UTAH STATEWIDE
ELK MANAGEMENT PLAN

UTAH DIVISION OF WILDLIFE RESOURCES
DEPARTMENT OF NATURAL RESOURCES

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STATEWIDE MANAGEMENT PLAN FOR ELK

I. PURPOSE OF THE PLAN

A. General

The statewide elk management plan provides overall guidance and direction for Utah's elk management program. This plan briefly describes general information on elk natural history, management, habitat, and population status. This statewide elk management plan was revised by a 20 person advisory committee. The committee was diverse and had representation from: the Utah Wildlife Board, five Regional Advisory Councils, Brigham Young University, Rocky Mountain Elk Foundation, Sportsmen for Fish and Wildlife, Utah Archery Association, US Forest Service, Bureau of Land Management, Utah Farm Bureau, Cooperative Wildlife Management Unit Association, Utah Guides and Outfitters, private landowners, livestock permittees, public at large, and Utah Division of Wildlife Resources (DWR). This group met eight times from April 7 to August 17, 2022. The committee identified components of the last elk plan that were working well and areas that could be improved upon, and then evaluated goals and objectives and developed new strategies to address those management issues.

B. Dates Covered

The elk plan was approved by the Wildlife Board on December 1, 2022 and will be in effect for 10 years until December 2032. Two mid-plan reviews spaced 3-4 years apart will be scheduled with the Wildlife Board in the spring of 2026.

II. SPECIES ASSESSMENT

A. Natural History

Elk (*Cervus elaphus*) are members of the cervid family along with deer, moose, and caribou. Elk are the same species as European red deer, even though visually they are quite different. North American elk are also commonly called wapiti to distinguish them from European red deer. Wapiti is the Shawnee name for elk and means "white rump" or "white deer." There are six recognized subspecies of elk in North America with all of the elk in Utah of the subspecies known as Rocky Mountain elk (*C. e. nelsoni*). In 1971, the Rocky Mountain elk was designated as Utah's state animal.

Elk males, females, and young are known as bulls, cows, and calves, respectively. Calves are generally born as singles (twins are extremely rare) after a gestation period of approximately 8–8.5 months. Calves are normally born mid-May through mid-June and typically weigh between 33-45 pounds at birth. Elk are gregarious animals and, as such, often gather into large nursery bands of cows and calves in early summer. During this time, it is common to see groups of several hundred elk. Within a few weeks, those nursery bands disperse into smaller groups across the summer range.

The antlers of bulls begin to grow as soon as the old antlers are shed in late winter or early spring. Bulls generally segregate from cows and calves through the summer antler growing period and often band together in small groups during this time. The velvet that covers and provides nourishment to the growing antlers begins to shed in early August. In Utah, the rut or breeding period for elk begins in early September and continues through early October with the peak of the rut typically occurring in mid to late September. In early September, bulls begin to bugle and gather cows into harems of approximately 10–20 females. Breeding bulls vigorously defend their harems from other "satellite" bulls who attempt to steal cows for themselves.

After the rut, bulls leave the cows and calves and either become reclusive or band together with other bulls. It is common to see large groups of bulls in the late fall and winter. In late spring, cows seek solitude for calving. At this time, yearlings from the previous year are often aggressively driven away by the cows and forced to find new home ranges. As new calves are born, the cycle of life begins again.

B. Management

1. DWR Regulatory Authority

The Utah Division of Wildlife Resources operates under the 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 necessary functions, powers, duties, rights, and responsibilities associated with wildlife management within the state. Division duties are to protect, propagate, manage, conserve, and distribute protected wildlife throughout the state.

2. Past and Current Management

Elk along with bighorn sheep were probably the most common game animals in Utah prior to settlement times. Native Americans, trappers, and pioneers all used elk as a source of food and clothing. Unrestricted hunting eliminated most of the elk in Utah by the end of the nineteenth century. Because of the low elk numbers, elk hunting seasons were closed in Utah in 1898.

Large scale transplant efforts are a major reason for the reestablishment of elk in Utah. Interstate transplants of elk occurred from 1912 to 1925 to reestablish elk to their historical ranges. During that period, elk were transplanted from Yellowstone National Park and released on the Fishlake, Oquirrh Mountains, Mount Timpanogos, Mount Nebo, Logan Canyon, and Manti units. A few elk were also captured from Montana and released in Smithfield Canyon during that period. In addition to the interstate transplant efforts, elk have also been captured and transplanted to and from source herds within Utah. Those transplants occurred in the late 1970s and 1980s and were mainly released on the eastern and southern Utah mountain ranges.

Elk herds in Utah were managed by the Board of Big Game Control from 1925 until 1996. In 1996, the Board of Big Game Control was abolished and replaced with five Regional Advisory Councils and a Wildlife Board that regulate the management of all wildlife in Utah.

Elk were hunted under a limited entry hunting system until 1967 when the Board of Big Game Control adopted an “open bull” hunt strategy on most large elk units. Smaller elk units continued to be managed as “restricted permit” or “limited entry” type hunts. That hunting strategy continued until 1989 when a “yearling only” regulation was initiated on the two largest elk herds, the Manti and Fishlake. Yearling only was later replaced with a “spike only” regulation and expanded to other units.

Elk herds in Utah are currently managed under a combination of general season (spike and any bull) and limited entry hunting regulations. The any bull units are located primarily in northern Utah and are generally on units with large amounts of private land, large wilderness areas, or units with very low elk populations (Figure 1). Spike hunting is used on most limited entry units (Figure 2) and is intended to reduce bull:cow ratios, while still allowing for trophy quality bulls. Any bull and spike hunts are designed to provide hunting opportunity. In 2022, DWR issued over 47,000 general season permits including 17,500 adult any bull, more than 2,200 youth any bull, 15,000 spike, and more than 12,700 archery permits. The harvest rate on these general season elk hunts is fairly low, with success rates in 2021 averaging 15.5% across all general season elk hunts (5,755 elk harvested by 37,211 hunters afield). Archery hunters recorded the lowest success rates (11.4%) whereas hunters that purchased multi-season tags, allowing them to hunt during multiple seasons, experienced the highest success rates (multi-season spike only 22.9%, multi-season any bull 28.2%).

Traditional limited entry hunting units/area are managed for an average age of harvested bulls (Figure 3, Table 1). Those age objectives are based on the premise that to achieve a given average age of harvest, a certain age structure and number of bulls must be present in the population. The higher the age class objective, the more the age structure will be shifted towards older animals, and as such, the greater the likelihood of a hunter harvesting a larger trophy animal. There is a strong correlation between age and antler size in bull elk, but only to a certain age. Large data sets analyzing antler size (measured via Boone and Crockett score) on bulls that have been aged using cementum annuli show that average maximum antler size for bulls is about 320” Boone and Crockett (B&C), and most bull have achieved 96% of their antler growth potential by 6.5 years old (Figure 4, Freeman et al. 2013). Data comparing age and main beam antler length for elk harvested in Utah show similar trends with 97% of length being achieved by 6.5 years old and length not increasing after an elk reaches 8.5 years old (Figure 5).

Based on these data and analyses, the elk plan committee and DWR made the decision to lower age objectives on some units in order to give more opportunity to hunt while still maintaining large antlered bulls. Lowering age objectives, especially on the highest age classes, will give more opportunity to hunt and large antlered bulls will still be available on the landscape. It may be more challenging for hunters to locate, hunt, and harvest large bulls, but the tradeoff of increasing hunting opportunity by increasing hunting challenge while still maintaining “quality” bulls was a major theme for the 2022 elk committee. By lowering age objectives by one year, hunting opportunity can be increased by 40-50%, assuming stable populations (UDWR, unpublished data).

C. Habitat

Elk are a generalist ungulate and have a varied diet consisting of grasses, forbs, and shrubs. The percentage of each food type can vary based on availability. This flexible diet allows elk to live in a variety of habitat types including Utah's mountains as well as some of the low deserts (Figure 6). Although elk inhabit most habitat types in Utah, they prefer to spend their summers at high elevations in aspen conifer forests. Elk will spend the winter months at mid to low-elevation habitats that contain mountain shrub and sagebrush communities.

Elk in Utah are more closely tied to aspen than any other habitat type. Aspen stands provide both forage and cover for elk during the summer months and are used for calving in spring. For several decades, aspen has been declining throughout the West from lack of disturbance (e.g., logging, fire), extended drought, and overgrazing all being listed as potential reasons for the decline. If declines in aspen communities continue, it will reduce the amount of suitable habitat available for elk and, as such, reduce the number of elk those habitats can support.

Water is an important component of elk habitat, and lack of sufficient water distribution limits the number and distribution of elk in Utah. In Utah, Jeffrey (1963) found that elk on summer range preferred areas within 0.33 miles of a permanent water source. Other studies have shown elk use of summer range declined markedly beyond 0.5 mile from water (Mackie 1970, Nelson and Burnell 1975).

D. Population Status

Elk are well established throughout Utah with the current statewide population estimated at approximately 84,390 animals (Figure 7). From 1975 to 1990, the elk population in Utah grew rapidly from an estimated 18,000 elk to 58,000 elk (average annual growth rate = 1.08). This rapid increase was largely due to low population levels and the abundance of available habitat (i.e., the population was well below carrying capacity). After 1990, population growth slowed down considerably through the use of antlerless harvest designed to reduce population growth rates, as well as reduce populations in areas with poor range conditions due to drought. Elk populations have held relatively steady during the last 10 years and most units are currently at or near the population objective (Table 2).

E. Recent Research

Utah actively monitors elk populations around the state and conducts research to improve management of this species. Recent efforts have focused on use of GPS collars to understand habitat use, movements, and survival of elk in several management units. For these projects, biologists capture elk each winter, conduct a general health assessment (e.g., measurement of animal condition via ultrasonography, pregnancy, etc.), and then fit elk with a GPS collar prior to release. GPS collars provide real-time data on habitat use, movements, and survival. When collared elk die, UDWR biologists and partners with universities and other agencies are notified via email. This notification provides us with data on the location and timing of each mortality, and also allows us to quickly investigate each mortality to determine probable cause of death.

By understanding why animals are dying, we can determine what is likely limiting populations and direct management to help alleviate the issues.

1. Survival

Annual survival of adult (≥ 1.5 years of age) female elk is generally high in Utah with the predominant source of mortality being hunter harvest. On the Wasatch and surrounding management units, annual survival of adult female elk ranged between 75 and 81 percent when harvest was included, but in the absence of harvest by humans, annual survival rates were much higher ranging between 93 and 98 percent (Figure 8, Sergeyev et al. 2021). In this study, over 21 percent of collared elk were killed by hunters with just 4 percent killed by mountain lions and less than 2 percent succumbing to disease, pregnancy complications, collisions with vehicles, or undetermined causes (Sergeyev et al. 2021). In an analysis of adult elk survival across several western states, Brodie et al. (2013) also found high adult survival in the absence of hunting with baseline survival estimates ranging from 93 to 95%.

Survival of neonate elk during their first year of life is much lower and averaged between 41 and 47 percent on the Book Cliffs management unit (Figure 9, Turnley et al. 2022). Neonate elk in the Book Cliffs were subject to predation by multiple predators, but mountain lions were responsible for the majority of deaths. Up to 45 percent of collared calves during their first year of life were killed by cougars in the Book Cliffs (Figure 10, Turnley et al. 2022).

Studies are currently underway to estimate survival of male and female yearling elk (from year 1.5 to 2.5 years old) in Utah.

2. Pregnancy

Pregnancy in elk is highly variable, differing across years and units (Figure 11 and Figure 12). During winter (January-February) captures in Utah, we have tested adult female elk for pregnancy using blood tests and ultrasonography. Based on these data, average adult pregnancy rates have been 85% with a range from 55% to 100%. Recent research on the Book Cliffs indicated pregnancy rates of elk are highly correlated with body condition of females, age, and calving status from the previous year. For body condition, pregnant females had greater amounts of rump fat at the time of capture than non-pregnant females (Figure 13). For age, females >12 years old were less likely to be pregnant than younger females (Figure 14). Lastly, energetic investment into a calf in the current year, determined by a lactation score at the time of capture, was a strong predictor of pregnancy status in the subsequent year. Females with high lactation scores in late winter, indicating they had nursed a calf in the months preceding, were less likely to be pregnant. This relationship interacted with age and was stronger in older females (>12 years) than for younger females (2-12 years). Lactation comes at a high energetic cost to female elk, with nursing calves gaining a pound or more a day between birth and six months of age. This display of reproductive pause appears to be a strategy to restore energy reserves spent in the previous year. Further research to understand how habitat quality influences this finding has been set to begin in 2023.

3. Age Structure

Elk are a long-lived ungulate with an average lifespan of 10-13 years in hunted populations. However, cementum analysis has confirmed elk living into their late twenties in some parts of the state. Due to high natural survival of adults, the greatest limiting factor of populations in Utah is recruitment of individuals. Population growth is contingent on both production and survival of calves in a given year. Based on the relationship found between age and pregnancy rates on the Book Cliffs, maximum reproductive potential of a herd is achieved by maintaining a younger age structure. Younger females are more likely to be in good condition, which translates to higher pregnancy rates and greater investment into offspring. Previous research indicates these maternal effects in ungulates influence both birthweight and survival of neonates. Maintenance of a younger age structure within a population is crucial to both growth and stability of the herd.

4. Elk Distribution

Distribution of elk on the landscape is fundamental because effective management of population size is dependent on elk being on public land and vulnerable to harvest during the hunting seasons. Distribution of elk shifts among seasons in a predictable manner and is strongly influenced by hunting pressure (Sergeyev et al., 2022). Based on data from elk located on the Wasatch and surrounding management units, there is an annual cycle where the majority (~75%) of elk are residing on public land during summer, whereas the majority of elk (~65%) reside on private land during late-winter. This pattern is likely due to the juxtaposition of public and private land; public land is typically higher in elevation and susceptible to deep snow during late-winter. Interestingly, there is typically a marked (10-15% of the entire population) shift in distribution from public land to private land associated with the opening day of the rifle elk season (Sergeyev et al. 2022). In an effort to 1) facilitate effective management of elk, 2) provide landowners with tools to manage elk on private property, and 3) to provide public hunters with greater opportunity for success, the UDWR implemented an over-the-counter opportunity to purchase a private-lands-only antlerless elk permit in 2016. The implementation of the private-lands-only hunt dramatically reduced the exodus of elk from public lands during the rifle season and effectively enabled owners of private land to manage elk on their properties.

5. Movement

Understanding patterns of movement and its influences are crucial to the management of elk. To better understand this behavior, over 500 elk were tracked on the Wasatch unit via GPS collaring. The objectives of the study were to determine the factors that influence timing and distance of movement as well as identify landscape features that serve as barriers to movement. Elk are known to be highly migratory animals. The timing and distance of migration can be highly variable in this species, with individuals beginning winter migration anywhere from September to February. In an analysis of environmental factors, it was found that annual maximum snow depth, a component of the Winter Severity Index, had a significant impact on determination of annual migration distance of elk. Snow depth, however, did not appear to influence the proportion of migratory individuals within a herd. Within the scope of this research, landscape features used to delineate hunt unit boundaries were analyzed in relation to elk movement. It was found that major roads and large ridgelines serve as barriers to movement, resulting in elk crossing these barriers less often than they would use other parts of the

landscape. This specific research validates the use of major landscape features including major roads and ridgelines as appropriate boundary lines for hunt units, and provides a guideline for future hunt boundary delineations, as there is decreased movement across these features compared to the rest of the landscape.

6. Future Research

In order to further understand the movement, survival, and behavior of elk, future research plans have been put in place in southern and central Utah. A neonate survival study will take place on the Central Mountains, Nebo unit beginning Spring of 2023. This study, occurring on a highly productive unit, will serve as a benchmark of comparison for the results produced from the Book Cliffs study, which occurred on a low production unit. Combined, these data will improve understanding of parturition behavior and calf survival across an array of environmental and herd conditions. In addition to this study, a second study is planned to begin in Southern Utah in winter of 2023, where more than 100 elk will be collared from the Boulder, Fishlake, Monroe, and Mt. Dutton units to determine the proportion of wintering elk that segregate on to each respective summer range. This study will additionally provide information surrounding summer range fidelity by both age and sex. In recent years (2020-present), GPS collars have been deployed on six-month-old elk calves on the Book Cliffs and Cache (Hardware Ranch) units. Collaring calves at this life stage will provide information surrounding survival of elk calves from six months to 1.5 years of age by producing data surrounding survival by sex, cause of mortality, and timing of mortality. The collar data will also help identify dispersal rates by sex and the factors influencing dispersal. Collaring efforts of six-month-old elk calves are planned to continue in future years to provide an adequate sample size for the analyses.

III. ISSUES AND CONCERNS

A. Habitat

Healthy and productive elk herds require large areas of high quality habitat. Crucial elk habitat has been and continues to be fragmented or lost to human expansion and development. Urbanization, road construction, OHV use, and energy development impact elk habitat. Proper planning and mitigation are essential to maintaining and improving elk habitat and migration routes. Elk summer ranges, such as aspen communities have been gradually changed over time by encroaching conifers due to fire suppression. Elk winter ranges once dominated by shrubs and perennial grasses have been replaced by annual grasses and invasive weeds drastically limiting the benefit to elk.

The DWR has a long history of restoring and enhancing elk habitat in Utah. The DWR habitat section, Habitat Council, Utah Watershed Restoration Initiative, and many conservation partners have provided leadership and funding to improve elk habitats. These projects include pinyon-juniper removal, controlled burns, wildfire rehabilitation and reseeding efforts, conifer thinning, etc., which has established more perennial grasses, forbs, and shrubs that benefit elk and other wildlife. Water catchments (i.e., guzzlers) and other water developments have been installed in Utah, aiding elk, cattle, and other big game species. Since 2005, DWR and our partners have treated 1,370,000 acres of elk habitat (870,000 acres of habitat improvement projects and

500,000 acres of fire rehabilitation). These restoration efforts will continue to support elk populations and their habitats throughout the state.

B. Population Size and Elk Distribution

The statewide elk management plan does not set a population objective for elk in Utah; rather, population objectives are established in unit plans and the summation of those objectives becomes the statewide objective. The current population objective for elk statewide is 78,990 (Table 2). Local committees or other forms of public input are used when changing a population objective for a given unit. Population estimates are obtained by conducting aerial surveys every 3 years as snow conditions and budgets allow. Population models include data on bull and cow harvest, survival, and calf production, are also used to estimate elk populations for a given unit in the absence of surveys and are updated annually.

Properly managing the distribution and number of elk within units is a key priority for DWR. In most units, managing to a population objective is easily attained by issuing antlerless elk permits to public hunters. However, in some units, particularly those with large quantities of private or tribal lands, managing to the population objective has been challenging because elk quickly learn to use sanctuary or refuge areas that receive little hunting pressure during hunting seasons (Mangus 2009, Sergeyev et al. 2022). To counter undesirable distribution, the DWR has reduced the number of antlerless elk permits available in the public draw and issued more private-lands-only antlerless elk permits. This change has resulted in improved elk distribution (Sergeyev et al. 2022), but has also decreased public cow hunting opportunities. One focus for this plan is to find ways to increase public antlerless elk hunting opportunities by making antlerless elk hunting more surgical and strategic. This effort is designed to minimize or avoid negatively changing elk distribution while still maintaining effective tools for managers and landowners to address conflicts.

C. Bull Hunting

This plan provides for opportunity and quality bull elk hunting in Utah. Opportunity hunts include general season spike only and any bull elk permits. Spike only harvest assists in managing high bull-to-cow ratios on units managed for limited entry bull units and can increase herd productivity. Spike harvest can result in increased calf production in future years because more cows can be retained in the population. Spike hunting occurs on most limited entry units, whereas any bull hunting typically occurs on units with lots of refugia for bulls (e.g., areas with large tracts of private lands, units with low elk populations/densities, wilderness areas or other large refuge areas such as tribal lands or national parks/monuments).

Limited entry bull hunts are designed for increased quality and older bulls with larger antlers. On traditional limited entry units, harvested bulls are managed to a desired age objective (Figure 3). The elk committee evaluated the current age objectives in the context of demand, point creep and success rates and made some changes to result in more opportunity to hunt mature bulls while still maintaining quality in the form of large antlered bulls. Based on antler size and age datasets, the 7.5-8.0 year age objective was eliminated and replaced with a 6.5-7.0 year old objective. The 6.5-7.0 objective was replaced with a 6.0-6.5 average age of harvest

objective. The 5.5-6.0 units typically hold large elk populations and seem to be a good balance of presenting a challenging opportunity to harvest a large bull along with more reasonable drawing odds, and this objective was unchanged. Most of the units managed in the 4.5-5.0 objective were not functioning well and that age objective has been eliminated. (Table 1).

Some units classified as "underperforming" during the mid-plan review of 2020 were identified, and bulls on those units/areas were hunted using a different strategy focused on primitive weapons to provide quality hunting experiences, where hunters are likely to be less selective and have lower success due to the limited range of the allowed weapons. These primitive weapon limited entry units utilize a month-long September archery hunt followed by another primitive weapons hunt that allows the use of handgun, archery, muzzleloader, shotgun with no optical sights. These are defined in rule as HAMS hunts (R657-5-48) and were intended to provide increased limited entry hunting opportunities. The HAMS hunts had mixed results and many of the units or areas that had been managed as HAMS have been converted to an any bull hunting strategy. The high demand for any bull hunting opportunities, coupled with the low demand for HAMS hunts, led to HAMS applications making up only 1% of limited entry elk applications in 2022. Because of the disproportionate demand, the committee and DWR concluded that most of these units would be better utilized if managed for any bull hunting. The remaining HAMS units will continue to be managed in ways that use HAMS and/or other forms of restricted weapon technology to optimize hunting opportunities.

D. Poaching

Poaching is not considered to be a major problem in Utah; however, it is extremely difficult to determine the true extent to which elk are being poached in the state. Although poaching has not resulted in overall declines in elk population numbers in Utah, poaching of mature bulls can be significant and has reduced hunter opportunity in some localized areas. Units that are most susceptible to poaching typically have small isolated elk populations and issue very few bull elk permits. High grading of bulls may also be occurring on some units where hunters kill one bull elk and then abandon it to look for a larger bull. Continued law enforcement efforts are needed to maintain hunting opportunities in Utah.

E. Predator Management

Utah's elk populations have increased dramatically since 1970 even with the presence of several predator species (e.g., mountain lion, black bear, and coyote). Survival analysis of adult cow elk on the Wasatch Unit and surrounding areas indicate that cougars account for 3.7% of annual elk mortality, and these predators typically target smaller elk in poor body condition (Sergeyev et al. 2021). Although mountain lions may display strong patterns of selection for elk calves (Clark et al. 2014, Turnley et al. 2002), along with black bears and coyotes that occasionally prey on elk, there are no known instances of predators causing elk herd declines in Utah. Predator management occurs in some elk herd units due to declining or depressed mule deer populations on shared ranges, and also occurs when deer herds are chronically below population objectives (UDWR 2020a). In some instances, elk herds may have benefited by this predator management that was initiated for deer and other ungulate species.

Although wolves are not currently established in Utah, there is concern that wolves could impact elk populations and elk hunting opportunities. Recent studies in surrounding western states have implicated predation by wolves as a reason for localized elk herd declines, particularly in areas with poor to marginal habitat quality (Hamlin and Cunningham 2009). To deal with the potential establishment of wolves in Utah, DWR in conjunction with the Wolf Working Group developed a wolf management plan that was approved by the Utah Wildlife Board in 2005 and mostly recently reviewed and revised in 2020 (DWR 2020b).

F. Disease

Similar to other wild ungulates, elk are susceptible to a wide variety of viral, bacterial, parasitic and prion diseases. In Utah, the two most concerning diseases include brucellosis (*Brucella abortus*) and chronic wasting disease (CWD). Other diseases and parasites either documented or considered a concern to elk include bluetongue virus (BTV), epizootic hemorrhagic disease (EHD), and arterial worm (*Elaeophora schneideri*).

Brucellosis is an infectious bacterial disease that causes late term abortions, non-viable calves, and sterility (Godfroid et al, 2011). Transmission most commonly occurs when an animal licks or ingests infected fetal materials, aborted fetuses, uterine discharges, or contaminated feed or water (Godfroid et al., 2011). Depending on environmental conditions, such as cool temperatures and moisture, the bacteria can remain viable in uterine discharges and the aborted fetus for prolonged periods of time (Crawford et al. 1990). Brucellosis is thought to be self-limiting in free-ranging elk populations because of their secretive nature during parturition and the fact that most female elk quickly consume fetal materials after birth (Thorne 2001). However, this has not been the case for elk of the Greater Yellowstone area where feed ground practices that cause elk to concentrate elk during a time period when abortions are most likely to occur. The herd concentrations may have allowed the disease to persist and increase in prevalence (Thorne 2001). This finding has also been reported in Idaho, where the prevalence of brucellosis antibodies is two to four times higher in elk that use feed grounds (Etter and Drew 2006).

Although brucellosis is not present in Utah, the proximity and potential exchange of elk in Utah with possible brucellosis positive elk from Wyoming or Idaho has caused concern. In response, the DWR has been monitoring for the disease in elk at Hardware Ranch on an annual basis since 1969. Hunter harvested antlerless elk from Rich and Cache counties are also tested through a voluntary participation program. In addition, the DWR has deployed hundreds of GPS collars on elk across northern Utah, southeastern Idaho, and southwestern Wyoming to monitor movements and potential comingling with infected herds in neighboring states. To date, no elk in the state of Utah has ever been classified as a suspect or reactor (DWR unpublished data).

CWD is a contagious, slow-acting, and fatal degenerative disease known to affect members of the cervid family including elk (Williams and Young 1982, Miller et al. 1998, Miller et al. 2000, Williams et al. 2002). CWD affects the central nervous system, resulting in weight loss, deterioration of body condition, and eventual death (Williams and Young 1982, Williams and Young 1992, Spraker et al. 1997, Williams et al. 2002). CWD was first documented in Utah in a hunter-harvested mule deer in late 2002 and has since been found in the North Slope and South

Slope, Nine Mile, La Sal Mountains, San Juan, Central Mountains, and most recently on the East Canyon unit on the north end of Salt Lake City.

Surveillance for CWD in Utah includes hunter-harvest sampling in areas known to have positive mule deer and targeted surveillance focusing on the removal of sick or symptomatic animals. To date, three elk have tested positive for CWD in Utah: two hunter harvested elk (La Sal Mountains 2009, South Slope 2021) and one female elk with neurological symptoms that was euthanized by DWR personnel in 2014 near Vernal, Utah. CWD has also been detected in privately owned captive cervids in Utah, which could present additional challenges in managing the disease. Chronic Wasting Disease in captive cervid facilities are of great concern to the health of Utah's wild elk. Licensing and CWD surveillance on captive elk ranches is overseen by the Utah Department of Agriculture and Food (UDAF), but the responsibility for removal of wild cervids within the ranches lies with DWR. Close collaboration with UDAF and enforcement of existing regulations is critical to prevent the spread of CWD from captive elk ranches.

G. Access Management

The use of off highway vehicles (OHVs) in Utah has dramatically increased in recent years. OHV registrations increased more than 3-fold from 1998 to 2006, from 51,686 to 172,231 (Smith 2008) and OHV use remains popular with over 180,000 OHV registrations recorded in 2021 (Utah State Tax Commission data). Uncontrolled use of OHVs can cause damage to elk habitat and disturbance to elk during critical phases of their life cycle. Shed antler gathering and the associated human disturbance on crucial winter ranges, especially with the use of OHVs, can cause undue stress on elk during a time when they must conserve energy. State and federal land management agencies are currently struggling with issues involving the use of OHVs on public land. Those agencies acknowledge OHVs as a legitimate use of public land, but also recognize the potential problems associated with uncontrolled activity. As such, these agencies have developed or are currently working on travel management plans to help minimize the impact of OHVs on wildlife and their habitat.

H. Depredation

Depredation of private croplands continues to exist in some areas despite careful management of elk populations. In some localized areas depredation can be a significant problem. DWR has committed substantial resources to address depredation concerns, and there are numerous programs designed to assist landowners with depredation situations. Harvesting elk on private lands can ease frustrations of private landowners and better distribute elk into more favorable portions of a unit. In the last elk plan cycle, the implementation of private-lands-only antlerless elk permits proved to be very effective for addressing conflicts on private lands. These permits are available on a first come, first served over the counter basis for units/areas and typically have long season dates from August 1 through January 31. This gives lots of flexibility to landowners to use hunting to remove animals doing damage and the associated hunting pressure to redistribute elk.

Depredation issues will continue to be addressed within the sideboards of state code, rule, and policy. Biologists and landowners will strive to find innovative solutions and tools to reduce

conflicts in a timely and efficient manner to help landowners better tolerate migratory populations of elk. Landowners and wildlife managers need effective tools to address elk that establish resident populations in and adjacent to low-elevation private agricultural lands.

I. Private Lands

Private lands provide valuable habitat to elk. Many crucial elk habitats throughout the state are privately owned, and some of those private rangelands have been converted to housing developments, recreational properties, or other uses that result in a loss of elk habitat. As such, programs that provide incentives for private landowners to manage their properties to benefit elk and other wildlife species (e.g., CWMU, LOA) are essential to the success of the state's elk management program. In some areas of the state, obtaining adequate cow harvest on private lands has been challenging and reviewing current incentive programs and additional management options will be necessary as elk management challenges continue to evolve. Additionally, the Utah Watershed Restoration Initiative has worked with numerous cooperating landowners to provide funding and other resources to accomplish vegetation treatments on both private and public lands to benefit elk and other wildlife species, as well as livestock.

J. Winter Feeding

Supplemental feeding is often viewed by the public as a viable solution to a lack of suitable winter range. However, there is evidence that the potential harm created by feeding elk may outweigh the limited benefits (WAFWA 2013). Winter feeding programs are costly and can cause problems for elk including behavioral changes, range destruction, and expansion of disease problems. Research conducted in Utah has shown that elk feeding programs in Utah can be reduced or eliminated without creating new problems (Mangus 2009).

Although there are negative consequences of winter feeding, it is also recognized that feeding may be necessary to sustain elk populations in emergency situations. It may also be necessary to temporarily feed elk to reduce depredation problems or to keep elk from impacting deer populations in extreme conditions. For instance, elk are fed at Hardware Ranch each winter to keep elk from moving on the urban interface. These elk are also physically examined, disease tested, and an outreach opportunity for the public to view and enjoy elk. Discussion of the future of the elk feeding program at Hardware Ranch continues as biologists weigh the benefits, costs and risks of the feeding operation and consider alternatives.

In Utah, winter feeding of big game is currently guided by the winter feeding policy (UDWR 2011). Under this policy, feeding is discouraged except under extreme circumstances. With the discovery of CWD in Utah, the feeding policy was updated to state that "the Division will not participate in any emergency big game feeding program that occurs within the known range or use area of any big game population where CWD, brucellosis or tuberculosis has been detected."

K. Competition

Competition occurs when two species use the same limited resource, and one of the two suffers in some way because of that use (WAFWA 2003). Competition can potentially take place

between elk and other ungulates such as horses, livestock, or deer. Competition most often occurs where habitat is limited such as on crucial winter ranges or on the summer ranges of some drier units.

Concern has been expressed by some that elk populations are responsible for declines in deer herds over the past few decades. Direct competition is possible during a hard winter when forage is limited because elk can successfully shift to a diet largely comprised of browse, causing a high degree of diet overlap with mule deer (Frisina et al. 2008). Additionally indirect competition, such as spatial and behavioral differences between elk and deer, may occur for fawning/calving habitats (Stewart et al. 2002, Sallee, et al. 2022). The extent of competition between elk and deer in Utah is not fully understood and that information is difficult to collect and quantify, but recent research on the Book Cliffs suggests interference competition between both species in birthing and rearing habitat does not occur (Sallee et al. 2022). Additionally, the presence of elk in mule deer rearing grounds had no effect on the growth of fawns from birth to six months of age, suggesting exploitative competition does not occur (Sallee et al. 2022). Deer herd declines have occurred in areas with few or no elk, and deer herd increases have occurred in areas with large elk populations. More study is needed to fully understand when, where, and under what conditions elk completion may impact mule deer.

There is also concern that elk and livestock compete for the same forage on shared ranges. Ranges where elk coexist with mule deer and livestock should be closely monitored to prevent over use and competition. Additionally, habitat improvement projects should be focused in those areas to reduce competition and improve range conditions for all species.

L. Research and Elk Movements

Understanding the movements of elk, factors that influence movements of elk, and potential barriers are needed to properly align management unit boundaries with biological groups of elk (Petersburg et al. 2000). Elk frequently move away from hunting pressure, which can make managing to a consistent population objective difficult in units with high amounts of migration. In southern Utah, individual elk that were radio-collared on the Mt Dutton unit have been observed on four neighboring units (DWR unpublished data). This can cause concern for both biologists and hunters because elk on a given winter range may have been on a neighboring unit during the fall hunting seasons. As a result, DWR, BYU, and many conservation groups have conducted research on elk movements on many units in the state. The results show that elk use the landscape at a much larger scale than was previously thought. Many management units do not fully encompass both winter and summer ranges for individual populations, and some units have elk from multiple units on winter or summer ranges. This creates a challenge to manage units to population and age objectives. In addition to movement data, information on body condition and survival estimates of elk are being collected, which aid in population modeling efforts and provide an understanding of overall herd health.

Increased knowledge of elk movements can also aid in reducing elk-vehicle collisions. DWR and our partners have worked to identify migration routes and locations where elk are commonly hit on roadways. This information has allowed us to know where to place underpasses and fences to increase elk survival. These studies have also provided data on the types of underpass structures

these animals will use (Cramer 2014). Although costly, these efforts are helping to prevent future collisions, increase public safety, and minimize elk mortalities.

IV. USE AND DEMAND

Elk have become one of the most sought after big game animals in Utah. Geist (1998) in Deer of the World says the following of red deer, the elk of the old world:

"It adorns coats of arms, crests and monuments and is the deer of legends, poetry, and songs. Castles were built in its honor and to display its antlers, and throughout history its hunting and management generated passions that transcended life, death, and reason…"

Sportsmen are no less passionate about elk and elk hunting in Utah today. Hunter demand and interest for limited entry permits has always been high and continues to increase. In 2022, 75,925 hunters applied for 3,117 limited entry permits, resulting in 1:19.8 draw odds for residents and 1:70.5 for nonresidents. Demand and applications have increased disproportionately to increases in limited entry permits, and as such, draw odds have become increasingly tough. Units managed for older age class bulls and early any legal weapon hunts are the most difficult to draw compared to lower age class units and hunts with primitive weapons or rifle hunts outside of the rut.

In addition to limited entry permits, Utah sold over 47,000 general season elk permits for spike and any bull hunts in 2022. Demand for general season elk permits has increased dramatically in the last 5 years. In 2018 general season any bull permits sold out 34 days after they went on sale over the counter. In 2020 they sold out in less than eight hours and in less than six hours in 2022 after upgrades to the server capacity to facilitate faster online permit sales. General season spike bull tags sold out in just nine hours in 2022. This unprecedented demand for general season elk hunting opportunity was an important factor taken into consideration in writing this plan. Finding ways to provide sustainable general season elk hunting opportunities was a top priority.

Elk are also a high interest watchable wildlife species. Nearly everyone enjoys seeing and hearing elk in the wild. Units which produce large bulls are especially attractive not only to hunters but to wildlife watchers as well. Many thousands of hours and considerable money is expended each year in elk watching activities. For instance, 15,000 – 20,000 people attend Hardware Ranch annually to view elk. As elk populations and habitats are properly managed, elk viewing and recreating activities will be enhanced for years to come.

VI. STATEWIDE MANAGEMENT GOALS AND OBJECTIVES

A. Population Management Goal: Improve management of Utah's elk populations.

Population Objective 1: Maintain healthy elk populations at biologically and socially sustainable levels.

Note: The statewide population objective is the sum of objectives contained in unit plans.

Strategies:

A. Elk Population Objectives
   a. Set population objectives and manage elk populations at appropriate spatial scales that account for migration patterns.
      i. Unit plans and population objectives may take into consideration refugia-centric elk that are largely unavailable to public hunters or that live across multiple jurisdictions (tribal lands, national parks/monuments, neighboring states, etc,) where the DWR does not have management authority. These situations would justify aggressive tools to manage conflicts on private lands and increased flexibility for the DWR in developing and managing towards target population objectives, including objectives that take into consideration elk that spend substantial time outside the jurisdiction of the DWR.
      ii. Committees may consider and make adjustments to target population objectives on units with willing landowners/stakeholders when there are large blocks of private ground that are intentionally managed to hold large numbers of elk on those lands. As landowner tolerance increases this should be taken into account when formulating population objectives.
      iii. To address resident elk or elk that are largely unavailable to public hunters in areas with high conflict that are dominated by private, agricultural lands biologists may:
         (a) Recommend private lands only general season any bull tags for a unit, or specific area within a unit, to have longer seasons or increased quotas in general season any bull units.
         (b) Recommend limited entry bull hunts for specific units/areas. These LE hunts could be recommended in addition to the current LE season structure and wouldn't be subject to LE bull age objectives, season structure or weapon splits.
   b. Establish local advisory committees to review individual herd unit management plans when considering a change (increase or decrease) in the population objective or unit boundary. Other unit plan updates and changes may be approved by the Division Director.
      i. Committees will be established following approval of the statewide elk plan where needed.
      ii. Committees will consist of the DWR unit biologist and regional wildlife manager or Supervisory Biologist as facilitators, two local sportsman's representatives, and one representative from each of the following (if applicable): Farm Bureau, Cattlemen's Association, Wool Growers

Association, Bureau of Land Management, USDA Forest Service, local elected official, RAC member, CWMU Association, Sportsmen for Fish and Wildlife, Mule Deer Foundation, Rocky Mountain Elk Foundation, tribal representative, local landowner or landowner association representative and other affected stakeholders.

iii. Recommendations from these committees will be reviewed by DWR and presented to the Regional Advisory Councils and Wildlife Board for public input and approval.

iv. Committees shall be provided with the results of recent habitat projects completed and planned projects, DWR range trend data, research findings, migration information and any other applicable data.

c. On units where population decreases are necessary, DWR will recommend short-term population objectives in unit management plans or increases in antlerless elk permits.

B. Population Management
   a. Utilize antlerless harvest as the primary tool to manage elk populations within herd size objectives and target specific areas where range concerns or depredation problems exist.
   b. Properly manage elk populations to minimize competition with mule deer on crucial mule deer ranges.
   c. If drought related conditions and high elk densities are negatively impacting elk habitat or private landowners, recommend additional antlerless and/or bull elk permits for affected areas at the August Wildlife Board meeting.
   d. During severe winters, aggressively use antlerless elk harvest (public hunters and DWR removal) to minimize conflicts.
   e. Consider using over-the-counter cow elk permits to provide additional harvest and hunting pressure in areas of conflict.
   f. Use hunting pressure strategically to redistribute elk away from high conflict areas and encourage elk availability on accessible public lands.
   g. Encourage innovative ideas from regional biologists to manage towards population objectives.

C. Monitoring Elk Populations and Elk Habitat
   a. Monitor all elk populations by helicopter survey on a three-year rotational basis to evaluate herd size, calf production, herd composition, and habitat use, as conditions and budgets allow.
   b. Evaluate herd size and population trends on an annual basis.
   c. Implement research studies where needed to close information and data gaps.
   d. Continue to support the interagency big game range trend study of crucial ranges throughout the state.
   e. Monitor range condition, utilization, and trends annually as manpower and budget allow.
   f. Once during the duration of this plan, GIS mapped elk habitat should be reviewed for geographical and habitat classification accuracy.

D. Predator Control
   a. Utilize the Predator Management Policy where needed to help achieve objectives for elk populations, including the management of wolves, if necessary.

E. Disease Control
   a. Investigate and manage disease outbreaks that threaten elk populations including CWD and brucellosis.
   b. Promote management practices that minimize disease risks such as discouraging baiting/feeding, conducting CWD surveillance, and assisting Utah Department of Agriculture and Food in monitoring elk farms/ranches for compliance.
   c. Follow the emergency big game winter feeding policy, and avoid unnecessary feeding of elk.

Population Objective 2: Foster support among stakeholders for Utah's elk management program.

Strategies:

A. Landowner Incentives
   a. Continue to provide incentive programs for landowners that will encourage elk populations on private land such as the CWMU, Landowner Association, and Walk-In Access programs.
   b. Address all depredation problems in a timely and efficient manner to increase landowner tolerance of elk populations in accordance with current laws, rules, and policies.
   c. Seek to remove barriers or disincentives for landowners to use hunters to help manage elk on private lands using mitigation permits, vouchers, or private lands only antlerless elk permits.
   d. Have DWR staff work with landowners to facilitate effective communication between landowners and hunters when using depredation hunter pool or alternate list hunters to alleviate conflicts on private lands.

B. Habitat Acquisition and Restoration
   a. Identify and support the acquisition of property (fee title or conservation easements) from willing sellers that would better accommodate current population numbers or allow for increased elk populations.
   b. Identify future habitat restoration projects with stakeholders.
   c. Increase tolerance of public land grazers not enrolled in a CWMU or LOA by conducting habitat projects that will benefit livestock and wildlife.

C. Public Outreach and Enforcement
   a. Educate the public on the use and validity of population modeling in wildlife management.
   b. Increase communication and understanding between DWR and stakeholders regarding elk distributions, population estimates, hunt recommendations, and management decisions.

c. On units with high amounts of social conflict, create elk committees during unit plan revisions and/or hold open houses to obtain public input.
d. Enforce existing laws that protect resources on public and private lands.

Population Objective 3: Achieve a proper distribution of elk on private and public lands.

Strategies:

A. Antlerless Permits
   a. Maintain private-lands-only anterless elk permits to encourage and target cow elk harvest on private lands.
   b. Continue to allow hunters to possess multiple anterless elk permits, but only allow for 1 cow elk permit to be obtained through the public draw system.
   c. Use depredation permits and vouchers, public hunters, and/or DWR removal to harvest resident elk on agricultural lands or where elk are creating conflicts.
   d. Issue antlerless-elk-control permits on units with low or zero elk population objectives, units that are dominated by private lands or in other appropriate situations. Use caution with antlerless elk control permits as to not have a negative impact on elk distribution and consider private lands only antlerless elk permits as an alternative.
   e. Coordinate season dates and permit numbers to distribute elk appropriately within a hunt unit and to achieve adequate harvest in areas of concern.
   f. Limit flexibility on hunting seasons to the specified dates for antlerless elk hunts to make antlerless harvest and associated hunting pressure more surgical and precise to help achieve a desirable elk distribution on the landscape.
   g. Where appropriate, rotate and vary antlerless elk hunting season dates and hunt units/areas to avoid habitually pushing elk into refuge areas.

B. Landowner Assistance Programs
   a. Create private-lands-only general season bull elk permits on any bull units to allow landowners and those landowners grant access to hunt bull elk on private lands.
      i. These private-lands-only general season bull elk permits may be issued at a regional, multi-unit, unit or sub-unit level with quotas and season dates to be determined based on need and circumstances.
      ii. If drought related conditions and high elk densities are negatively impacting private lands, recommend additional private-lands-only general bull elk permits and/or extended season dates at the August Wildlife Board meeting.
   b. Secure easements to increase hunter access to elk on public and private lands from willing participants.
   c. Work with law enforcement to protect elk and to reduce illegal activities with a special focus on trespassing, vandalism and theft.

B. Habitat Management Goal: Conserve and improve elk habitat throughout the state.

Habitat Objective 1: Maintain sufficient habitat to support elk herds at population objectives and reduce competition for forage between elk and livestock.

Strategies:

A. Elk Habitat Classification and Assessment
   a. Identify and characterize elk habitat throughout the state.
   b. Provide information to educate counties, municipalities, and developers to promote zoning that recognizes elk habitats and movement corridors.

B. Habitat Management
   a. Coordinate with land management agencies and private landowners to properly manage and improve elk habitat, especially calving and wintering areas.
   b. Work with state and federal land management agencies and private landowners to use livestock as a management tool to enhance crucial elk ranges.
   c. It is recommended that activities related to project disturbances occurring in crucial elk habitats should occur outside of Dec. 1 to April 15 for crucial winter ranges and May 15 to July 15 for parturition.
   d. Where crucial elk habitat will be lost, if avoidance is not practical, mitigation should be encouraged. A voluntary mitigation ratio of 4:1, improving or conserving 4 acres for every 1 acre disturbed is recommended.

C. Habitat Improvement
   a. Utilize Habitat Council, Utah Watershed Restoration Initiative, Wildlife Conservation Permit funds, and other funding mechanisms to restore or improve crucial elk habitats.
   b. Increase forage production by annually treating a minimum of 40,000 acres of elk habitat.
   c. Coordinate with land management agencies, conservation organizations, private landowners, and local leaders through the regional Watershed Restoration Initiative working groups to identify and prioritize elk habitats that are in need of enhancement or restoration.
      i. Identify habitat projects on summer ranges (aspen communities) to improve calving habitat and summer forage.
      ii. Encourage land managers to manage portions of forests in early succession stages through the use of controlled burning, logging or other methods. Controlled burning in areas with invasive weed and/or safety concerns should be supported only when adequate planning and mitigation measures have been identified.
      iii. Promote Fire Use (let-burn) policies in appropriate areas that will benefit elk, and conduct reseeding efforts post wildlife.

D. Habitat Acquisition
   a. Acquire important elk habitat from willing sellers to offset habitat loss that can be managed for elk and other wildlife.

b. Support programs such as conservation easements that provide incentives to private landowners to keep prime elk habitat managed as rangeland.

E. Public Support
   a. Educate the public on the value of the general license, conservation, and expo permits for funding elk habitat improvement projects.
   b. Continue to support the conservation permit and habitat enhancement programs that provide crucial funding for habitat improvement efforts.

Habitat Objective 2: Reduce adverse impacts on elk herds and elk habitat.

Strategies:

A. Travel Management. where allowed by land management authority
   a. Seek to maintain new permanent roadways within crucial elk habitats to 2 miles or less of roads per square mile.
   b. Work with project proponents and/or local governments to voluntarily mitigate impacts from new permanent roads in crucial elk habitats that would exceed 2 miles of roads per square mile.
   c. Consider use of seasonal closures as appropriate to mitigate impacts from new permanent roads in crucial elk habitats that would exceed 2 miles of roads per square mile.
   d. Support the construction of temporary and/or administrative roads for habitat improvement or land use management activities.
   e. Assist with road rehabilitation efforts for temporary roads constructed for habitat improvement or land use management activities.

B. Energy Development
   a. Coordinate with land management agencies and energy development proponents to develop an effective mitigation approach for large-scale energy or other related land use activities or developments that have the potential to impact crucial elk habitat.
   b. Encourage energy development companies to avoid or minimize the impact of disturbance while using Best Management Practices to promote the conservation of wildlife resources.
   c. Promote movement corridors in areas of large-scale disturbance or areas that will be fenced.

C. Migration Corridors
   a. Avoid, minimize or mitigate impacts from large-scale development that occur within migration corridors. Voluntary mitigation is recommended at a 4:1 ratio meaning 4 acres of improved or conserved habitat for every 1 acre of disturbance.

D. Noxious Weed Control
   a. Work with land management agencies, county weed boards, and cooperative weed management groups to control the spread of noxious and invasive weeds throughout the range of elk in Utah.

E. Wild and Feral Horse Management
   a. Work with federal land managers and local governments to support feral and wild horse and burro management through gathers and other efforts in elk habitat.

F. Human Recreation
   a. Coordinate with land management agencies on recreational projects or plans to avoid, minimize or mitigate impacts in elk calving areas and critical winter ranges.

G. Drought
   a. Following extended periods of extreme drought work with land management agencies and willing landowners to restore crucial habitats.
   b. Work to identify drought resilient seed mixes on ranges that are frequently affected by drought.

H. Human Disturbance and Development
   a. Avoid, minimize or mitigate impacts from large-scale development that occur within crucial elk habitats. Voluntary mitigation is recommended at a 4:1 ratio meaning 4 acres of improved or conserved habitat for every 1 acre of disturbance.

C. Recreation Management Goal: Enhance recreational opportunities for hunting and viewing elk throughout the state.

Recreation Objective 1: Maintain a diversity of elk hunting opportunities.

Strategies

A. Opportunity Emphasis - General Season Units
   a. Provide the following statewide general season hunting opportunities:
      i. 15,000 spike bull permits.
      ii. Offer any bull permits over the counter with no cap on permits for the two rifle seasons in October and the muzzleloader season.
         (a) Re-instate a multi-season permit that allows hunters to hunt all the any-bull hunting seasons.
      i. Unlimited general season archery bull elk permits valid on both spike and any-bull units.
   b. Provide hunting opportunities that will encourage youth participation and maintain family hunting traditions:
      i. Unlimited general season youth bull elk permits valid on both spike only and any bull units during all respective general season dates using the specified weapon and following regulations specific to the units where they are hunting.
      ii. Draw only youth any bull (hunters choice) permits with a limited quota. This hunt typically occurs in September.

B. Quality Emphasis – Traditional Limited Entry Hunts
   a. Provide varied levels of traditional limited entry elk hunting (Figure 3, Table 1).
      i. Maintain 3 categories of age class harvest objectives for traditional limited entry units including 6.5-7.0 years, 6.0-6.5 years and 5.5-6.0 years.
      ii. Accurately monitor the age of harvested bull elk by collecting a statistically valid sample of teeth from all standard seasons on all limited entry units. Provide incentives to encourage hunters to submit teeth or implement mandatory tooth submission if necessary.
      iii. Recommend traditional limited entry bull permits on each unit based on the 3-year average and trend of age data. Permit recommendations should make progress towards the age objective. Biologists will supplement harvest age data by also taking into account high bull:cow ratios, high hunter success rates and hunts with difficult conditions that may reduce harvest age when recommending permit numbers.
      iv. Maintain quality, but seek additional opportunity by increasing permits when the 3-year average of the any legal weapon hunts harvest success rate exceeds 75%, and the unit is meeting or exceeding the age objective.
      v. On traditional limited entry units recommend permits for the 3 weapon types based on the following percentages: 25% for archery, 15% for muzzleloader, and 60% for any legal weapon.

(a) If a unit has all 3 any weapon season, permits should be recommended as 10% for the early any weapon season, 30% for the mid any weapon season, 17% for the late any weapon season and 3% multi-season.
(b) Adjustments may be made for units that cannot accommodate all 3 any weapon seasons. For example on a unit without a late any weapon hunt, permits may be recommended as 20% early any weapon, 37% mid any weapon, and 3% multi-season.
(c) If shifting allocation of permits to more challenging seasons reduces the unit average harvest age, biologists may adjust the average age to put more weight on seasons where harvest tends to be more selective and most likely to represent true availability of bulls.

C. Restricted Weapons and HAMS hunts
   a. Provide additional limited entry opportunity by having some units or areas managed for restricted weapons including HAMS or restricted weapon seasons.
   b. Recommend limited entry bull permits on HAMS and restricted weapons units to increase opportunity while maintaining success rates in the range of traditional limited entry archery hunts 20%-40% or maintaining average age of harvested bull elk between 3.5-4.5.
   c. On primitive weapon limited-entry elk units, allocate permits using a 50/50 split between the September archery hunt and a HAMS or restricted weapons hunt as the standard approach. Biologists may recommend unit-specific adjustments to this split, when warranted by local management needs, within a range of 50/50 to 70/30. When an adjusted split is recommended, assign the higher permit allocation to the hunt with the lower recent success rate.
D. Adaptive Opportunity Hunts
   a. These hunts are designed to be challenging to hunters, while providing more limited entry elk hunting opportunities and push perceived limits and boundaries.
   b. Results of these hunts and the status of the units where they occur will be carefully monitored and used to make adjustments, future decisions and recommendations.
   c. Ages from harvested elk on these hunts would not count towards the age objective.
   d. Recommend issuing a limited number of late season archery or restricted weapon hunts on all limited entry units where feasible and when the unit is meeting or exceeding the age objective.
      i. Permits should equal 1% of the combined limited entry permits on the unit or a minimum of 5 permits. Permit numbers may be increased if success rates stay low (<40%) and the hunt successfully provides additional opportunity.
      ii. Permits will be issued in addition to other limited entry elk permits on the unit.
   e. Recommend additional restricted weapons or HAMS hunts on limited entry units with high bull:cow ratios (> 40 bulls/100 cows) or as needed to manage sex ratios.
   f. Recommend limited entry bull elk hunts on general season elk units to provide unique opportunities to hunt elk where the quality of the hunt comes from a limited number of permits or unique season dates rather than from managing a unit or area for older age class bulls. These hunts wouldn't be subject to age

objectives or the formation of limited entry landowner associations. Examples include a late season archery, HAMS or restricted weapon hunt on the East Canyon unit to allow opportunity at bulls that migrate in late in the year, or a limited entry muzzleloader bull hunt in the High Uintas wilderness overlapping the muzzleloader deer season.

E. Hunting Access
   a. Continue to support programs that provide incentives for private landowners to manage for elk and elk habitat (e.g. CWMU, Landowner Association, and Walk-In Access programs).
   b. Identify and support the acquisition of leveraged pieces of property (such as Cinnamon Creek and the Book Cliffs Initiative) that control access to or management of larger tracts of public land for the purpose of increasing hunting and wildlife viewing opportunities.
   c. Support the responsible use of OHV's in specified areas during hunting seasons.
   d. Assist state and federal agencies with the development of travel management plans.

Recreation Objective 2: Increase opportunities for viewing elk while educating the public concerning the needs of elk management and the importance of habitat.

A. Education
   a. Use social media and other media outlets to promote interest and emphasize the importance of elk habitat and population management.
   b. Promote public tours, elk viewing days, and spring range rides on crucial elk winter ranges to demonstrate the importance of elk habitat and population management.
B. Partners
   a. Work with partners (conservation organizations, state and federal agencies, etc.) to increase outreach efforts that promote elk conservation, habitat, and management.
   b. Highlight the importance of the conservation permit program, expo permits, watershed restoration initiative, and license and permits sales for funding efforts to improve elk habitat.

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Wisdom, Michael & Preisler, Haiganoush & Naylor, Leslie & Anthony, Robert & Johnson, Bruce & Rowland, Mary. (2018). Elk responses to trail-based recreation on public forests. Forest Ecology and Management. 411. 223-233. 10.1016/j.foreco.2018.01.032. Figure 1. Any Bull hunting units/areas, Utah 2023.

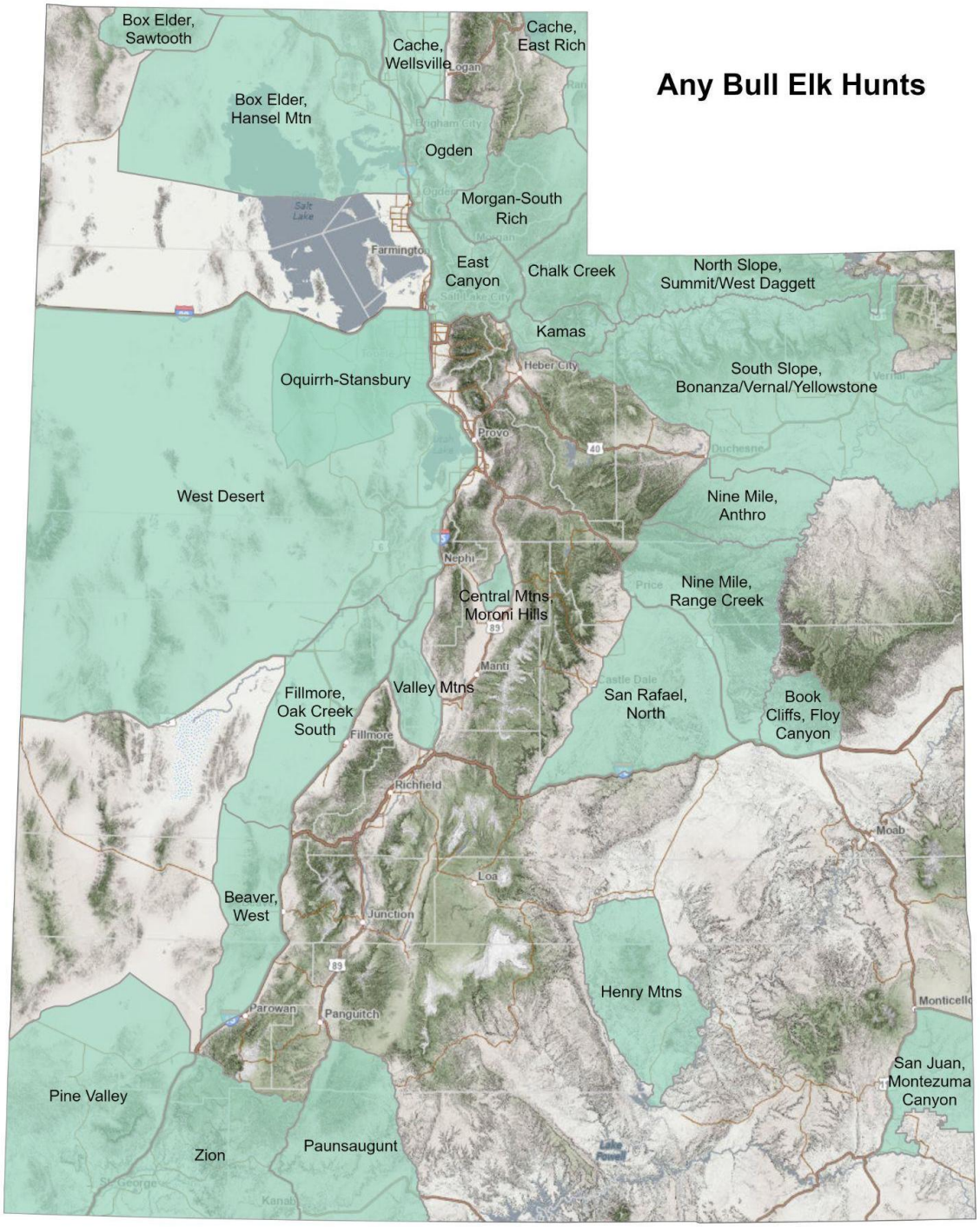
Any Bull Elk Hunts
Box Elder, Sawtooth
Cache, Wellsville
Cache, East Rich
Box Elder, Hansel Mtn
Ogden
Morgan-South Rich
East Canyon
Chalk Creek
North Slope, Summit/West Daggett
Kamas
Oquirrh-Stansbury
South Slope, Bonanza/Vernal/Yellowstone
West Desert
Nine Mile, Anthro
Nine Mile, Range Creek
Central Mtns, Moroni Hills
Fillmore, Oak Creek South
Valley Mtns
San Rafael, North
Book Cliffs, Floy Canyon
Beaver, West
Henry Mtns
San Juan, Montezuma Canyon
Pine Valley
Zion
Paunsaugunt
Salt Lake
Farmington
Heber City
Provo
Nephi
Manti
Fillmore
Richfield
Loa
Junction
Parowan
Panguitch
Moab
Monticello
Lake Powell

Figure 2. Spike only hunting units/areas, Utah 2023.

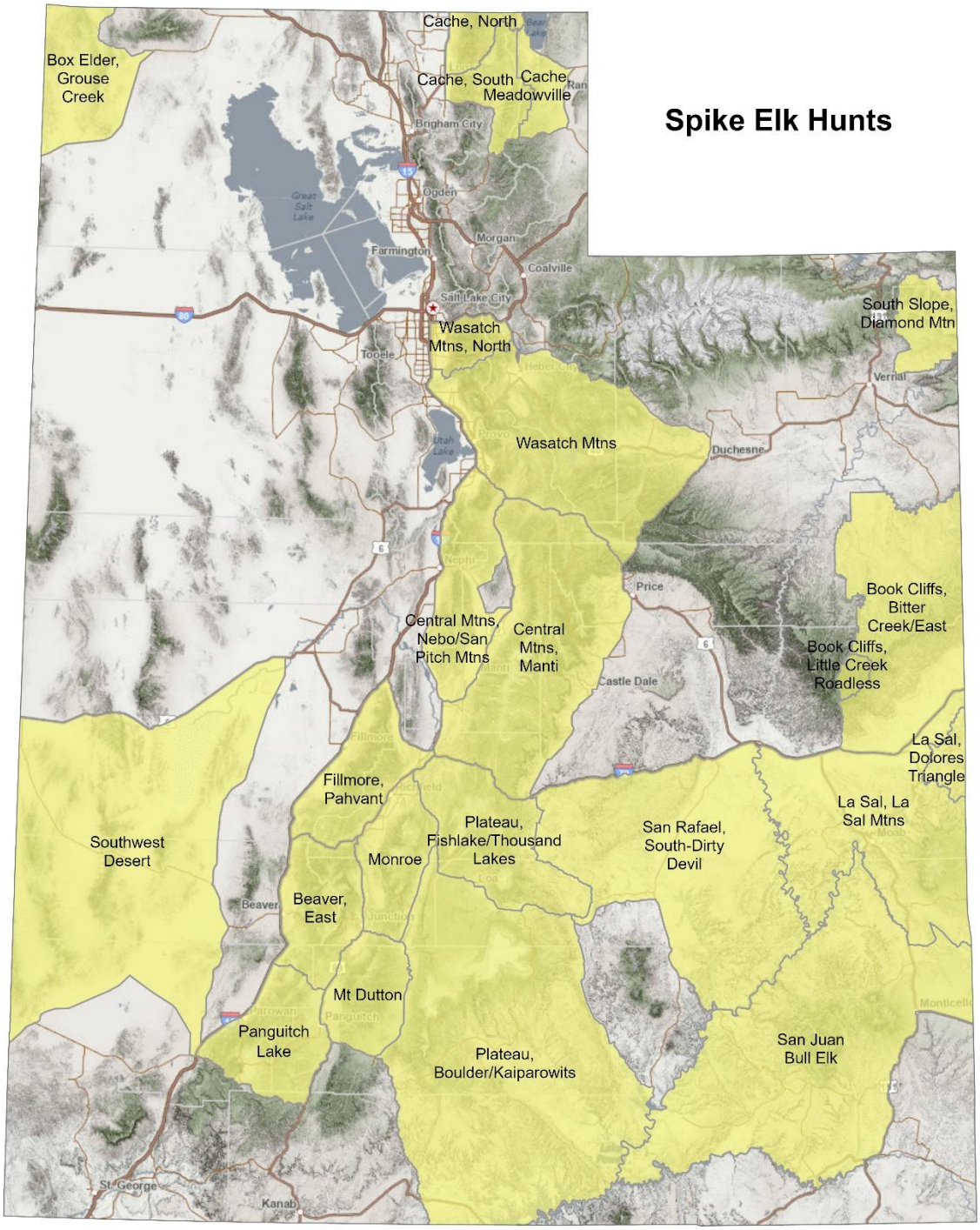

Figure 3. Age objective for limited entry elk units, Utah 2022.

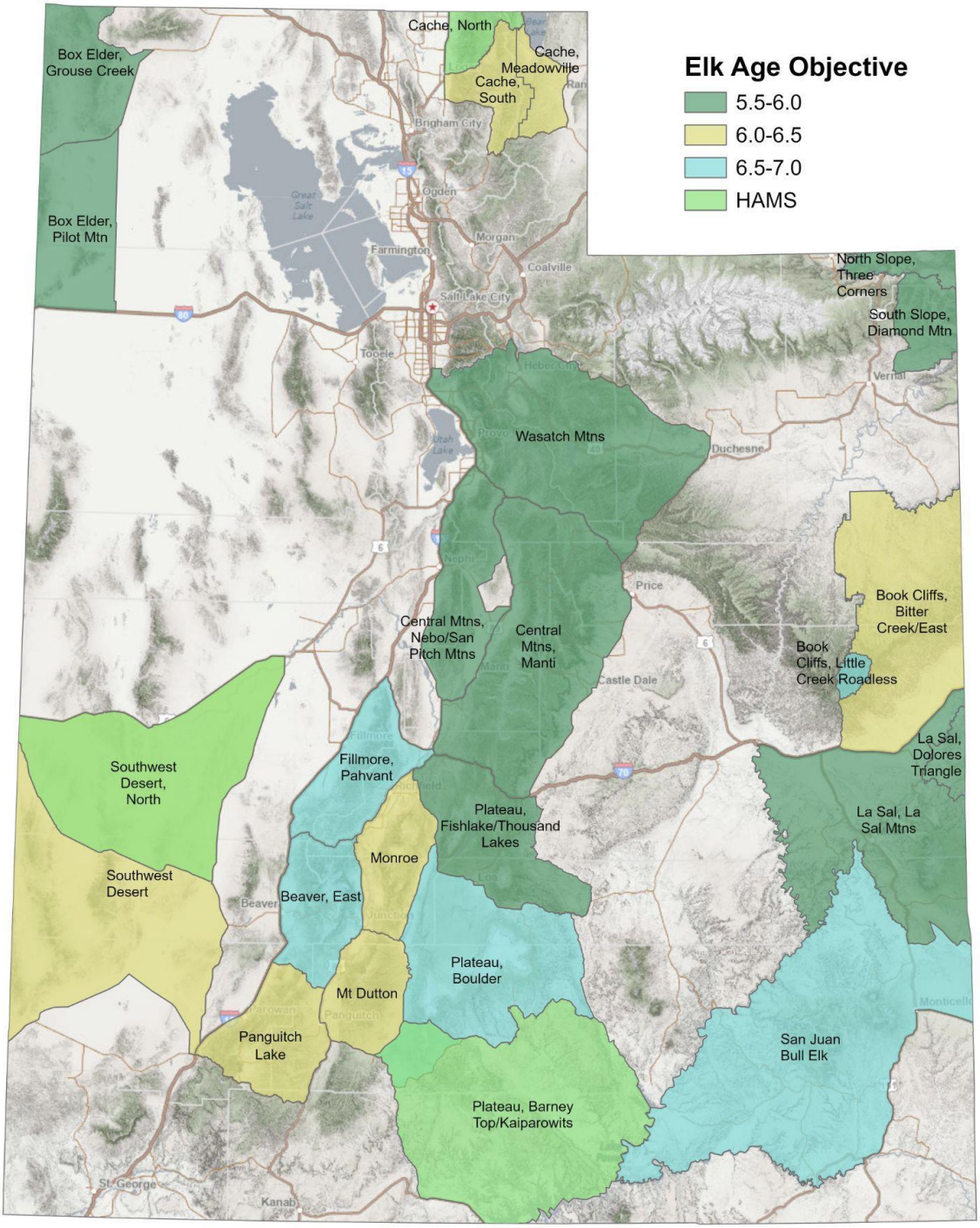

Figure 4. Elk age vs Boone and Crockett Score (Freeman et al. 2013).

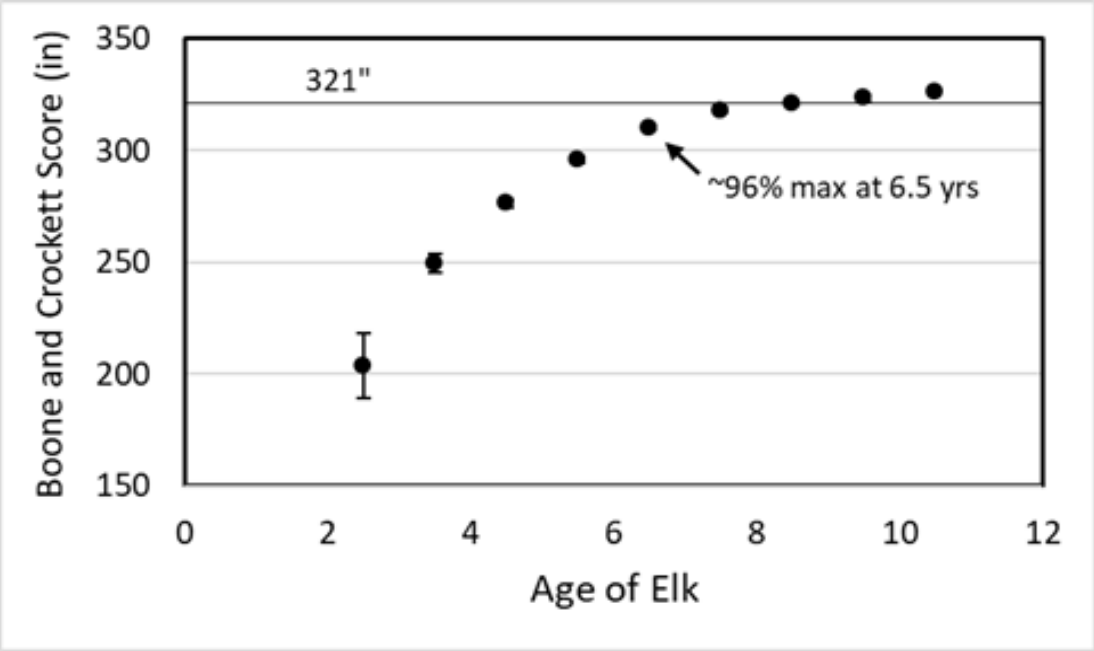

Figure 5. Average age of elk harvested in Utah in relation to length of main beam.

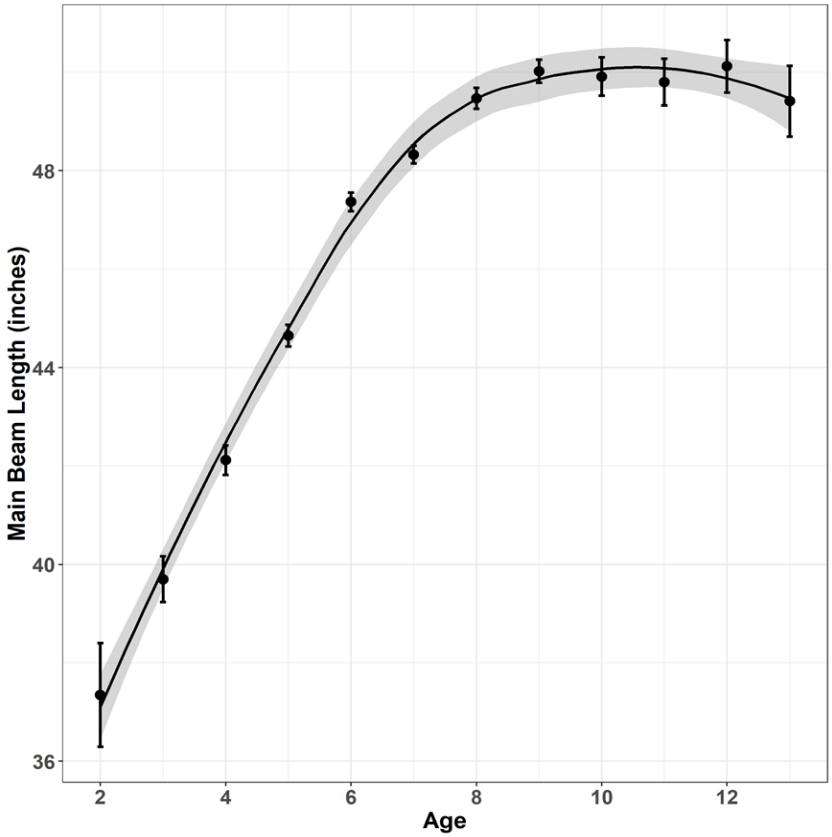

Figure 6. Elk habitat, Utah 2022.

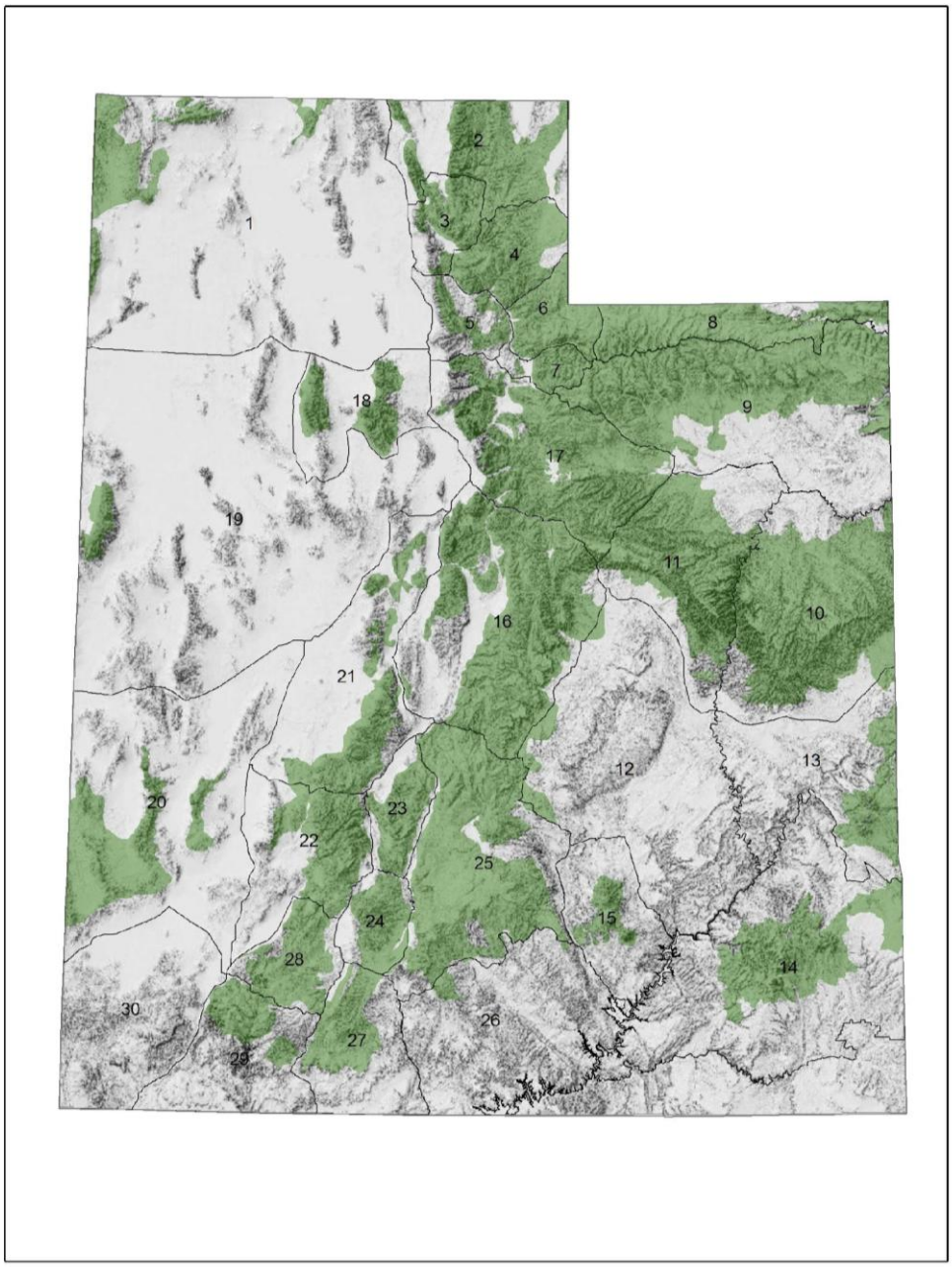

Figure 7. Statewide post-season elk population objective (dashed line, 78,990) and population estimates, Utah 2000–2021.

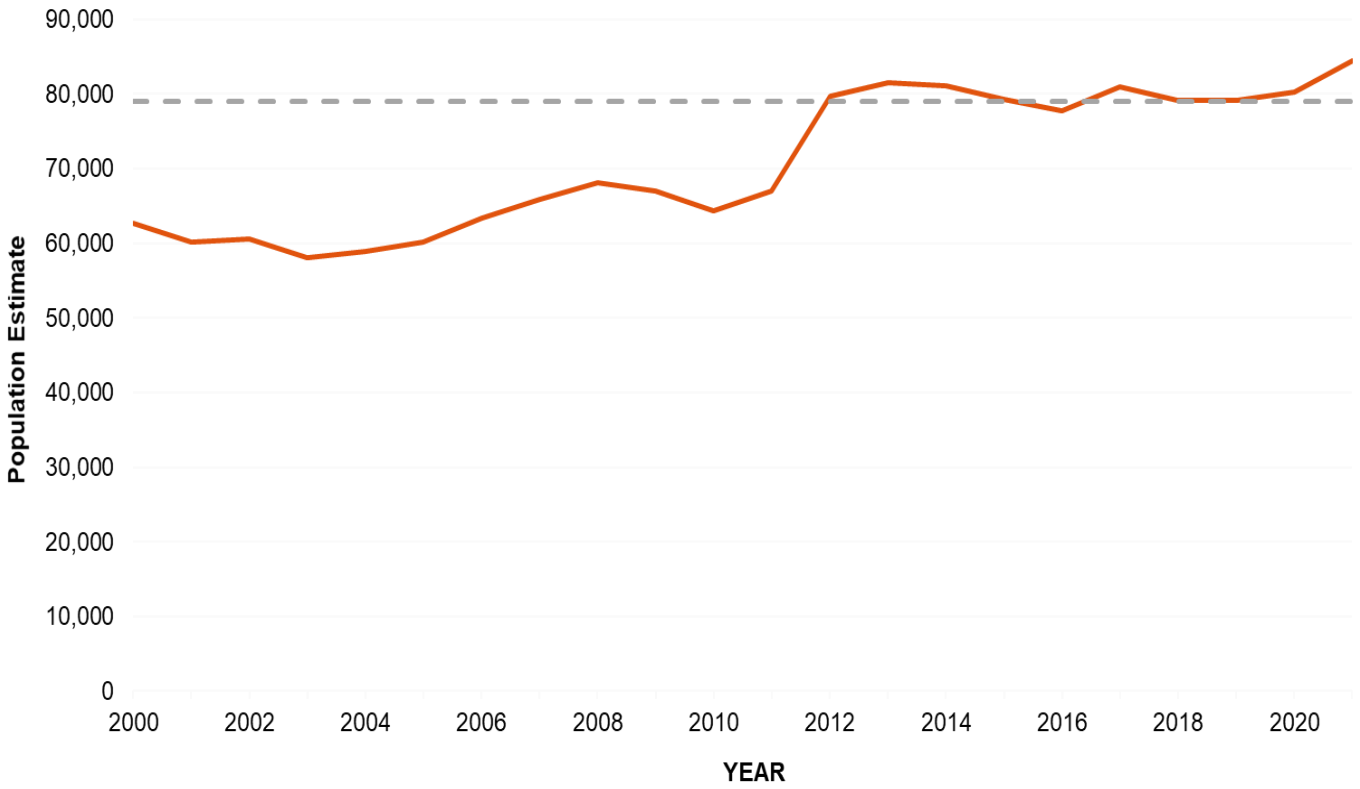

Figure 8. Annual survival of collared female elk in central Utah, USA, 2015–2017. The solid line (red) denotes survival with all mortalities included, the dashed line (blue) excludes hunter-related mortalities (Sergeyev et al. 2021).

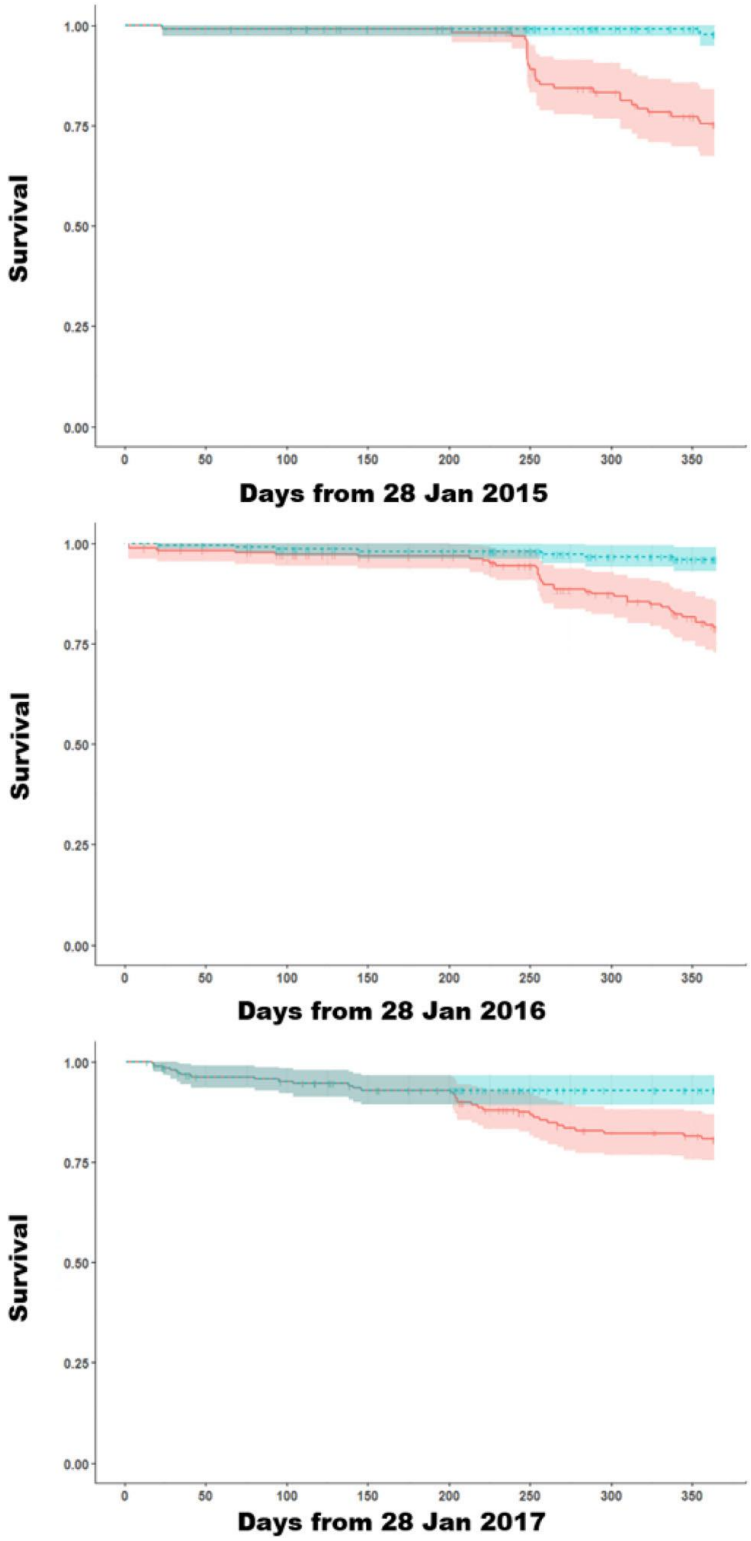

Figure 9. Annual survival of elk calves on the Book Cliffs management unit in eastern Utah. Survival rates are for the first year of life.

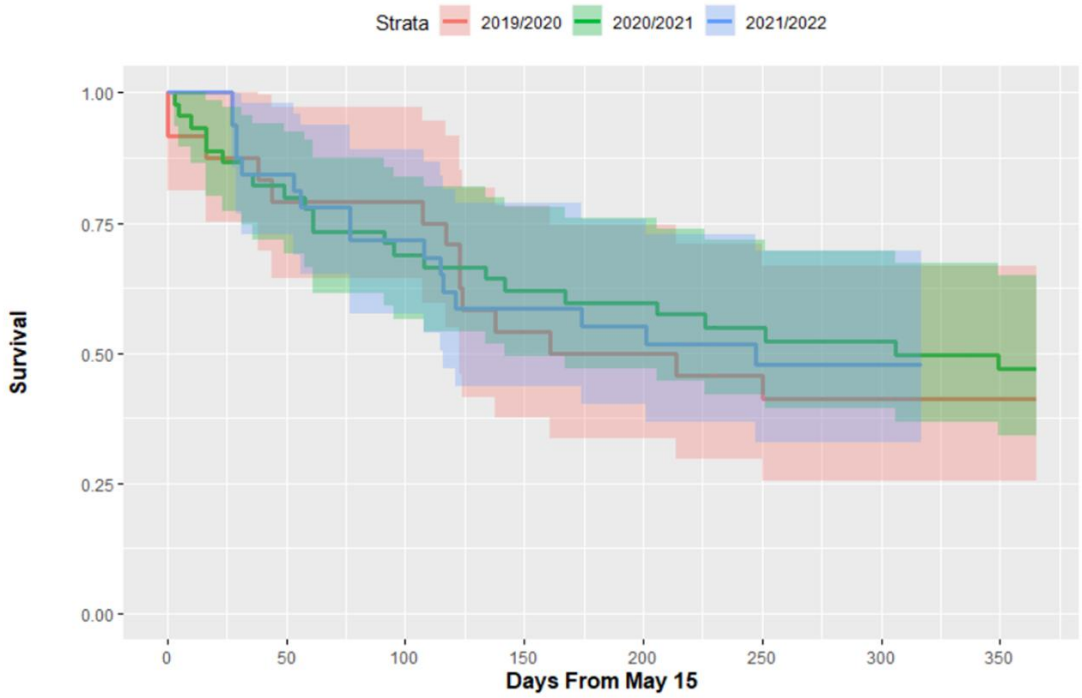

Figure 10. Cause-specific mortality of neonate elk on the Book Cliffs unit in Northeastern Utah 2019-2021.

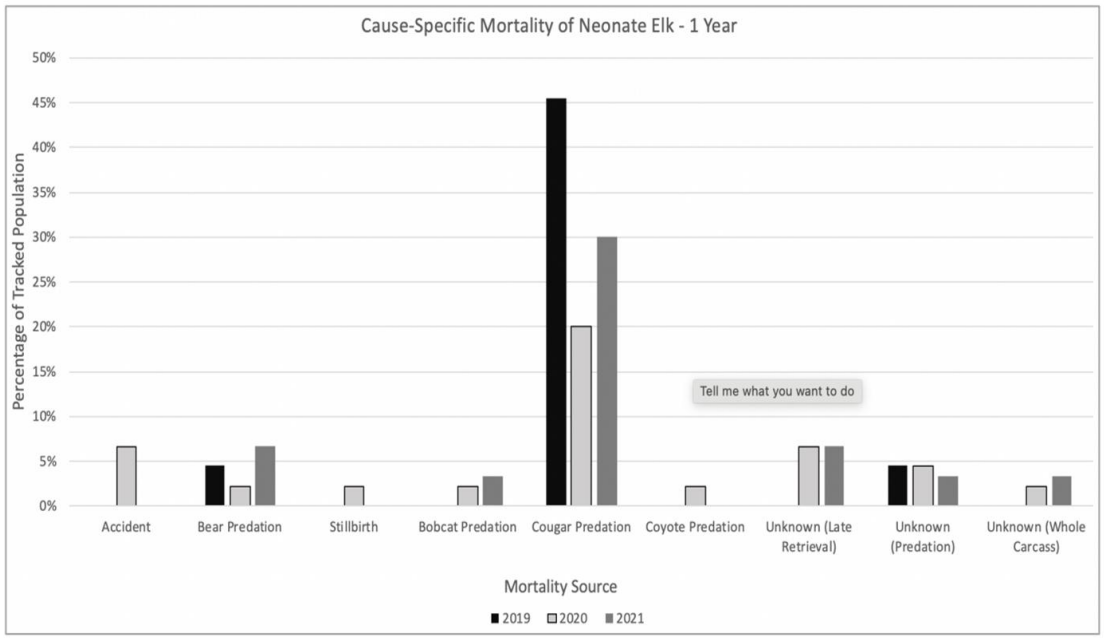

Figure 11. Annual variation in pregnancy rates for elk in Utah, 2015-2022..

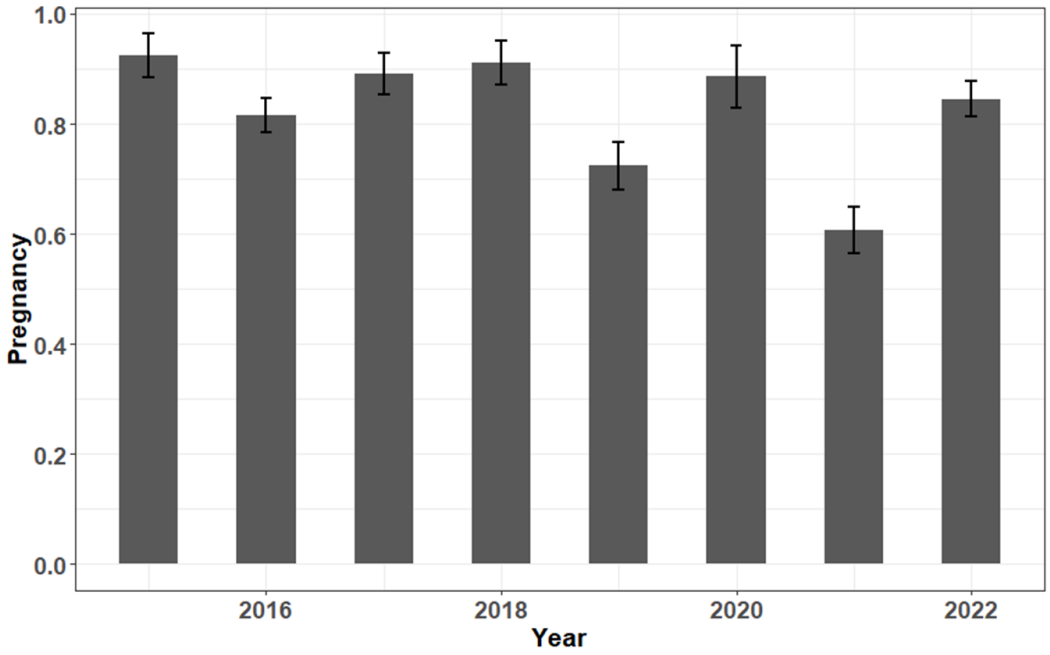

Figure 12. Mean pregnancy rate of adult female elk by unit determined via transabdominal ultrasound, Utah. Data have been combined across years.

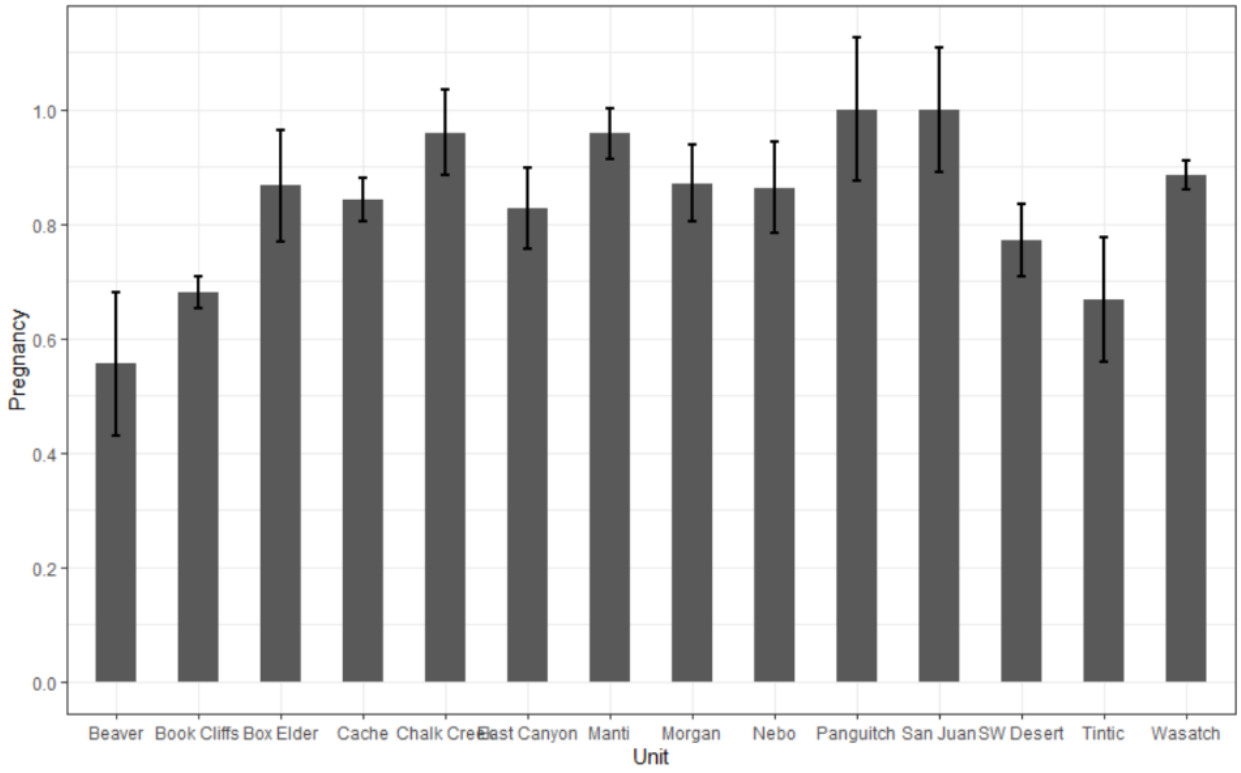

Figure 13. Mean rump fat as measured via ultrasonography during winter captures for pregnant and non-pregnant (open) elk in Utah.

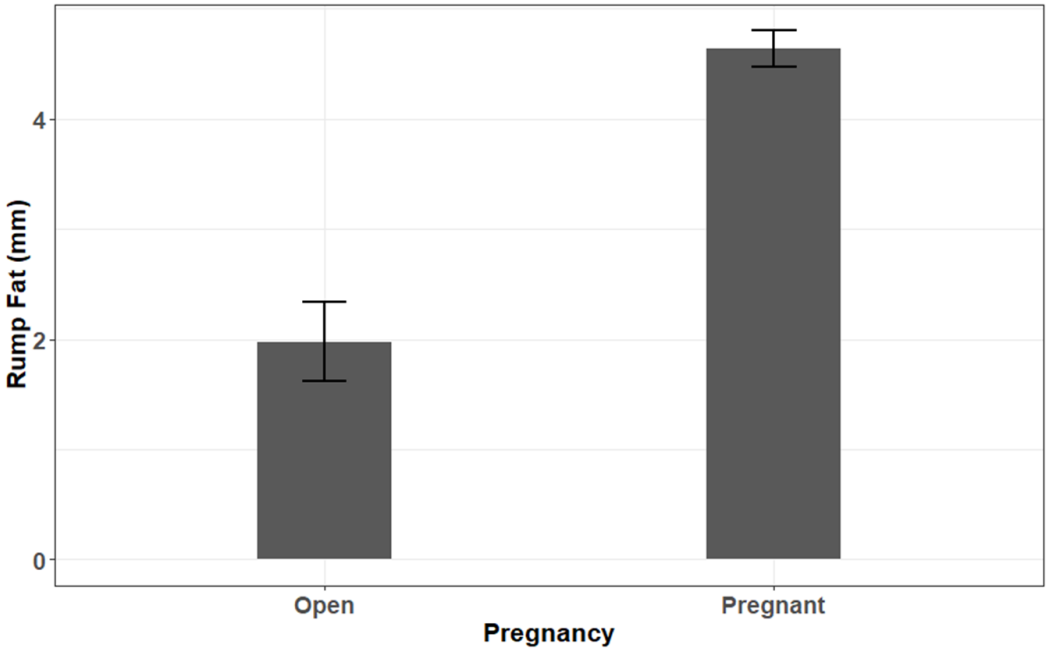

Figure 14. Pregnancy rates and age of elk in Utah.

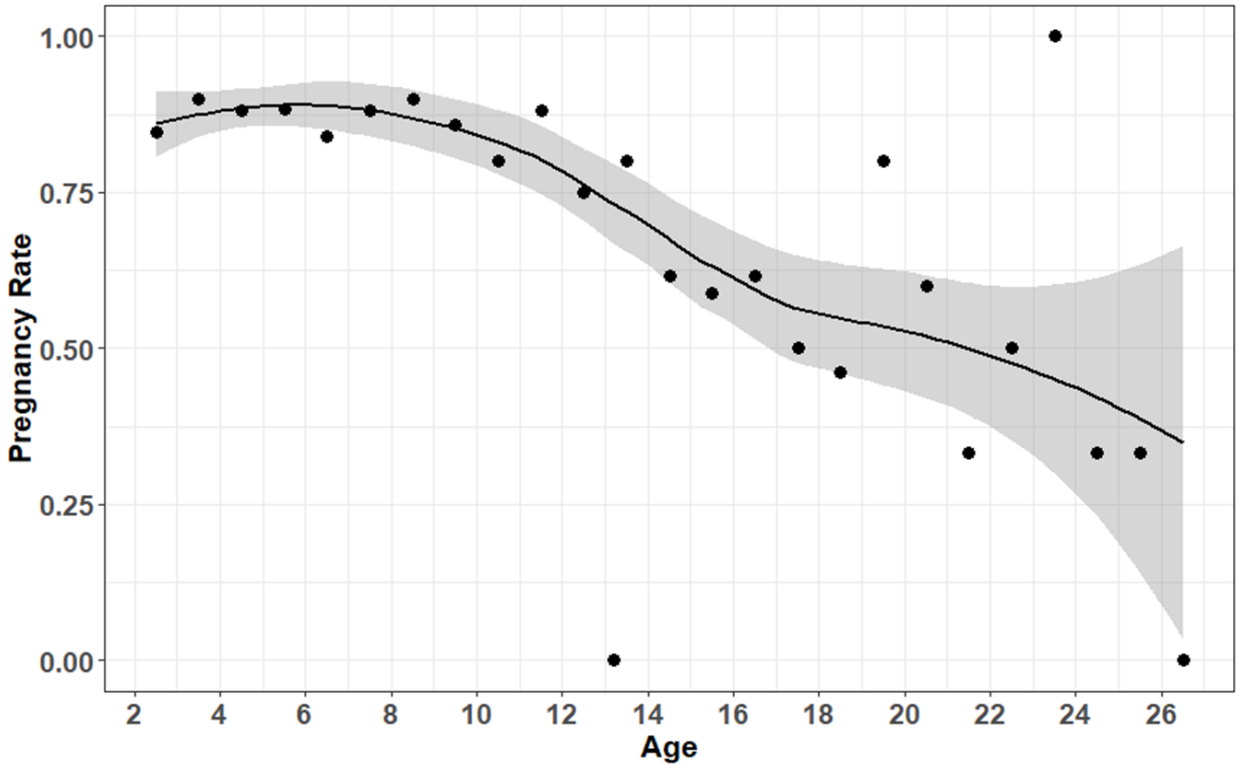

Table 1. Limited Entry age objectives and average age of harvested bull elk by management unit, Utah 2015–2021.

Unit	2023 Age Objective	Year							3-year average
		2015	2016	2017	2018	2019	2020	2021	
Beaver, East	6.5-7.0	6.9	7.7	8.0	7.6	7.9	8.3	8.4	8.2
Book Cliffs, Little Creek Roadless	6.5-7.0	7.5	7.3	7.1	7.0	7.0	7.0	8.3	7.4
Fillmore, Pahvant	6.5-7.0	7.8	8.1	7.9	7.6	6.5	8.7	7.5	7.6
Plateau, Boulder	6.5-7.0	7.3	8.2	7.3	8.2	7.5	7.2	7.8	7.5
San Juan Bull Elk	6.5-7.0	8.1	8.2	7.4	8.3	7.6	7.8	7.7	7.7
Book Cliffs, Bitter Creek/East	6.0-6.5	7.5	7.8	6.2	6.4	6.0	5.9	5.2	5.7
Cache, Meadowville	6.0-6.5	4.8	4.7	4.9	5.1	5.5	5.3	7.0	5.9
Cache, South	6.0-6.5	5.5	4.7	5.0	5.7	5.9	6.0	7.1	6.3
Monroe	6.0-6.5	7.8	7.8	6.4	6.7	7.3	7.1	7.7	7.4
Mt Dutton	6.0-6.5	5.9	6.0	6.1	6.9	5.8	6.8	7.5	6.7
Panguitch Lake	6.0-6.5	5.4	5.9	5.1	6.1	6.7	5.7	6.7	6.4
Southwest Desert, South	6.0-6.5	6.8	7.8	6.3	7.2	7.3	7.1	6.6	7.0
Box Elder, Grouse Creek	5.5-6.0	5.5	5.7	5.2	6.0	5.5	5.3	6.4	5.7
Box Elder, Pilot Mtn	5.5-6.0	6.5	6.1	6.7	5.3	7.7	7.2	5.7	6.9
Central Mtns, Manti	5.5-6.0	5.9	6.3	6.0	6.4	6.3	6.8	6.5	6.5
Central Mtns, Nebo/San Pitch Mtns	5.5-6.0	6.0	5.3	5.8	5.8	5.7	6.7	7.2	6.5
La Sal, Dolores Triangle	5.5-6.0	-	-	-	5.0	4.0	-	-	4.0
La Sal, La Sal Mtns	5.5-6.0	6.6	6.3	5.7	5.9	5.7	6.2	6.2	6.0
North Slope, Three Corners	5.5-6.0	5.7	5.4	5.0	4.7	6.0	4.8	5.5	5.4
Plateau, Fishlake/Thousand Lakes	5.5-6.0	6.0	6.0	6.0	5.9	6.0	7.2	6.9	6.7
South Slope, Diamond Mtn	5.5-6.0	6.8	7.7	7	7.3	6.9	7.8	7.4	7.4
Wasatch Mtns	5.5-6.0	6.6	6.7	6.4	6.3	6.2	6.3	5.9	6.1
Statewide average		6.5	6.7	6.3	6.4	6.4	6.7	6.9	6.6

Table 2. Postseason (late fall) elk herd population estimates and objectives by unit, Utah 2017–2021.

Unit	Population Objective	Year				
		2017	2018	2019	2020	2021
Beaver	1,050	1,500	1,400	1275	1200	850
Book Cliffs	7,500	6,500	6,500	5500	5500	5,500
Box Elder	675	700	650	700	700	700
Cache	2,300	2,500	2,500	2700	3000	3,350
Central Mtns, Manti	12,000	11,300	11,500	9300	9500	9,900
Central Mtns, Nebo	1,450	1,300	1,400	1900	1850	1,700
Chalk Creek	3,200	4,000	3,900	3600	3400	4,400
East Canyon	1,800	2,400	2,300	2300	2800	3,000
Fillmore	1,600	1,400	1,450	1350	1400	1,350
Henry Mtns	0	30	30	30	25	25
Kamas	850	600	600	700	725	1,050
La Sal	2,500	2,900	2,700	2900	2700	2,100
Monroe	1,400	1,000	1,050	1100	1150	1,100
Morgan-South Rich	3,800	3,650	3,650	6500	6900	6,700
Mt. Dutton	2,000	1,500	1,600	1050	1250	1,400
Nine Mile, Anthro	700	1,200	1,100	1100	1100	1,100
Nine Mile, Range Creek	1,800	1,350	1,450	1250	2100	2,100
North Slope, Summit	300	275	275	300	300	750
North Slope, Three Corners	700	430	480	490	550	600
North Slope, West Daggett	1,300	700	750	650	620	1300
Ogden	2,000	1,750	1,750	1600	1750	2,200
Oquirrh-Stansbury	1,650	1,100	1,100	700	700	800
Panguitch Lake	1,300	1,500	1,400	1400	1450	840
Paunsaugunt	140	275	200	275	200	200
Pine Valley	50	50	50	50	50	50
Plateau, Boulder/Kaiparowits	1,700	1,200	1,300	1050	1150	1,200
Plateau, Fishlake/1000 Lakes	5,900	4,900	5,200	4750	5100	5,450
San Juan	1,300	1,300	1,300	1300	1450	1,400
San Rafael	0	30	30	30	25	-
South Slope, Diamond Mtn/Vernal	3,000	4,300	4,000	4200	4000	3,800
South Slope, Yellowstone	5,000	7,500	7,500	7400	7400	7,400
Southwest Desert	975	1,500	1,300	1075	975	975
Wasatch Mtns, Avintaquin	1,800	2,000	1,900	1900	1900	2,600
Wasatch Mtns, Currant Creek	3,200	2,200	2,600	1850	3000	4,000
Wasatch Mtns, West	3,400	3,400	3,400	3400	3400	3,500
West Desert, Deep Creek	350	350	300	400	200	200
Zion	300	600	475	475	800	800
Statewide Totals	78,990	79,190	79,090	76,550	80,320	84,390