productive winter mule deer habitat.

Crucial mule deer habitat in some areas on the Morgan-South Rich Unit is also being lost and degraded through Juniper expansion. In certain areas where Juniper stands occur, the spread and invasion of young juniper have had a dramatic negative impact on existing browse and other understory species

Habitat Management

Loss of critical winter ranges to development is the highest cause of loss of mule deer habitat in the Morgan/South Rich unit. The loss of sagebrush and other browse species on the remaining winter range is important when considering habitat quality. Contributing factors to the loss of browse species such as the impact of the increase in weedy species, particularly annual grasses, juniper expansion, lack of browse regeneration and other variables are all of a concern in the habitat management of the Morgan/South Rich Unit.

To address the direct loss of habitat, efforts will be made towards the protection and conservation of remaining mule deer habitat. Efforts must be made to work with counties, cities, private landowners and federal agencies to maintain and protect critical and existing winter range from future losses. Through existing partnerships and developing new conservation partners efforts are being made to identify and prioritize critical habitat areas. Conservation easements will be an important part of this effort. Other conservation efforts are ongoing throughout the unit.

Encourage conservation easements in all ownership sectors, and additional acquisitions for DWR.

To address habitat quality and degradation, habitat improvement projects have been and will continue to be planned throughout the unit. Habitat projects have been and are being done on UDWR Wildlife Management Areas, and private lands throughout the unit. The habitat projects are designed to address the specific issues within each project area. Recent past projects have included annual grass control and shrub plantings on the Henefer/Echo WMA.

Habitat projects addressing the encroachment of Juniper are critical to maintaining and increasing winter mule deer habitat. Tools such as chaining, bullhog, lop and scatter and tebuthiron should be utilized in areas where they would be most beneficial. Planting of browse species such as black (*Artemsia nova),* Wyoming (*Artemesia tridentata Wyomingensis*) and Mountain (*Artemesia tridentata vaseyana*) sagebrush, Antelope Bitterbrush (*Purshia tridentata*) and Mountain Mahogany (*Cercocarpus ledifolious, Cercocarpus montanus)* are critical and should be used where the Ecological site descriptions dictate their use.

The following are some of the areas that have been targeted for habitat projects within the unit over the next three to four years.

- Henefer/Echo WMA winter range rehabilitation and enhancements
- Round Valley WMA winter range rehabilitation and enhancements
- Other private lands winter range rehabilitation and enhancements

PERMANENT RANGE TREND SUMMARIES

Purpose of Range Trend Studies-The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Division's big game management program. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas.

The majority of the permanent range trend studies are located on deer and elk winter ranges. Range trend data are used for habitat improvement planning purposes.

Objective

Monitor, evaluate, and report range trend at designated key areas throughout the state, and inform Division biologists, public land managers, and private landowners of significant changes in plant community composition in these areas.

Expected Results and Benefits

Range trend studies are resurveyed every five years, and vegetation condition and trend assessments are made for key areas.

Summary and Excerpts of 2011 Range Trend Result

Unit 4 Morgan/South Rich

Thirteen interagency range trend studies were sampled in Unit 4 during the summer of 2011. A total of nineteen studies have been established within Unit 4 since 1984. Six sites were suspended for various reasons and if the need arises in the future these studies can be sampled again.

Desirable Components Index: The desirable components index (DCI) for deer was created as a tool to address condition and/or value of winter ranges for mule deer. This index was designed to score mule deer winter range based upon several important vegetation components (ie., preferred browse cover, shrub decadence, shrub young recruitment, cover of perennial grasses, cover of perennial forbs, cover of annual grasses and cover of noxious weeds). Although the index may be useful for assessing habitat for other species (ie. sage grouse and elk), the rating system was devised to specifically address mule deer winter range requirements.

This index is used primarily to determine if a particular site has the vegetation components necessary to be a good winter range for mule deer. It can also be used to identify areas where habitat restoration projects may be needed and assist land managers in determining possible rehabilitation options. Because it does not take into account factors such as soil stability, hydrologic function, and other environmental factors, it should not be used to assess a sites function and/or condition as typically used by the Federal land management agencies. Desirable mule deer winter range provides 12-20% of preferred browse cover, 20% or less shrub decadency, and 10% or more of the shrub population is young. The herbaceous understory contains 8-15% perennial grasses cover, 5% perennial forb cover, and less than 5% annual grass cover.

Condition of Mid-Level potential deer winter range on Unit 4, as indicated by DWR range trend surveys.

Year	Mean DCI score for Unit	Classification	Unit-specific DCI score range: Poor	Unit-specific DCI score range: Fair	Unit-specific DCI score range: Good
1996	48.3	Poor-Fair	27-40	41-55	56-71
2001	56.2	Fair			
2006	50.9	Poor to Fair			
2011	46.6	Poor			

Condition of Low-Level potential deer winter range on Unit 4, as indicated by DWR range trend surveys.

Year	Mean DCI score for Unit	Classification	Unit-specific DCI score range: Poor	Unit-specific DCI score range: Fair	Unit-specific DCI score range: Good
1996	44.4	Fair-Good	27-40	41-55	56-71
2001	53.7	Good			
2006	47.8	Good			
2011	49.2	Good			

CURRENT POPULATION STATUS

Year	Buck Harvest	Post-Season F/100 D	Post-Season Buck/100 D	Post-Season Population	Objective	% of Objective
2010	839	84	41	15,400	12,000	128%
2011	600	61	39	14,000	12,000	117%
2012	877	86	40	17,400	12,000	145%

Duration of Plan

This unit management plan was approved by the Wildlife Board on _____ and will be in effect for five years from that date, or until amended.

DEER HERD UNIT MANAGEMENT PLAN
Deer Herd Unit # 5
(East Canyon)
March 2013

BOUNDARY DESCRIPTION

Morgan, Summit, Salt Lake and Davis counties – Boundary begins at the junction of I-80 and I-84 (Echo Junction); southwest on I-80 to I-15; north on I-15 to its junction with I-84 near Ogden; east on I-84 to Echo Junction and I-80.

LAND OWNERSHIP

RANGE AREA AND APPROXIMATE OWNERSHIP*

	Yearlong range		Summer Range		Winter Range	
Ownership	**Area (acres)**	**%**	**Area (acres)**	**%**	**Area (acres)**	**%**
Forest Service	561	14%	45802	19%	18626	21%
Bureau of Land Management	0	0%	173	<1%	314	<1%
Utah State Institutional Trust Lands	0	0%	754	1%	59	<1%
Native American Trust Lands	0	0%	0	0%	0	0%
Private	3516	86%	188243	79%	65865	75%
Department of Defense	0	0%	193	<1%	773	1%
USFWS Refuge	0	0%	0	0%	0	0%
National Parks	0	0%	0	0%	0	0%
Utah State Parks	0	0%	0	0%	840	1%
Utah Division of Wildlife Resources	0	0%	2296	<1%	1273	2%
TOTAL	4077	100%	237461	100%	87750	100%

UNIT MANAGEMENT GOALS

Manage for a population of healthy animals capable of providing a broad range of recreational opportunities, including hunting and viewing. Balance deer herd impacts on human needs, such as private property rights, agricultural crops and local economies. Maintain the population at a level that is within the long-term capability of the available habitat to support.

POPULATION MANAGEMENT OBJECTIVES

Target Winter Herd Size – Maintain a target population size of 13,500 wintering deer. This population objective remains both the short-term (5 year life of this plan) and long term, barring significant changes in range conditions.

Herd Composition – Maintain a minimum 3-year average postseason buck to doe ratio of 18-20:100 in accordance with the statewide plan.

Unit 4

1994-2003 Objective:	9,500
2003 Objective:	8,500
2003-2013 Objective:	7,000
2013-2018 Objective:	13,500
Change since 2003:	+6,500

Change to population objective is based primarily on new data and models available beginning in 2006. New estimates of actual population numbers have been taken into account and the new objective should reflect the numbers of deer that are currently on the unit.

POPULATION MANAGEMENT STRATEGIES

Monitoring

Population Size - Utilizing harvest data, postseason and spring classifications and mortality estimates, a computer model will be used to estimate winter population size. Annual mortality will be estimated based on survival of radio collared animals on a nearby representative unit.

Buck Age Structure - Estimates of the age class structure of the buck population will be determined primarily (directly) through the use of hunter harvested bucks at checking stations and field bag checks, and secondarily (indirectly) using post-season classification observations.

Harvest - The primary technique used to estimate harvest over the unit is the statewide uniform harvest surveys.

Limiting Factors (May prevent achieving management objectives)

Crop Depredation - Address depredation issues as prescribed by state law and DWR policy. Some geographic populations may be maintained at lower levels due to conflicts with crop production and private landscapes.

Habitat – Winter range condition is the major limiting factor on the East Canyon unit. Range condition is currently ranked as fair due to a reduction of browse and competition from introduced weedy species. Excessive habitat utilization will be addressed by antlerless harvests.

Predation - Consistently high fawn/doe ratios seem to indicate that predation is not a primary limiting factor for deer on the East Canyon WMU. Coyote removal through a bounty system is currently underway and future fawn/doe ratios will be used to determine if the removal was effective.

Highway Mortality - Cooperate with the Utah Dept. of Transportation in construction of highway fences, passage structures and warning signs.

Illegal Harvest, Crippling Loss, Disease and Parasites - Although poaching losses appear insignificant on the East Canyon Unit, due primarily to a highly visible law enforcement effort, crippling losses are a concern, especially under buck-only hunting. Hunter survey studies (Austin, D.D. 1992. Great Basin Naturalist 52:364-372) suggests as many as 18 deer may be left in the field per 100 hunters. Disease is very difficult to evaluate, but high mortality in the spring is often associated with disease. The animal disease diagnostic facility associated with Utah State University acts as the laboratory to identify disease problems. Chronic Wasting disease is of further concern though it has not yet been detected on the unit. Surveillance will be implemented by testing hunter harvested animals as well as targeted surveillance of symptomatic animals.

HABITAT

Habitat Description

The East Canyon Management Unit is located mostly on the east side of the Wasatch Mountains. The topography varies across the unit from fairly deep canyons and steep slopes in the western portion to more gentle open slopes and fewer cliffs in the east. Most of the unit is drained by the Weber River. Several creeks along the north and east edges of the unit drain directly into the river. The East Canyon Creek flows into the Weber River. East Canyon Reservoir is located approximately in the center of the unit. The highest elevations are along the western boundary on peaks of the Wasatch Range which reach above 9,500 feet. The lowest point is 4,800 feet in the northwest corner where the Weber River flows out of the unit.

The upper limit of normal winter range is generally considered to be about 7,000 feet. Winter range is found in the major drainages and around East Canyon Reservoir. All of the valleys have been developed for agriculture and housing. The major canyons, Weber, East, and Main Canyons, contain housing developments and high-use roads. The northern, eastern, and southern boundaries are formed by Interstates 80 and 84. Other more narrow and higher elevation canyons have seasonal roads. The area is highly developed because a majority of the unit is private land. Not only is the quantity of winter range limited, but the quality is compromised by development and roads. Many deer that summer on the unit migrate over to the Davis County side of the unit (Wasatch Face) to winter. Winter migration into the unit from other areas is minimal.

Most of the winter range is comprised of sagebrush range types. The sagebrush type has a good mix of browse species and can provide substantial forage for wintering deer. This browse type, which is 20% of the total range, is composed mainly of big sagebrush, but also includes bitterbrush, service berry and Gambel oak. Other range types include agricultural lands.

Habitat concerns

Mule deer habitat on the East Canyon Unit is fairly abruptly divided between summer range and winter range.

Lower elevation winter range is the major limiting factor for mule deer populations on the East Canyon unit. The winter range areas are also those areas that are most at risk. A large threat to mule deer habitat on the East Canyon Unit is the direct loss of crucial winter range acres due to development and urbanization; Most of the increase in home building is occurring on the foothills in what was historic deer winter range on the Wasatch Face.

Additional threats and losses to deer winter range on the East Canyon unit is the reduction in habitat quality due to the loss of critical browse species (sagebrush, bitterbrush etc). This loss has been attributed to a number of factors, fire, agriculture, drought etc. However, the abundance of weedy annual grass species, and the increase of the exotic, weedy, perennial grass bulbous bluegrass are the more likely causes of sagebrush decline. These weedy species can form dense mats of cover that compete with seedling and young sagebrush plants, which limits establishment of new sagebrush plants into the

population. As the sagebrush population matures, decadence increases and density decreases as old plants begin to die.

The Wasatch Face area of the East Canyon Unit has endured major housing development in historic winter range. The majority of winter range has been converted, leaving wintering mule deer short on winter range on the face. To mitigate for this loss, winter habitat on the Wasatch Back needs to be improved to accommodate wintering big game. This is a challenge with the high percentages of winter range being privately held.

Mule deer winter range habitat has seen a decrease in sagebrush density. Causes of sagebrush decline are varied and multiple causes may have compounded effects on the low potential studies in this unit. The moderate drought in recent years has likely caused increased stress on plants, and negatively impacted them. Sagebrush age structure across the area is generally old and one age class. The lack of regeneration of the stand through establishment of young sagebrush is a concern. Annual grass species are present but not prevalent through most of the areas. However, the range trend does show increases of weedy species such as cheatgrass and bulbous bluegrass in many of the low potential studies in this unit. Perennial grass and forb species have increased on many of the studies as browse species decline, and may compete with browse establishment.

Habitat Management

Loss of critical winter ranges to development is the highest cause of loss of mule deer habitat in the East Canyon unit. The loss of sagebrush and other browse species on the remaining winter range is important when considering habitat quality. Contributing factors to the loss of browse species such as the impact of the increase in weedy species, particularly annual grasses, lack of browse regeneration and other variables are all of a concern in the habitat management of the unit.

To address the direct loss of habitat, efforts will be made towards the protection and conservation of remaining mule deer habitat. Efforts must be made to work with counties, cities, private landowners and federal agencies to maintain and protect critical and existing winter range from future losses. Through existing partnerships and developing new conservation partners efforts are being made to identify and prioritize critical habitat areas. Conservation easements will be an important part of this effort. Other conservation efforts are ongoing throughout the unit.

Encourage conservation easements in all ownership sectors, and additional acquisitions for DWR.

To address habitat quality and degradation, habitat improvement projects will be planned throughout the unit when possible.

The following are some of the areas that have been targeted for habitat projects within the unit over the next three to four years.

- East Canyon Wildlife Management Area
- Private lands

PERMANENT RANGE TREND SUMMARIES

Purpose of Range Trend Studies-The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Division's big game management program. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas.

The majority of the permanent range trend studies are located on deer and elk winter ranges. Range trend data are used for habitat improvement planning purposes.

Objective

Monitor, evaluate, and report range trend at designated key areas throughout the state, and inform Division biologists, public land managers, and private landowners of significant changes in plant community composition in these areas.

Expected Results and Benefits

Range trend studies are resurveyed every five years, and vegetation condition and trend assessments are made for key areas.

Summary and Excerpts of 2011 Range Trend Result

Unit 5 East Canyon

Five interagency range trend studies were sampled in Unit 5 during the summer of 2011. A total of twelve studies have been established within Unit 5 since 1984. Seven of these studies were suspended for various reasons. If the need arises in the future these studies can be sampled again. To access maps, discussions, and data tables for suspended studies see: http://www.wildlife.utah.gov/range.

Desirable Components Index: The desirable components index (DCI) for deer was created as a tool to address condition and/or value of winter ranges for mule deer. This index was designed to score mule deer winter range based upon several important vegetation components (ie., preferred browse cover, shrub decadence, shrub young recruitment, cover of perennial grasses, cover of perennial forbs, cover of annual grasses and cover of noxious weeds). Although the index may be useful for assessing habitat for other species (ie. sage grouse and elk), the rating system was devised to specifically address mule deer winter range requirements.

This index is used primarily to determine if a particular site has the vegetation components necessary to be a good winter range for mule deer. It can also be used to identify areas where habitat restoration projects may be needed and assist land managers in determining possible rehabilitation options. Because it does not take into account factors such as soil stability, hydrologic function, and other environmental factors, it should not be used to assess a sites function and/or condition as typically used by the Federal land management agencies. Desirable mule deer winter range provides 12-20% of preferred browse cover, 20% or less shrub decadency, and 10% or more of the shrub population is young. The herbaceous understory contains 8-15% perennial grasses cover, 5% perennial forb cover, and less than 5% annual grass cover.

Condition of deer winter range on Unit 5, as indicated by DWR range trend surveys.

Year	Mean DCI score for Unit	Classification	Unit-specific DCI score range: Poor	Unit-specific DCI score range: Fair	Unit-specific DCI score range: Good
1996	38.7	Poor	35-49	50-64	65-79
2001	49.6	Poor to Fair			
2006	44.9	Poor			
2011	53.0	Fair			

Current Population Status

Year	Buck Harvest	Post-Season F/100 D	Post-Season Buck/100 D	Post-Season Population	Objective	% of Objective
2010	626	75	26	11,900	7,000	170%
2011	659	61	33	10,600	7,000	151%
2012	910	84	27	12,900	7,000	184%

Duration of Plan

This unit management plan was approved by the Wildlife Board on _____ and will be in effect for five years from that date, or until amended.

DEER HERD UNIT MANAGEMENT PLAN
Deer Herd Unit # 6
(Chalk Creek)
April 2013

BOUNDARY DESCRIPTION

Summit and **Duchesne** counties - Boundary begins at the junction of Interstates 84 and 80 near Echo; then northeast on I-80 to the Utah-Wyoming state line; south and east along this state line to Highway SR-150; south on SR-150 to Pass Lake and the Weber River Trail; west on this trail to Holiday Park and the Weber River road; west on this road to Highway SR-32; north and west on SR-32 to I-80 and Wanship; north on I-80 to I-84 near Echo.

LAND OWNERSHIP

RANGE AREA AND APPROXIMATE OWNERSHIP*

	Yearlong range		Summer Range		Winter Range	
Ownership	**Area (acres)**	**%**	**Area (acres)**	**%**	**Area (acres)**	**%**
U.S Forest Service	0	--	33,719	11%	91	.1%
U.S. Bureau of Land Management	0	--	507	.2%	324	.4%
Utah School and Institutional Trust Lands Administration	0	--	363	.1%	259	.3%
Native American Trust Lands	0	--	0	0%	0	0%
Private	0	--	271,558	88.7%	71,612	96%
U.S. Department of Defense	0	--	0	0%	0	0%
USFWS Refuge	0	--	0	0%	0	0%
National Park Service	0	--	0	0%	0	0%
Utah Division of Parks and Recreation	0	--	0	0%	131	.2%
Utah Division of Wildlife Resources	0	--	0	15%	2,044	3%
TOTAL	0	--	306,147	100%	139,907	100%

UNIT MANAGEMENT GOALS

Manage for a population of healthy animals capable of providing a broad range of recreational opportunities, including hunting and viewing. Balance deer herd impacts on human needs, such as private property rights, agricultural crops and local economies. Maintain the population at a level that is within the long-term capability of the available habitat to support.

POPULATION MANAGEMENT OBJECTIVES

- Target Winter Herd Size – Maintain a target population size of 10,500 wintering deer. This population objective remains both the short-term (5 year life of this plan) and long term, barring significant changes in range conditions.

- Herd Composition – Maintain a minimum 3-year average postseason buck to doe ratio of 15-25:100 in accordance with the statewide plan.

	Unit 6
1994-2005 Objective:	11,500
2006-2013 Objective:	10,500
2013-2018 Objective:	10,500
Change:	-1000

The population objective was reduced in 2006 to account for loss of deer winter habitat due to residential and urban development.

POPULATION MANAGEMENT STRATEGIES

Monitoring

Population Size - Utilizing harvest data, postseason and spring classifications and mortality estimates, a computer model will be used to estimate winter population size. Annual mortality will be estimated based on survival of radio collared animals on a nearby representative unit.

Buck Age Structure - Estimates of the age class structure of the buck population will be determined primarily (directly) through the use of hunter harvested bucks at checking stations and field bag checks, and secondarily (indirectly) using post-season classification observations.

Harvest - The primary technique used to estimate harvest over the unit is the statewide uniform harvest surveys.

Limiting Factors (May prevent the unit from achieving management objectives)

Crop Depredation - Address depredation issues as prescribed by state law and DWR policy. Some geographic populations may be maintained at lower levels than the range can support due to conflicts with crop production and private landscapes.

Habitat – Winter range condition is the major limiting factor on the Chalk Creek unit. Winter and summer forage conditions, private land range availability and landowner acceptance will ultimately determine herd size. One factor that is potentially limiting is the increasing population and density of elk on the limited winter range. Elk numbers continue to increase on the unit and occupy and dominate what was once mule deer winter range. Excessive habitat utilization will be addressed by antlerless harvests.

Predation - Consistently high fawn/doe ratios seem to indicate that predation is not a primary limiting factor for deer on the Chalk Creek WMU. Coyote removal through a bounty system is currently underway and future fawn/doe ratios will be used to determine if the removal was effective.

Highway Mortality - UDWR has been working closely with the Utah Dept. of Transportation to prevent WVC's (wildlife vehicle collisions) in this unit. Several areas have been previously identified as having high WVC's: the I-80 and SR-32 area (especially around Rockport Reservoir and the agricultural fields surrounding I-80 and the Weber River); the I-80 area around the Echo Junction and several miles to the north-east; and Hwy. 150. This agency cooperation has resulted the installation of 8' wildlife exclusion

fences, the construction of wildlife escape ramps (along I-80), and the inclusion of wildlife paths under the I-80 Weber River bridge. In addition, a consultant firm completed a wildlife mortality study for UDOT for I-80 from Salt Lake City to Echo Junction. This study identified additional fencing, escape ramp, and wildlife passage needs throughout the I-80 corridor.

Illegal Harvest, Crippling Loss, Disease and Parasites

Although poaching losses appear insignificant on the Chalk Creek Unit, due primarily to a highly visible law enforcement effort, crippling losses are a concern, especially under buck-only hunting. If illegal kills be identified as a significant source of mortality, specific preventative measures will be developed within the context of an Action Plan. This plan will be developed in cooperation with the Law Enforcement section.

Disease is very difficult to evaluate, but high mortality in the spring is often associated with disease. The animal disease diagnostic facility associated with Utah State University acts as the laboratory to identify disease problems. Chronic Wasting disease is of further concern although it has not yet been detected on the unit. Surveillance will continue to be implemented by testing hunter harvested animals as well as targeted surveillance of symptomatic animals.

HABITAT

Habitat Description

The Chalk Creek Management Unit has an estimated 74,461 acres of winter habitat and 306,147 acres of summer habitat for mule deer range. The majority of the range is privately owned (96% of the winter range), and 89% of the summer range also occurring on private property. Widespread private ownership leads to numerous management complications. Development and loss of habitat due to other land disturbances are some of the biggest concerns to mule deer winter range. The discovery, development, and removal of oil throughout the unit, especially the Chalk Creek area, has led to increased road densities and scattered housing developments. New agricultural projects on crucial winter range also continue to increase depredation problems and further decrease the available big game habitat. Because of the preponderance of private land and the establishment of Cooperative Wildlife Management Areas (CWMU's) access is severely restricted for public hunting on large areas.

The topography of the unit is influenced mainly by the Uinta Mountains to the east, with their drainages flowing through long, gradual slopes down into the Weber River Valley. Other major drainages include Crandall Canyon, Chalk Creek, Echo Canyon, Hixon Canyon, Pecks Canyon, and Grass Creek. The southern exposures of these canyons are especially important winter ranges. The rest of the winter range is found in the low rolling foothills of the western and central areas of the unit. The upper limits of the winter range vary between approximately 6,800 and 7,200 feet (Giunta 1979).

Towns located in the valley along the Weber River include: Oakley, Peoa, Wanship, Hoytsville, and Coalville. Echo and Rockport Reservoirs, located on the west side of the unit on the Weber River, are both significant barriers to big game movement. Additionally, I-80 through Echo Canyon discourages big game movement and many deer deaths occur there during winter and spring.

Habitat concerns

Mule deer habitat on the Chalk Creek Unit is divided between summer range and winter range. The summer range is mostly at higher elevations with the majority of the summer range being on private property. Due to the loss of habitat and the increasing number of elk on the unit, overuse on remaining winter range is a serious threat to the health and productivity of the winter browse species contained in the heavily utilized ranges.

Lower elevation winter range is the major limiting factor for mule deer populations on the Chalk Creek unit. The winter range areas are also those areas that are most at risk. Threats to mule deer habitat on the Chalk Creek unit include the continued loss of acres and the reduction in habitat quality due to the

loss of critical browse species (sagebrush, bitterbrush etc). The loss of habitat can be attributed to different factors and may be specific to specific areas. One factor is the expansion of Juniper across the winter range particularly from Echo south to Oakley. Other concerns are the direct loss of crucial winter range acres due to development and urbanization. Most of the increase in home building is occurring on the foothills in what was historic deer winter range.

The increasing abundance of weedy annual grass species, and the increase of the exotic, weedy, perennial grass bulbous bluegrass are also contributing factors of sagebrush decline. These weedy species can form dense mats of cover that compete with seedling and young sagebrush plants, which limits establishment of new sagebrush plants into the population. As the sagebrush population matures, decadence increases and density decreases as old plants begin to die. Annual grass species such as cheatgrass can also increase fuel loads and increase the chance of a catastrophic fire event.

Habitat Management

Loss of critical winter ranges to development is the highest cause of loss of mule deer habitat in the Chalk Creek unit. The habitat quality of the sagebrush and other browse species on the remaining winter range is important to protect.

To address the direct loss of habitat, efforts will be made towards the protection and conservation of remaining mule deer habitat. Efforts must be made to work with counties, cities, private landowners, non-governmental organizations (NGO's), state and federal agencies to maintain and protect critical and existing winter range from future losses. Through existing partnerships and developing new conservation partners, efforts are being made to identify and prioritize critical habitat areas. Conservation easements will continue to be an important part of this effort. Other conservation efforts are ongoing throughout the unit.

Encourage conservation easements and fee title acquisitions in all ownership sectors to protect critical habitats.

To address habitat quality and degradation, habitat improvement projects have been and will continue to be planned throughout the unit. Habitat projects have been and are being done on UDWR Wildlife Management Areas, and private lands throughout the unit. The habitat projects are designed to address the specific issues within each project area. The major issues are Jumiper encroachment and annual grass competition reducing the amount of browse species available to wintering wildlife. This in turn causes over-utilization of remaining browse, causing degeneration of existing plants. Recruitment of browse plants is also a concern due to annual grasses and over utilization by removing immature plants. Areas such as Crandall Canyon and the surrounding drainages are very dense in Juniper and are prime areas for Juniper removal projects, utilizing chaining, lop and scatter, bullhog and other accepted methods for thinning and removing Juniper.

The following are some of the areas that have been targeted for habitat projects within the unit over the next three to four years.

- Crandall Canyon winter range rehabilitation and Pinyon/Juniper (PJ) tree removal.
- South Fork PJ thinning and winter range enhancement.
- A particular focus of treatment area is the expanding Juniper that dominates the crucial winter ranges from Echo south to Oakley. Those areas of Phase I and Phase II juniper will be targeted. The challenge is to find multiple cooperative land owners in a given area, where larger projects can be done.

PERMANENT RANGE TREND SUMMARIES

Purpose of Range Trend Studies-The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Division's big game management program. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas.

Statewide, the majority of the permanent range trend transects are located on deer and elk winter ranges. The range trend data resulting from these studies are used for habitat improvement and planning purposes.

Objective

Monitor, evaluate, and report range trend at designated key areas throughout the state, and inform Division biologists, public land managers, and private landowners of significant changes in plant community composition in these areas.

Expected Results and Benefits

Range trend transects are resurveyed every five years, and vegetation condition and trend assessments are made for key areas.

Summary and Excerpts of 2011 Range Trend Result

Unit 6 Chalk Creek

Nine range trend studies were sampled in Unit 6 during the summer of 2011. A total of twelve studies have been established within Unit 6 since 1984.

Three transects have been suspended over the years. These sites were suspended for various reasons and if the need arises in the future these studies can be sampled again.

Desirable Components Index:
The desirable components index (DCI) for deer was created as a tool to address condition and/or value of winter ranges for mule deer. This index was designed to score mule deer winter range based upon several important vegetation components (ie., preferred browse cover, shrub decadence, shrub young recruitment, cover of perennial grasses, cover of perennial forbs, cover of annual grasses and cover of noxious weeds). Although the index may be useful for assessing habitat for other species (ie. sage grouse and elk), the rating system was devised to specifically address mule deer winter range requirements.

This index is used primarily to determine if a particular site has the vegetation components necessary to be a good winter range for mule deer. It can also be used to identify areas where habitat restoration projects may be needed and assist land managers in determining possible rehabilitation options. Because it does not take into account factors such as soil stability, hydrologic function, and other environmental factors, it should not be used to assess a sites function and/or condition as typically used by the federal land management agencies. Desirable mule deer winter range provides 12-20% of preferred browse cover, 20% or less shrub decadency, and 10% or more of the shrub population is young. The herbaceous understory contains 8-15% perennial grasses cover, 5% perennial forb cover, and less than 5% annual grass cover.

Condition of High Potential deer winter range on Unit 6 as indicated by DWR range trend surveys.

Year	Mean DCI score for Unit	Classification	Unit-specific DCI score range: Poor	Unit-specific DCI score range: Fair	Unit-specific DCI score range: Good
1996	68.0	Good	35-49	50-64	65-79
2001	58.9	Fair			
2006	62.8	Fair			
2011	70.9	Good			

Condition of Mid-level Potential deer winter range on Unit 6 as indicated by DWR range trend surveys.

Year	Mean DCI score for Unit	Classification	Unit-specific DCI score range: Poor	Unit-specific DCI score range: Fair	Unit-specific DCI score range: Good
1996	43.4	Fair	27-40	41-55	56-71
2001	47.2	Fair			
2006	46.8	Fair			
2011	49.0	Fair			

Current Population Status

Year	Buck Harvest	Post-Season F/100 D	Post-Season Buck/100 D	Post-Season Population	Objective	% of Objective
2010	667	71	34	8,500	10,500	81%
2011	612	64	32	8,000	10,500	76%
2012	912	71	35	9,800	10,500	93%

Duration of Plan

This unit management plan was approved by the Wildlife Board on _____ and will be in effect for five years from that date, or until amended.

DEER HERD UNIT MANAGEMENT PLAN
Deer Herd Unit # 7
(Kamas)
April 2013

BOUNDARY DESCRIPTION

Summit and Wasatch counties - Boundary begins at the junction of I-80 and SR-32 (Wanship); south on SR-32 to the Weber Canyon Road at Oakley; east on this road to Holiday Park and the Weber River Trail; east on the Weber River Trail to SR-150 near Pass Lake; south on SR-150 to the North Fork of the Provo River; south along this river to the Provo River; south along this river to SR-35; west on SR-35 to Francis and SR-32; west on SR-32 to US-40 near Jordanelle; north on US-40 to I-80; north on I-80 to SR-32 and Wanship.

LAND OWNERSHIP

RANGE AREA AND APPROXIMATE OWNERSHIP*

	Yearlong range		Summer Range		Winter Range	
Ownership	**Area (acres)**	**%**	**Area (acres)**	**%**	**Area (acres)**	**%**
U.S. Forest Service	0	--	119,932	72.5%	6,511	19%
U.S. Bureau of Land Management	0	--	91	.1%	5	.1%
Utah School and Institutional Trust Lands Administration	0	--	74	.1%	153	.5%
Native American Trust Lands	0	--	0	0%	0	0%
Private	0	--	44,824	27%	26,084	78%
U.S. Department of Defense	0	--	0	0%	0	0%
USFWS Refuge	0	--	0	0%	0	0%
National Park Service	0	--	0	0%	0	0%
Utah Division of Parks and Recreation	0	--	0	0%	148	.4%
Utah Division of Wildlife Resources	0	--	507	.3%	657	2%
TOTAL	0	--	165,428	100%	33,558	100%

UNIT MANAGEMENT GOALS

Manage for a population of healthy animals capable of providing a broad range of recreational opportunities, including hunting and viewing. Balance deer herd impacts on human needs, such as private property rights, agricultural crops and local economies. Maintain the population at a level that is within the long-term capability of the available habitat to support.

POPULATION MANAGEMENT OBJECTIVES

- Target Winter Herd Size – Maintain a target population size of 8,000 wintering deer. This population objective remains both the short-term (5 year life of this plan) and long term, barring significant changes in range conditions.

- Herd Composition – Maintain a minimum 3-year average postseason buck to doe ratio of 18-20:100 in accordance with the statewide plan.

	Unit 7
1994-2005 Objective:	12,000
2001-2005 Objective:	8,000
2013-2018 Objective:	8,000
Change:	0

POPULATION MANAGEMENT STRATEGIES

Monitoring

Population Size - Utilizing harvest data, postseason and spring classifications and mortality estimates, a computer model will be used to estimate winter population size. Annual mortality will be estimated based on survival of radio collared animals on a nearby representative unit.

Buck Age Structure - Estimates of the age class structure of the buck population will be determined primarily (directly) through the use of hunter harvested bucks at checking stations and field bag checks, and secondarily (indirectly) using post-season classification observations.

Harvest - The primary technique used to estimate harvest over the unit is the statewide uniform harvest surveys.

Limiting Factors (May prevent the unit from achieving management objectives)

Crop Depredation - Address depredation issues as prescribed by state law and DWR policy. Some geographic populations may be maintained below the number of animals the range could support due to conflicts with crop production and private landscapes.

Habitat – Winter range availability and condition is the major limiting factor on the Kamas unit. Excessive habitat utilization will be addressed by antlerless harvests.

Predation - Consistently high fawn/doe ratios seem to indicate that predation is not a primary limiting factor for deer on the Kamas WMU. Coyote removal through a bounty system is currently underway and future fawn/doe ratios will be used to determine if the removal was effective.

Highway Mortality – UDWR has been working closely with the Utah Dept. of Transportation to prevent WVC's (wildlife vehicle collisions) in this unit. Several areas have been previously identified as having high WVC's: the I-80 and SR-32 area (especially around Rockport Reservoir and the agricultural fields surrounding I-80 and the Weber River); U.S. 40 (Milepost 1-7); I-80 between U.S. 40 and SR-32 (Wanship); and Hwy. 150. This agency cooperation has resulted in the installation of 8' wildlife exclusion fences, and the construction of wildlife escape ramps in some locations. Planning is currently underway for the construction of a joint pedestrian/wildlife underpass to be located around milepost 3-4 on U.S. 40. This underpass will be in conjunction with 8' wildlife exclusion fencing. In addition, a consultant firm completed a wildlife mortality study for UDOT for I-80 from Salt Lake City to Echo Junction. This study identified additional fencing, escape ramp, and wildlife passage needs throughout the I-80 corridor.

Illegal Harvest, Crippling Loss, Disease and Parasites–

Although poaching losses appear insignificant on the Kamas Unit, due primarily to a highly visible law enforcement effort, crippling losses are a concern, especially under buck-only hunting. Should illegal harvest be identified as a significant source of mortality, specific measures will be developed within the context of an Action Plan. This plan will be developed in cooperation with the Law Enforcement Section.

Hunter survey studies (Austin, D.D. 1992. Great Basin Naturalist 52:364-372) suggests as many as 18 deer may be left in the field per 100 hunters.

Disease is very difficult to evaluate, but high mortality in the spring is often associated with disease. The animal disease diagnostic facility associated with Utah State University acts as the laboratory to identify disease problems. Chronic Wasting disease is of further concern although it has not yet been detected on the unit. Surveillance will continue to be implemented by testing hunter harvested animals, as well as targeted surveillance of symptomatic animals.

HABITAT

Habitat Description

The Kamas Management unit is located between the Uinta and Wasatch Mountains in the north-central part of the state. The 1977 inventory of the Kamas unit, then known as Herd Unit 20, classified 10% of the unit as winter range (Giunta 1979). Boundary changes in 1985 reduced the total acreage and shifted a portion of the winter range north of the Weber River into the Chalk Creek management unit. There was another realignment of the herd unit boundaries again in 1996 and in 2004. Even with these changes, the ratio of winter to summer range has stayed basically the same, with about 10% of the area being classified as winter range. The limiting factor for big game in this management unit is the lack of adequate amounts of good quality winter range. With severe winters, the available range is reduced even further. An example of this problem can be illustrated by the large winter deer losses which occurred during the winter of 1992-93.

The western portion of the unit is primarily privately-owned land consisting of the Kamas valley and the "West Hills" which is situated between Kamas Valley and the Park city area, the mountainous, eastern portion of the unit is managed by the U.S. Forest Service. The Kamas Wildlife Management Area, administered by the Division of Wildlife Resources, is also located within this unit. Approximately 67% of the winter range is under private ownership with the Forest Service managing another 28% of the normal winter range. There is abundant summer range in the Uinta Mountains to the east. These mountains contain the headwaters of the Weber and Provo Rivers, which flow west through the Rhodes and Heber Valleys. The south and west exposures along these rivers, in addition to land along Beaver Creek and the mountain face east and north of Kamas, provide the major deer wintering areas.

Because of the varying topography, the deer winter range is separated into several distinct areas. The upper limits vary considerably, but lower limits generally follow the canyon bottoms, roads, and the upper limits of cultivated land. Wintering areas north of the Weber River, on the Kamas face, Beaver Creek, and the Provo River, have long been recognized as crucial to the deer herd on the western edge of the Uinta Mountains.

Habitat concerns

The summer mule deer habitat is mostly at higher elevations in the eastern part of the unit including private and National Forest Service lands. Summer range habitat concerns are the changes in the forest systems. In some areas the loss of aspen stands due to conifer encroachment is a concern. In addition, the Uinta Mountains are suffering from a high percentage of pine beetle kill. This is opening up some area to improved summer range due to increased water table and improved understory. The danger is from catastrophic wildfire burning through the beetle killed trees.

Lower elevation winter range is the major limiting factor for mule deer populations on the Kamas unit.

The winter range areas are also those areas that are most at risk. The largest threat to mule deer habitat in the Kamas area is the direct loss of crucial winter range acres due to development and urbanization. Most of the increase in home building is occurring on the foothills in what was historic deer winter range. This development is occurring through all areas of the unit. From Oakley to Kamas on the west, including continuous development of summer homes up the canyons and scattered throughout the summer ranges. There is also significant development on the West Hills area.

In addition to the continual stresses put on the winter range by development, there is an increasing number of elk congregating on the unit. The elk are occupying the areas that were once reserved for mule deer, while the mule deer are forced to less productive areas. Overuse on remaining winter range is a serious threat to the health and productivity of the winter browse species contained in the heavily utilized ranges. In heavy winter years, these ranges are overwhelmed and have in the past been the cause of high winter mortality during deep snow years.

The increasing abundance of weedy annual grass species and the increase of the exotic, weedy, perennial grass bulbous bluegrass are also contributing factors of sagebrush decline. These weedy species can form dense mats of cover that compete with seedling and young sagebrush plants, which limits establishment of new sagebrush plants into the population. As the sagebrush population matures, decadence increases and density decreases as old plants begin to die. Annual grass species such as cheatgrass can also increase fuel loads and increase the chance of a catastrophic fire event.

There are also areas that are experiencing juniper encroachment and are in need of treatments to address this problem. Utilizing the tools available to remove juniper are important. Enhancement of existing winter range through increase and improvement of browse species, as well as increasing the diversity of the browse species is crucial to preventing future high mortality events.

Habitat Management

Loss of critical winter ranges to development is the highest cause of loss of mule deer habitat in the Kamas unit. The habitat quality of the sagebrush and other browse species on the remaining winter range is important to protect. . Contributing factors to the loss of browse species such as the impact of the increase in weedy species, (particularly annual grasses), juniper expansion, lack of browse regeneration and other variables are all of a concern in the habitat management of the Kamas Unit.

To address the direct loss of habitat, efforts will be made towards the protection and conservation of remaining mule deer habitat. Efforts must be made to work with counties, cities, private landowners, non-governmental organizations (NGO's), state and federal agencies to maintain and protect critical and existing winter range from future losses. Through existing partnerships and developing new conservation partners, efforts are being made to identify and prioritize critical habitat areas. Conservation easements will be an important part of this effort. Other conservation efforts are ongoing throughout the unit.

To address habitat quality and degradation, habitat improvement projects have been and will continue to be planned throughout the unit. Habitat projects have been and are being done on UDWR Wildlife Management Areas, and private lands throughout the unit. The habitat projects are designed to address the specific issues within each project area. The issues are Juniper encroachment and annual grass competition reducing the amount of browse species available to wintering wildlife. This in turn causes over-utilization of remaining browse, causing degeneration of existing plants. Recruitment of browse plants is also a concern due to annual grasses and over utilization by removing immature plants. Areas such as Crandall Canyon and the surrounding drainages are very dense in Juniper and are prime areas for Juniper removal projects, utilizing chaining, lop and scatter, bullhog and other accepted methods for thinning and removing Juniper.

PERMANENT RANGE TREND SUMMARIES

Purpose of Range Trend Studies-The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Division's big game management program. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas.

Statewide, the majority of the permanent range trend transects are located on deer and elk winter ranges. The range trend data resulting from these studies are used for habitat improvement and planning purposes.

Objective

Monitor, evaluate, and report range trend at designated key areas throughout the state, and inform Division biologists, public land managers, and private landowners of significant changes in plant community composition in these areas.

Expected Results and Benefits

Range trend transects are resurveyed every five years, and vegetation condition and trend assessments are made for key areas.

Summary and Excerpts of 2011 Range Trend Result

Unit 7 Kamas

Six interagency range trend studies were sampled in Unit 7 during the summer of 2011. A total of eight studies have been established within unit 7 since 1984. Two studies have been suspended over the years. If the need arises in the future these studies can be sampled again.

Desirable Components Index:

The desirable components index (DCI) for deer was created as a tool to address condition and/or value of winter ranges for mule deer. This index was designed to score mule deer winter range based upon several important vegetation components (ie., preferred browse cover, shrub decadence, shrub young recruitment, cover of perennial grasses, cover of perennial forbs, cover of annual grasses and cover of noxious weeds). Although the index may be useful for assessing habitat for other species (ie. sage grouse and elk), the rating system was devised to specifically address mule deer winter range requirements.

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Condition of deer winter range on Unit 7, as indicated by DWR range trend surveys.

Year	Mean DCI score for Unit	Classification	Unit-specific DCI score range: Poor	Unit-specific DCI score range: Fair	Unit-specific DCI score range: Good
1996	44.2	Fair	27-40	41-55	56-71
2001	52.2	Fair			
2006	41.2	Fair			
2011	44.2	Fair			

Current Population Status

Year	Buck Harvest	Post-Season F/100 D	Post-Season Buck/100 D	Post-Season Population	Objective	% of Objective
2010	441	78	21	5,950	8,000	74%
2011	446	76	21	6,000	8,000	75%
2012	424	76	21	5,500	8,000	68%

Duration of Plan

This unit management plan was approved by the Wildlife Board on _____ and will be in effect for five years from that date, or until amended.