

STRATEGIC MANAGEMENT PLAN FOR CHUKAR PARTRIDGE
(*Alectoris chukar*)



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STRATEGIC MANAGEMENT PLAN FOR CHUKAR PARTRIDGE
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Prepared By:

Utah Division of Wildlife Resources
Upland Game Advisory Committee Members:

Ray Lee
Ernie Perkins
John Staley

Dean Mitchell, Upland Game Program Coordinator
Utah Division of Wildlife Resources

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Purpose Of The Plan

General

This document is Utah's strategic plan for the Chukar Partridge. It presents five-year management goals, objectives and strategies for the Chukar Partridge in Utah. It identifies issues and concerns and specifies strategies to overcome them. The plan provides strong focus for division work, year-to-year priorities and allocation of resources.

DWR annual operations will key on projects that address issues and concerns through the strategies identified in this plan. Resources will be allocated to those projects that relate to the priority goals. As many strategies as possible will be addressed each year. Throughout the five-year life of the plan, annual emphasis will shift to meet the highest priorities.

Dates Covered

This plan is effective for five years from the date approved by the Utah Wildlife Board as indicated.

Species Assessment

Natural History

Species Description

Chukar Partridge are a medium-sized partridge. Total length ranges from 13.39 to 14.96 inches and weight is 19.4 to 23.8 ounces. Females are slightly smaller than males in length, and in weight, otherwise the sexes are alike. Adult males can often be identified in hand by the button spur or spur bump on the back of the legs. Generally, Chukar Partridge are grayish brown to olive above, with buff underparts. There is a very distinct black line through the forehead, eyes, and down neck forming a gorget between the white throat and gray upper breast. Red legs and bill, with prominent black and chestnut barring on flanks and chestnut tail feathers are very distinctive (Christensen 1996).

Chukar Partridge are native to Asia, the Middle East, and southern Europe. The first introduction to North America occurred in 1893 when five pairs were shipped to Illinois from what is now Pakistan (Christensen 1996). Between 1931 and 1970, approximately 795,000

Chukar Partridge were released in 41 states in the United States and 10,600 in six Canadian provinces (Christensen 1996). Over time, it has been discovered that the preferred habitats of Chukar Partridge are found in the Great Basin physiographic region of the western United States and north through eastern Oregon, western Idaho, and eastern Washington where steep, rocky, mountainous terrain contains a mixture of brush, grasses, and forbs.

Primary foods consist of the leaves and seeds of annual (primarily the introduced cheatgrass (*Bromus tectorum*)) and perennial grasses, and the seeds of various forbs associated with the sagebrush (*Artemisia* spp.)–grass vegetation type of the Great Basin, or the saltbush (*Atriplex* spp.)–grass type in more southern areas (Christensen 1996).

Chukar Partridge are a monogamous species with the male generally remaining with its mate until all incubating, hatching, and brood-rearing duties are completed. Pairing can begin as early as early February and extend through late March. Egg-laying can begin in early March and run through April and May.

Chukar Partridge are persistent nesters. If the first nest fails, it is not uncommon to see downy young in late August. A second brood per season is unlikely. Clutch sizes range from 10–21 eggs with 15–16 being average. Incubation averages 24 days and chicks are capable of flight at less than two weeks of age. By 18 weeks of age the young are generally not distinguishable from adults in the wild (Christensen 1996).

The covey, which usually consists of adults and their offspring, is the primary social group. Often the covey will consist of more than one family group since chicks and adults have a tendency to mix at water sources. It has been found that by the time chicks were three weeks old, brood integrity was questionable and it was not uncommon to observe coveys of 30–50 chicks with one to three adults. In high production years, coveys of 100 chicks with as many as 10 adults have been observed in Nevada (Christensen 1996).

Known predators of adults and chicks include: coyote (*Canis latrans*), bobcat (*Lynx rufus*), Great-horned Owl (*Bubo virginianus*), Prairie Falcon (*Falco mexicanus*), Sharp-shinned Hawk (*Accipiter striatus*), Coopers Hawk (*Accipiter cooperii*), Red-tailed Hawk (*Buteo jamaicensis*) and Golden Eagle (*Aquila chrysaetos*) (Christensen 1996).

Utah History and Current Distribution

Chukar Partridge were first introduced into Utah in 1935, and continuing introduction of pen-raised and wild-trapped birds have intermittently continued to the present. Well over 300,000 birds have been released to date.

For the most part, Chukar Partridge have done well in Utah, but have periodically experienced

significant localized or general population declines due to severe winters or drought.

Chukar Partridge are widely distributed throughout Utah. They are found on all of the borders of the State, and widely within. They are generally found along the entire Wasatch Mountain Range, and on many mountain ranges east of the I-15 corridor with the exception of Washington County; in most of the mountain ranges west of the I-15 corridor; in the mountains surrounding the Uintah basin; and in the Green and Colorado River drainages. A map of potential Chukar Partridge distribution in Utah is included in Appendix 1 (USDI 1997).

Management

DWR Regulatory Authority

The Utah Division of Wildlife Resources is charged by the Legislature to manage the state's wildlife resources. Its purpose is to assure the future of protected wildlife for its intrinsic, scientific, educational and recreational values. Protected wildlife species are determined by the Utah Legislature and by terms of the Federal Endangered Species Act of 1973.

The Utah Division of Wildlife Resources presently operates under authority granted it 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 section of the 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.

Past Management

In 1921 the DWR established the Springville Game Farm. Initially the game farm was used to produce mostly Ring-necked Pheasants (*Phasianus colchicus*). With the success of the pheasant, the game farm shifted direction and in 1936 the rearing of Chukar Partridge began. The first Chukar Partridge came to the Springville Game Farm in 1935 as a result of the purchase of eggs from a game farm in California. Three hundred eggs were purchased by the Box Elder Wildlife Federation and hatched by game farm personnel. On August 20, 1936, 76 Chukar Partridge hatched from these eggs and were released into Box Elder County (Mitchell 1990).

Chukar Partridge were planted experimentally in the early 1940s but showed no real promise. In 1951, a considerable number of Chukar Partridge were trapped by the U. S. Fish and Wildlife Service from the wild in the country of Turkey and were flown directly to Utah where they were

released into the wild (Mitchell 1990). Between 1951 and 1966 177,664 Chukar Partridge were released from the Springville Game Farm in over 187 sites throughout the state. After 1967, planting of game farm Chukar Partridge was phased out and the emphasis was put on other bird species (Mitchell 1990). By 1968, 286,000 Chukar Partridge had been released at 191 different sites around the state. Wide distribution occurred largely on public lands providing the potential for increased hunter participation and harvest. The Springville Game Farm continued limited production of Chukar Partridge for emergency purposes only until 1975 when the game farm was closed and all remaining birds were released (Mitchell 1990).

In the late 1970s, due to a decline in wild Chukar Partridge populations, the DWR renewed limited operations at the Springville Game Farm. The purpose of the project was to provide birds to reestablish populations that declined due to various mortality factors, principally unfavorable weather, and to establish birds in areas not previously occupied. This program was supplemented by a “day-old-chick” program under which interested citizens could obtain day-old chukar chicks from the game farm and propagate them for release into the wild. The Springville Game Farm was again closed in 1993, and remains closed to the present (Mitchell 1990).

In 1997, a program was established to purchase pen-reared Chukar Partridge from local private game bird growers. Approximately 4,000 pen-reared Chukar Partridge have been purchased annually for release in areas of the state where habitat has been improved and where chukar populations have declined or were not originally established.

In conjunction with this program, an aggressive effort to construct guzzlers in areas identified as potential Chukar Partridge habitat throughout the state has occurred. Since the mid-1990s, several hundred 350–gallon guzzlers, designed specifically for upland game, have been built.

Current Management

For years, DWR estimated Chukar Partridge reproductive efforts using random brood counts. These counts were typically conducted around known watering holes or on guzzlers. Beginning in 1996, a helicopter survey was initiated to determine if the technique could be used to replace the manpower-intensive random brood counts. The helicopter survey is flown only on a single transect in the desert west of Salt Lake City and is designed to provide an index of annual chukar populations. Efforts are underway to assess the statistical validity of the helicopter survey as an index of annual chukar populations. Data derived are currently used to prepare annual hunting season forecasts.

Limited attempts at trapping and transplanting Chukar Partridge have occurred over the past five years with little to no success. Attempts by volunteers and DWR staff to capture birds on Antelope Island State Park and on private properties in Box Elder County have yielded little.

Pen-reared Chukar Partridge releases continue as mentioned above. Annual releases consist of a total of 4,000 birds purchased from private game bird growers. General locations of release

sites are published annually in an effort to provide hunters with an opportunity to harvest birds. Initially, all pen-reared birds were banded with an aluminum leg band to attempt to study return to the hunter bag and survival of released birds. Band returns were so small that no conclusions could be drawn. As such, most banding has been discontinued. It's not known if the small number of band returns was a result of hunters not bothering to report bands from harvested birds, or if hunters were not harvesting any birds.

Chukar Partridge annual harvest data is collected through a telephone survey in January. Chukar Partridge harvest statistics are provided in Appendix 2.

Guzzler construction has slowed from that of the mid-1990s. Currently a research study is underway through Brigham Young University to assess the value of guzzlers to wildlife populations throughout Utah. The objectives of the study are as follows: determine species of wildlife using guzzlers; determine timing and climatic conditions of use by species; assess placement and location variables; determine Chukar Partridge survival and reproductive differences in areas with guzzlers versus areas without and to assess water quality throughout the year in guzzlers.

Habitat and Utilization

Habitat Requirements

General

Topography plays a major role in Chukar Partridge habitat. Birds prefer steep, rocky slopes. In their native habitats, Chukar Partridge can be found from sea level up to 16,000 feet in elevation. Utah has a tremendous amount of potential habitat based on topography.

Chukar Partridge use steep, rocky terrain as a means of escaping predators. They will usually out distance predators by running up a steep slope. If that doesn't work they will fly down and around the hill to escape.

Although the Chukar Partridge is a bird of arid climates, it's speculated that free water plays a role in their ability to survive. This is not currently well understood. During hot dry periods, Chukar Partridge will visit water sources on a daily basis.

Chukar Partridge don't seem to be selective about where they drink. They may drink from a hollow in a rock or even from a small puddle in the opening of a mine shaft. More often they utilize small springs or streams that are found in their habitats. Many of these are intermittent

and will dry up during the latter part of the summer.

In an attempt to provide water for livestock in the west, many watering troughs have been built on the landscape. This may be beneficial to birds in local areas. However, livestock troughs may also create drowning hazards for young birds. These hazards are easily remedied by installing ramps that young birds can use if they fall in while drinking.

Plants are important to Chukar Partridge for nesting, cover, and food. Throughout the year, plants make up the majority of the bird's diet. The exception is during the summer when young birds eat insects as their primary food.

Chukar Partridge prefer a grass and forb understory with some desert shrubs (*Artemisia*, *Atriplex*, *Ephedra* and *Sarcobatus*). Areas with scattered trees (juniper and pinyon) may be used.

Assorted grasses (*Agropyron*, *Bromus*, *Oryzopsis*, *Sitanion*, and *Stipa*) make up the majority of the bird's diet. Chukar Partridge select grass shoots and leaves when they are available. When they can't find green grass, birds will often eat grass seeds. Chukar Partridge will utilize cultivated grains such as barley and wheat when available.

Breeding and nesting

Chukar Partridge are monogamous and by mid-March pair bonding begins. Mates are selected using several specific calls. These calls are used by both sexes. The male will display with his head down, neck extended, and one wing extended until the tip touches the ground. As pairs are established the covey begins to disperse. Each pair searches for an appropriate territory. Nesting territories are defended especially near the actual nest site. The boundaries of the territories don't seem to be very well defined. When nesting conditions are extremely poor, coveys may actually reassemble after a few weeks without attempting to nest (Christensen 1996).

When conditions are proper, the birds will nest in areas that offer great concealment. The nest is usually located under a desert shrub and tucked against some rocks. The actual nest is a depression similar to a dusting bowl. The bowl is lined with dry grass stems and feathers.

Brood-rearing

After hatching, the broods are cared for by one or both parents. Young Chukar Partridge are precocious and leave the nest within hours of hatching. It is important that the adults find areas

with good numbers of insects for the developing chicks. Insects play a major role in providing protein for young birds developing feathers, muscle, and bones. Adult Chukar Partridge will protect young birds by feigning to draw predators away from their young.

As other broods hatch, parents may combine broods to form large coveys of 50 or more. This also provides more supervision as the adults share responsibilities. At heavily used water sources, young birds may become mixed with other broods. During this time the family groups usually break down.

Broods of young birds are observed going to water daily when the air temperature exceeds 100 degrees F (Benolkin 1988). No scientific data exists to document water usage at daily temperatures under 100 degrees F. Nevada helicopter surveys found that 85% of summer brooding period birds were found within ¼ mile of water (Benolkin 1988). This generally leaves a lot of area with no usage during the dry summer season. It is intuitively obvious that the availability of cover, insects, and water, without the young (flightless birds) having to traverse up or down large rocks and/or steep slopes is essential. This is most important up to three weeks of age, when a brood begins to be capable of coordinated flight (Sullivan 1994).

Fall and winter

Movement of coveys during this period is controlled by the weather. Late summer, fall and early winter rain and snow help many of the grasses (e.g. cheatgrass) to green up. This source of food provides birds with enough moisture to allow them to wander over miles of habitat and this may be an important time for the birds to pioneer or disperse into new areas.

As winter sets in, accumulating snow results in the Chukar Partridge grouping up and collecting at lower elevations (the snow line or below) in search of food (Christensen 1970). They may spend most of the winter at lower elevations on south-facing slopes, as this is usually the first area where snow melts allowing the birds access to food. Wind swept areas may also offer access to food supplies.

Cover, both rock and brush, is also a significant winter habitat requirement as the coveys cope with winter storms and predators.

Historic Habitat Trends

Utah has released more Chukar Partridge than any other state. The total number is over 300,000. Many of the early releases may have been in areas of marginal habitat. Over the years, a lot has been learned about the habitat requirements of this bird. Chukar Partridge populations throughout the west have gone through a series of booms and busts depending on

weather patterns of wet or dry summers and mild or extreme winters.

There have been several changes in Utah habitat since the initial introduction of Chukar Partridge. Habitat areas along the foothills near heavily populated regions of the state have suffered major losses to urban sprawl.

In many areas of the state where repetitive fires or overgrazing has occurred, cheatgrass has invaded. This may actually increase the food supply for the birds, but also causes new range problems. Cheatgrass is an exotic annual that usually dries out in early June. Dry lightning storms during the summer months easily ignite areas covered with cheatgrass. As the fire spreads, it may consume many other types of vegetation needed for nesting and brood-rearing. In the following winter and spring, cheatgrass invades the burned areas before the other vegetation can establish. In the worst scenario, before the shrubs and perennial grasses can grow back, the area burns again—providing even greater competitive advantage to the cheatgrass. This trend is currently happening, resulting in a degradation of Utah's sagebrush habitats. This could create large areas that would lack all the proper vegetation to support Chukar Partridge populations.

Current Habitat Status

Utah's Chukar Partridge habitat is currently being eroded by urbanization and loss of sagebrush habitats.

Utah Geographic Approach to Planning (GAP) Analysis is an environmental geographic information system (GIS) that defines and identifies, based on spatial models, "critical," "high," "substantial," and "limited" value to Utah landscapes based upon analysis of vegetative cover and other factors (USDI 1997). Utah GAP is currently the best habitat definition and measurement tool available.

GAP analysis identifies 31,875 square miles of "high" and "substantial" value Chukar Partridge habitat in Utah. Of this, 42% is identified as of "high" value" (will provide a basis for intensive use), and 58% is of "substantial value" (will provide a basis for frequent use).

Climate

Chukar Partridge do best in a semi arid to arid climate. In it's native lands, Chukar Partridge can survive in areas where precipitation may be as low as four inches annually (Christensen 1996). Birds do best in areas of short, hot summers and moderate winters. Chukar Partridge can survive extended periods of cold weather if food is available.

Extended periods of deep, crusted snow is one of the major limiting factors of this species. Utah occasionally experiences harsh winters during which the snow can linger for weeks or even months. This type of winter causes major reduction in populations and in some cases areas have experienced complete die offs.

Population

Estimated Habitat Carrying Capacity

How many Chukar Partridge can live in Utah? There is not a simple answer as there is no current scientific or authoritative estimate of the habitat carrying capacity for the Chukar Partridge population in Utah.

Annual Chukar Partridge populations vary dramatically (by up to a factor of nine), depending on weather (Molini 1976). This fluctuation dictates use of a base population (number of birds the habitat can support) concept to estimate the potential habitat carrying capacity for Chukar Partridge. The base population concept provides a very rough estimate of a potential average population in an average year.

California, Idaho, Nevada and Washington studies show populations in good habitat areas, and in normal years, in a range of 30 to 50 Chukar Partridge per square mile (Christensen 1996). Nevada estimates medium density in average habitat areas of 18 Chukar Partridge per square mile in normal years (Molini 1976).

Exceptional years can produce populations three times the base population norm, while bust years can reduce this base number by two-thirds (Molini 1976). Exceptional habitat areas, with good weather, can produce counts of 120 birds per square mile in successive years (Molini 1976).

Utah Chukar Partridge population data, at this point, is not as developed as that of some other western states such as California, Idaho, Nevada and Washington, but likely aligns to their estimates and ranges. Therefore, the following model developed in Nevada (Molini 1976), of summer Chukar Partridge populations, will be used for Utah in an attempt to estimate habitat carrying capacity.

High Density = 30–50 birds per square mile

Medium Density = 16–29 birds per square mile

Low Density = 15 or less birds per square mile

This Nevada model multiplies medium density population (a conservative 18 birds per square mile) by the square miles of Chukar Partridge habitat to derive a rough potential habitat carrying capacity (Molini 1976).

Determining the square miles of Utah Chukar Partridge habitat is the next step in estimating potential habitat carrying capacity. Chukar Partridge expand their territory significantly as soon as fall precipitation stimulates green up of grasses, especially cheatgrass. A covey will often range three times as far during the early fall compared to their summer range.

Summer habitat conditions and precipitation are factors that are largely responsible for Chukar Partridge recruitment (the number of young which are produced and survive), which largely determines the size of the population going into the winter. Thus, the quantity (size) of summer habitat is the factor that determines Chukar Partridge populations in semi arid and arid environments, and ideally can be used to estimate Utah's potential habitat carrying capacity.

There is currently no model or studies that might be used to derive summer habitats of Chukar Partridge in Utah. As previously mentioned, the best available Utah model, GAP analysis, identifies some 31,785 square miles of "high" and "substantial value" Chukar Partridge habitat in the state.

Multiplying the "high" and "substantial" value square miles of habitat by the Nevada model for population density (18 birds per square mile), the Utah Chukar Partridge estimated potential habitat carrying capacity is projected at a base population of 572,130 birds.

Estimated Population

The need to estimate Utah's Chukar Partridge population is perhaps best expressed in the following quote from Nevada literature, "It is apparent that before any meaningful management guidelines can be set forth for a given resource, that an idea of the population parameters of that resource must be known. Even though the figures presented may be questionable, they are based upon the best data available at present and a starting point is achieved by defining at least a "ballpark" figure for Nevada's chukar resource base" (Molini 1976).

One way of estimating populations is by extrapolating from the percentage of populations harvested by hunting. However, these extrapolations are highly variable depending upon the percentage of the population assumed taken by hunting. Studies have estimated hunting mortality at a low, but broad range of 4–25% of population (Christensen 1996). In this model, even a small change in the harvest percentage rate results in a large change of total population.

For example, using data from 1999, the Utah harvest of Chukar Partridge was 64,727 birds (Mitchell and Wing 2000). At a 4% harvest rate, this would extrapolate to a total population of

over 1.62 million birds. At a 15% harvest rate estimated by Shaw (1971) for Utah and Molini (1976) for Nevada, this would extrapolate to a total population of 431,000 birds. As a best estimate, taking Utah harvest from the period of 1994 through 1999, which includes bad, average and good population years, and then applying the estimate of 15% of the population taken by hunting, a total population of 212,000 birds is derived.

Another way of very roughly estimating the current Utah base, or average annual, Chukar Partridge population is by comparison of hunter harvest per day as compared to hunter harvest per day in another state such as Nevada, which is believed to have a somewhat reliable population estimate. This extrapolation assumes that Utah hunters are comparably capable to Nevada hunters, and that there are no significant differences (e.g. accessibility, terrain) between the two states that result in different harvest per day—other than the amount of Chukar Partridge habitat and the density of the Chukar Partridge population.

Comparing the period 1958–1974 between Utah and Nevada, the number of hunter days afield for Chukar Partridge for each state is slightly below four days per hunter, with Nevada averaging less than 10% above Utah. The average number of birds per hunter day in Nevada from 1958 to 1974 was 2.42; in Utah, for the same years, the figure drops to 1.10, representing 42% of the Nevada harvest (Molini 1976, Mitchell and Wing 2000). Applying this 42% factor to the Nevada base population of 750,000 birds results in an estimated Utah base population for that two-decade period at 315,000 birds.

There are a myriad of assumptions associated with the two population estimation methods described above. As such, there is not a lot of confidence is placed in them at this time. They need to be tested and validated, but provide starting points for determining Utah Chukar Partridge population estimates.

Population Limiting Factors

Drowning

Drowning of birds in dry desert areas during summer periods where the birds are forced to use livestock tanks or troughs or open pit or mine shaft water sources can cause significant mortality, especially among young birds. However, drowning does not appear to be a population limiting factor (Christensen 1996).

Fire

Fire can cause mortality of young birds, but is not a significant factor on older birds. No authenticated cases are known where a bird capable of flight died due to fire (Christensen 1970, Sullivan 1994).

Hunting

Hunting is an obvious source of mortality for Chukar Partridge, and may be a limiting factor for a few localized populations. However, it is not considered a limiting factor for the species in Utah. As in other states, there are many Chukar Partridge populations that are unaffected by hunting. Even in heavily hunted areas that were studied in other states, a hunting harvest of only four to 25% was reported (Christensen 1996). This is well within the ability of the species to absorb and prosper (Christensen 1996).

Predation

Both ground and aerial predators prey on Chukar Partridge. Nests are vulnerable to predation. Young Chukar Partridge (less than two weeks old) are quite vulnerable to predation (Christensen 1996). Predation is not considered a population-limiting factor.

Water

The role of free water in the biology and ecology of Chukar Partridge is poorly understood.

Studies conducted in Nevada conclude that good Chukar Partridge populations (50 - 300 birds) can be built in areas that have good food, escape and roosting cover, but lack water. New and increased populations can be created where water is nonexistent through the construction and maintenance of guzzlers (Benolkin 1988).

Utah is the second driest state in the United States. Intuitively, it is thought that improved water resource development will create entirely new local Chukar Partridge populations in areas where there is no free or persistent water, and will increase populations in areas where the lack of persistent water sources has suppressed populations.

Nevada studies indicate that 85% of Chukar Partridge used only 10% of the available habitat, and are found within three miles of a water source during the summer months (Benolkin 1988). By comparison, only 30% of Chukar Partridge were found within three miles of water in February. In this same study of a 23 square mile, "low value" habitat area with no permanent

Chukar Partridge and with little natural water, 11 guzzlers were constructed. These guzzlers provided the basis for a population averaging 550 birds, or 24 birds per square mile, over a 10-year period (Benolkin and Benolkin 1994).

An average population of 24 birds per square mile multiplied by Utah's potential Chukar Partridge habitat of 31,875 square miles, projects to a total population of 765,000 birds.

Uniquely, one Utah study in 1969-1970 disagrees with the value of water to Chukar Partridge populations (Shaw 1971). Shaw (1971) concludes that, "...The spring distribution of Chukar Partridge did not appear to be influenced by the availability of water. ... In summer months, most birds concentrated around sources of water and guzzler use increased to a maximum in August. However, some Chukar Partridge appeared to be living without use of any permanent water sources..."

It was concluded that in these years, water provided by guzzlers failed to improve Chukar Partridge productivity, survival, or availability to hunters. The results of this study indicated that unless drinking water is far more important to Chukar Partridge in drier years, installation of guzzlers in comparable habitats is not a feasible management technique. It should be noted that above average precipitation fell in the Utah study area during the two years of the study, 1969-1970.

Weather

Weather is undoubtedly the major factor limiting Utah Chukar Partridge populations. Three separate phenomena are key.

Severe winter weather, especially heavy, deep, crusted and persistent snow can produce a significant loss of adult birds. It is generally agreed that this condition can reduce the population to remnant levels (90% kill). These winter kills should be periodically anticipated in Northern Utah. It is believed that the overall population can recover relatively quickly from these losses by movement from adjacent territories as long as the winter kill is not widespread. It is also useful to note that recruitment can result in documented fall population ratios of 700 to nearly 900 chicks per 100 adults in reasonably good years (Christensen 1996). Thus a subsequent good spring and summer can offset the effects of a very bad winter.

Late spring/summer dry weather or drought is another very significant limiting factor in Utah. This affects the Chukar Partridge in several ways. A severe summer drought or prolonged drought over years can outright kill adult birds, or can greatly affect their breeding and productivity. A severe dry period in the late spring will severely affect insect populations, which are crucial to the survival of chicks. Protein from insects forms the bulk of the chick's diet during the first several weeks (Molini 1976). A dry spring can also negatively affect the preparation of hens for breeding readiness and egg production.

Persistent wet and cold periods in spring and early summer can be problematic. Young chicks can die from exposure due to wet and cold weather.

Use and Demand

Over the past 40 years in Utah, Chukar Partridge hunting harvests have ranged from a high of over 80,000 in 1969, to lows of approximately 25,000 in 1958 and 1985. The trend is somewhat down. Birds per hunter day range from lows of approximately .5 birds per day to highs of over 1 bird per day. This trend is stable. Birds per hunter per year have ranged from lows of approximately two birds to highs of four birds or slightly higher. The number of hunters has remained level at approximately 10,000.

Chukar Partridge can be outstanding “Watchable Wildlife” candidates. They are popular finds for formal or informal bird watchers, and can be the highlight of a family picnic or outing.

An Information and Education effort to attract and inform the public (along the lines of the Swan, Bald Eagle, Kokanee Salmon, and Mountain Goat days) does not currently exist.

Issues And Concerns

Population Management Issues and Concerns

- a. Determining Chukar Partridge distribution in Utah.
- b. Establishing and maintaining Chukar Partridge in Utah.
- c. Lack of sufficient data (population survey, harvest management strategy) to drive management decisions.
- d. Understanding of the impacts of disease on Utah Chukar Partridge populations.
- e. Understanding of the impacts of predation on Utah Chukar Partridge populations.
- f. Understanding of the impacts of weather, especially precipitation, on Utah Chukar Partridge populations.

Habitat Issues and Concerns

- a. Understanding and defining the importance of water to Chukar Partridge in Utah.
- b. Understanding and defining the importance of wildfires, and the lack of rehabilitative management to re-establish shrubs, grasses and forbs in Chukar Partridge habitats.
- c. Delineating optimum Utah Chukar Partridge habitats.

Other Issues and Concerns

- a. The lack of resources to restore habitat, and to build populations.
- b. The lack of a model or showcase project to convincingly demonstrate that potential populations that could be established.
- c. The lack of a plan to increase Chukar Partridge recreational opportunities.

Summary And Conclusions

Utah has a significant, but under-utilized, Chukar Partridge resource. Utah has a tremendous amount of suitable habitat that is located on public lands. If these lands are protected from development and degradation there should be Chukar Partridge for many future generations. As other huntable Utah wildlife populations and habitat are reduced by development and population growth, Chukar Partridge populations offer significant resistance to these problems—and even significant population growth potential. Additional scientific data and information is needed on populations, habitat, water impacts, disease, and management to ensure the future of the Chukar Partridge in Utah.

Goals, Objectives, and Strategies

GOAL A: Establish and maintain optimum Chukar Partridge populations in all suitable habitat in Utah.

Objective 1. Increase Utah five-year base, or average, Chukar Partridge populations by 100% by 2008.

Strategy a. Develop a Chukar Partridge population index technique. Use the technique to validate current Chukar Partridge population estimates and distribution across Utah's landscape.

Strategy b. Develop a Chukar Partridge harvest management strategy to be driven by the population data collect in Strategy a. above.

Strategy c. Continue annual releases of pen-reared Chukar Partridge. Birds should be released in areas where habitats have been improved and in areas where populations have declined to increase hunting opportunity.

Strategy d. Develop a transplant priority list in each DWR region and statewide for releases of pen-reared and wild trapped Chukar Partridge.

Strategy e. Investigate the feasibility of trapping wild Chukar Partridge from other states.

Objective 2. Improve Chukar Partridge habitat on 64,000 acres statewide by 2008.

Strategy a. Complete Brigham Young University guzzler research study. Use results to drive future Chukar Partridge-specific water maintenance and development efforts.

Strategy b. Develop a model to identify occupied and unoccupied Chukar Partridge habitats statewide.

Strategy c. Develop a Chukar Partridge habitat projects priority list by DWR region and statewide.

Strategy d. Develop Chukar Partridge habitat management guidelines.

Strategy e. Study the feasibility of establishing a permanent guzzler maintenance and construction crew.

GOAL B: Increase Chukar Partridge hunting and viewing opportunity in Utah.

Objective 1. Increase Chukar Partridge hunting opportunity by 100% by 2008.

Strategy a. Recruit new hunters.

Strategy b. Provide Chukar Partridge hunter access to private lands (e.g. Cooperative Wildlife Management Unit Program, Walk-in Access Program, conservation easements, etc.)

Objective 2. Increase public awareness and viewing opportunity for Chukar Partridge by 100 percent by 2008.

Strategy a. Measure public awareness and viewing opportunity.

Strategy b. Information and education (e.g. brochures, news releases, television and radio stories, etc.)

Strategy c. Chukar Partridge awareness/viewing workshops.

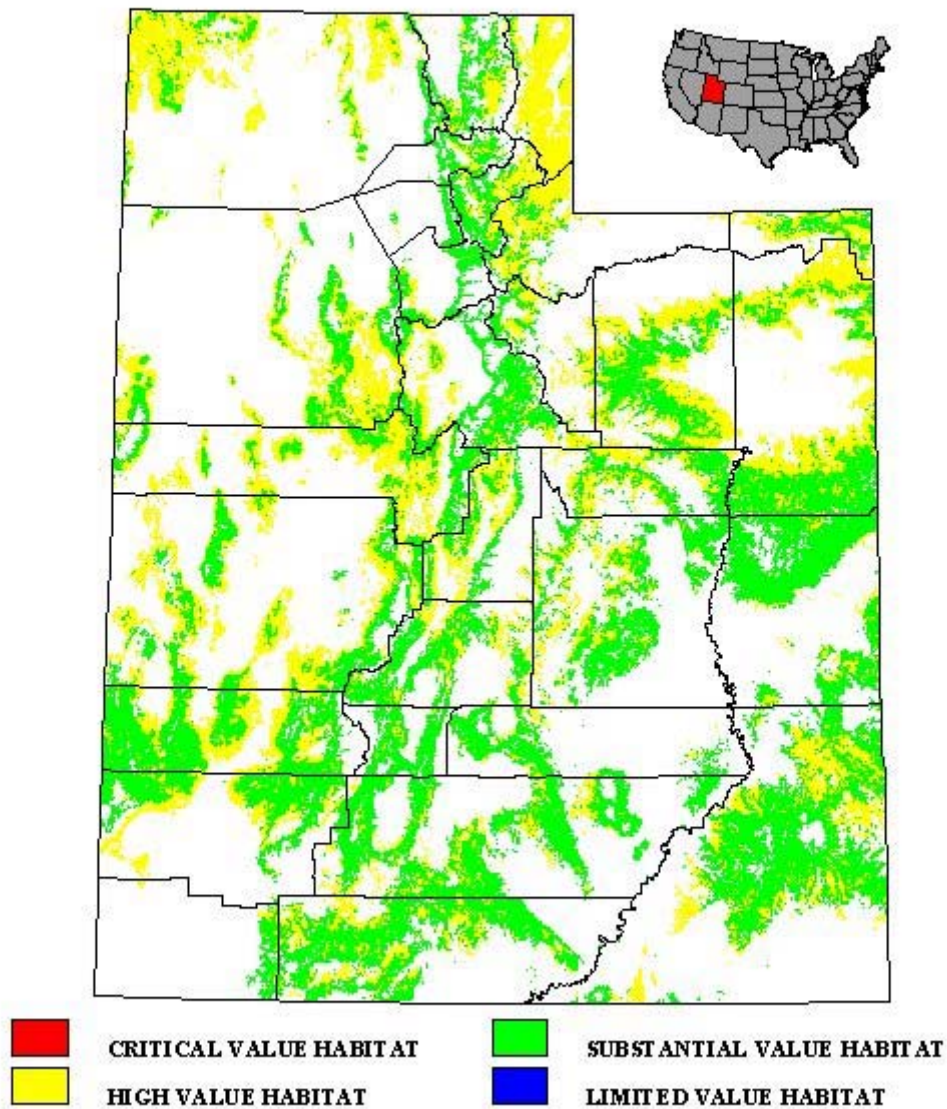
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APPENDICES

Appendix I: Map of Utah Potential Distribution of Chukar Partridge

UTAH GAP ANALYSIS - PREDICTED HABITAT Chukar



Appendix II: Utah Chukar Partridge Harvest Statistics

Statewide summary of Chukar Partridge harvest statistics, 1958-2001.

Year	Total Hunters	Total Harvest	Hunter-Days Afield	Chukars Per Hunter-Day	Chukars Per Hunter
1958	11,124	19,578	25,100	0.78	1.76
1959	11,154	8,700	26,364	0.33	0.78
1960	13,252	21,733	30,610	0.71	1.64
1961	14,046	20,821	35,675	0.58	1.48
1962	11,638	33,500	35,010	0.95	2.88
1963	14,532	42,806	40,824	1.05	2.95
1964	16,090	42,974	39,971	1.08	2.67
1965	16,431	35,335	45,067	0.78	2.15
1966	17,133	61,370	54,448	1.13	3.58
1967	17,485	48,906	50,671	0.97	2.80
1968	20,744	73,218	61,402	1.19	3.53
1969	22,529	80,917	71,674	1.13	3.59
1970	18,013	56,053	49,911	1.12	3.11
1971	17,917	61,151	55,378	1.10	3.41
1972	16,685	36,925	46,502	0.79	2.21
1973	13,888	48,135	50,677	0.95	3.47
1974	16,412	44,658	48,856	0.91	2.72
1975	16,156	41,151	51,083	0.81	2.57
1976	14,171	43,726	47,143	0.93	3.09
1977	12,691	34,155	38,873	0.88	2.69
1978	16,291	65,747	54,239	1.21	4.04
1979	15,210	51,918	42,254	1.23	3.41
1980	15,100	51,511	47,778	1.08	3.41
1981	12,907	44,983	36,662	1.23	3.49
1982	11,326	24,460	32,691	0.75	2.16
1983	10,418	29,649	31,904	0.93	2.85
1984	9,846	20,179	30,715	0.66	2.05
1985	7,930	20,938	24,346	0.86	2.64
1986	9,397	25,346	31,672	0.80	2.70
1987	11,276	32,848	39,099	0.84	2.91
1988	11,237	32,057	40,088	0.80	2.85
1989	10,910	27,628	40,384	0.68	2.53
1990	11,195	26,486	38,463	0.69	2.37
1991	10,577	24,355	34,010	0.72	2.30
1992	11,125	28,599	37,463	0.76	2.57
1993	10,128	18,774	34,147	0.55	1.85
1994	8,455	18,721	28,389	0.66	2.21
1995	9,097	20,954	31,140	0.67	2.30
1996	10,197	26,594	37,116	0.72	2.61
1997	9,665	23,840	34,711	0.69	2.47
1998	9,283	36,013	33,082	1.09	3.88
1999	14,388	64,727	53,842	1.20	4.50
2000	14,056	36,460	45,097	0.81	2.59
2001	8,043	22,944	29,032	0.79	2.85
Totals (1958-2001)	580,148	1,631,543	1,793,563	--	--
Averages (1958-2000)	13,305	37,409	41,036	0.88	2.74