UTAH BLACK BEAR MANAGEMENT PLAN
V. 2.0
2011-2023

Utah Black Bear Advisory Committee

DWR Publication 11-01

Utah Division of Wildlife Resources
1594 West North Temple
Salt Lake City, Utah 84114

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Plan Goal

Maintain a healthy bear population in existing occupied habitat and expand distribution while considering human safety, economic concerns, and other wildlife species.

Definition: A "healthy" bear population is one that has a proportion of breeding age animals that will maintain population levels consistent with habitat, and that maintains genetic variability.

Introduction

The purpose of the Utah Black Bear Management Plan is to provide direction for management of black bear (*Ursus americanus*) in Utah. This purpose is in accordance with the mission statement of the Utah Division of Wildlife Resources (UDWR). The mission of UDWR is:

To serve the people of Utah as trustee and guardian of the state's wildlife

The Utah Black Bear Management Plan will direct black bear management statewide for a period of twelve years (2011-2023). Over the life of the plan, four three-year harvest recommendation cycles will be presented to the Utah Wildlife Board for approval. In 2017, six years after the plan has been adopted, an evaluation of key objectives will occur, primarily those associated with the population management system. During 2023, this document will be reviewed, management progress will be evaluated and an updated management plan will be written and presented to the Utah Wildlife Board for approval.

Background

In 1999, the UDWR Director appointed an ad hoc committee, which became known as the Black Bear Discussion Group, to address concerns with black bear management and develop Utah's first black bear management plan. This group contained citizen representatives of sportsmen and animal protection groups, researchers, livestock operators, and representatives from Federal and State agencies. In 2010 the Division revised the Utah Black Bear Management Plan using a similar process.

Resources assembled by the Black Bear Discussion Group in formation of Utah's first Black Bear Management Plan have been utilized and updated in this document (UDWR 2000).

Natural History

The range of the American black bear historically included all the forested areas of the continent from Alaska to the northern states of Mexico and from California, east to Florida and the Canadian provinces of Newfoundland and Nova Scotia. Today, while reduced, the range of black bear still includes all or parts of 38 states, 11 Canadian provinces, and 7 Mexican states. In Utah, the black bear is present in much of the forested habitat. The Deep Creek Mountains, Pilot Range, Henry Mountains, and Raft River Mountains are notable exceptions (Figure 1).

The black bear is secretive, long lived, and has a low annual reproduction rate compared to other large North American wildlife species. Based on harvest levels, Utah may have the smallest bear population of all the western states, except Nevada. Data from Utah during the past twenty years suggests a growing population that may have stabilized in recent years.

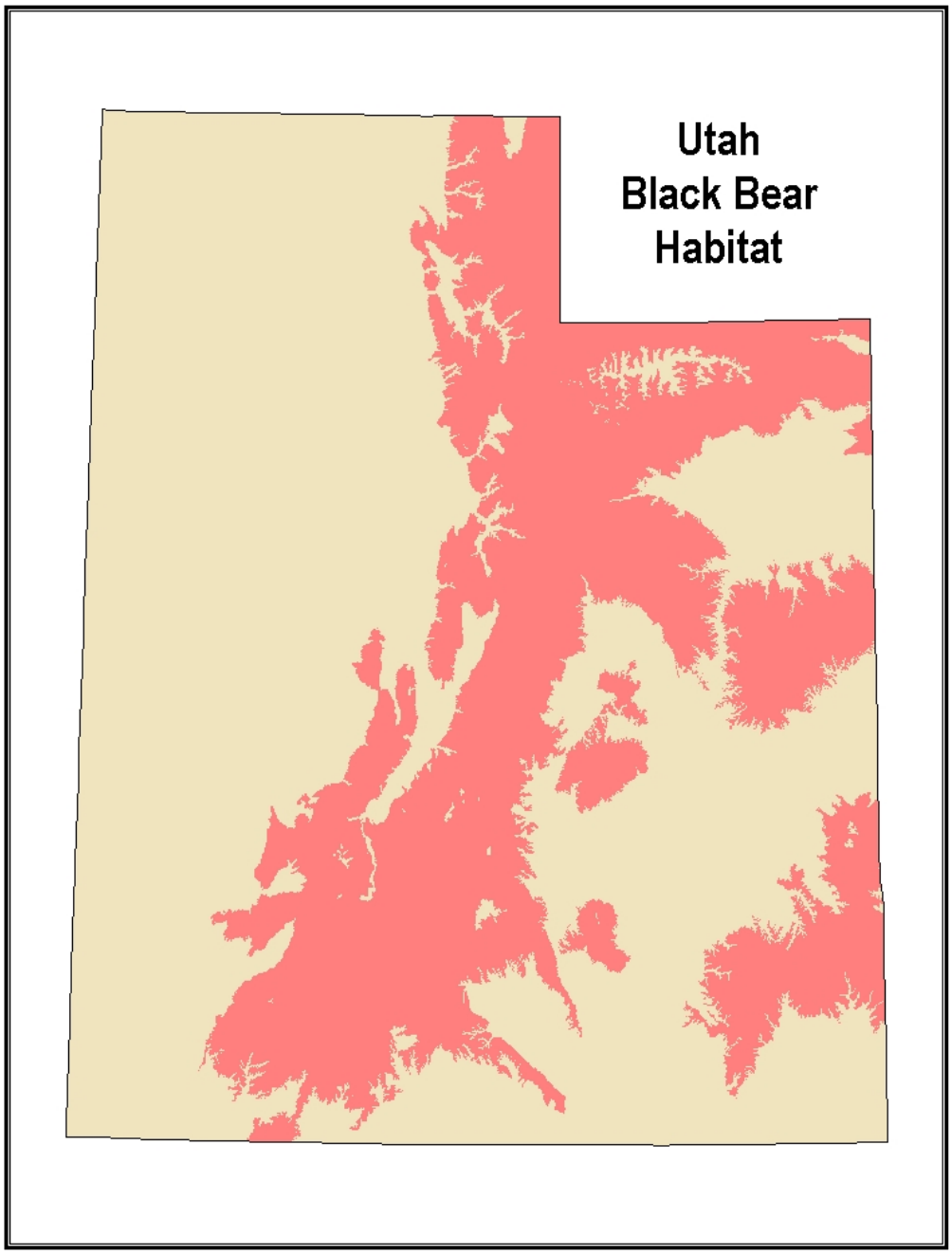
Description

In the mountain west most black bears have brown to dark chocolate pelage while a few are black. In the East they are generally black except for the frequent presence of a white triangle on the upper chest, and brown muzzles. Bears from the west tend to have lighter muzzles, and some individuals are blonde. In Utah, the white chest patch is infrequent. The dark brown pelage may appear black, especially in low light conditions.

The weight of black bears varies. A male black bear that weighed 816 lbs was recorded in Minnesota in 1991. A female in Pennsylvania weighed 454 lbs. However, the mature western black bear male will typically be 250 - 300 lbs and the female 150-180 lbs in mid summer. These weights vary depending on season, age, and food supply. An Idaho study (Beecham and Rohlman 1994) showed a weight difference between male and female bears of all ages of 77 lbs (n=132). A Colorado study (Beck 1991) of a limited number of bears showed mean summer weights of 280 lbs for males and 167 lbs for females. In Utah, large males in summer may weigh over 300 lbs and adult females 130 - 150 lbs.

Black bears have a compact body with stout legs, especially the forearms, and feet. They have recurved claws, a straight facial profile and no shoulder hump. Mature males are about 60 in long while mature females are about 50 in. After about 7 years, growth slows. The length measurements from the Colorado study showed greater lengths than Idaho in both males and females. Some differences in measurement techniques could account for part of the difference but the heavier weights from Colorado suggest that the Colorado bears may genetically be slightly larger or have access to better food supplies. Weights and lengths from ongoing studies in Utah are comparable to Colorado. Black bears have a keen sense of smell and stand on their hind legs to aid in seeing and smelling. They are strong swimmers.

Figure 1. Distribution of black bear habitat in Utah, represented by dark (red) area on map.



In the west, black bears of both sexes occasionally live in excess of 20 years of age. Study animals, as well as harvested animals, have exceeded 20 years in Utah. In hunted

Idaho populations the males averaged several years younger than the females (Beecham and Rohlman 1994). Hunter selectivity for larger bears coupled with the male bears larger range make them more likely to be taken.

Reproductive Biology

Black bears tend to be solitary, except for females with cubs, and during the breeding season of June and July. After fertilization, the egg remains free and unattached in the uterus until implantation in late fall. Birth occurs in late January or early February. The cubs are born with eyes closed and weigh 8 to 12 oz. In the Intermountain west, age at first reproduction is typically 4.5 years. Males are sexually mature at 3.5 to 4.5 but don't reach physical maturity until age 7.5. Occasionally, first litters occur at 3.5 or as late as 7.5 years. Litter sizes may increase with the age of the female but two cubs are most common. Poor food crops may result in females skipping a year or more between cub production. While the average is 2 cubs per litter, litter sizes range from 1 to 4. Typically, litters are produced every other year (Beck 1991). The sex ratio of cubs is either 1:1 or slightly male biased. Cub mortality is higher in the west with Utah fitting the pattern at 45 to 50% (Beecham and Rohlman 1994; Tolman and Black 1998). The average annual litter frequency (number of litters for all females in a population) for a typical western population is 16 to 18% (Beecham and Rohlman 1994) and may vary significantly year to year. Cubs stay with the females for 16 to18 months after birth. Family groups break up in late spring prior to the breeding season. Causes of cub mortality are starvation, predation, and a variety of other causes of unknown significance. Yearlings and subadults have a survival rate as high as 90% depending largely on the level of human caused mortality, primarily hunting, and removal for depredation and nuisance activity.

Predation

As omnivores, black bears use a wide variety of foods, changing diets seasonally based on availability (Beck 1991, Kolenosky and Strathearn 1987) and typically do not obtain much of their food through predation. Rogers (1987) found that fruits, nuts, and insects were the foods most important to fall fattening and reproductive success. A study in Idaho (Beecham and Rohlman 1994) revealed that typically less than 2% of the diet is mammals. Black bear research in Utah (Richardson 1991, Bates 1991, Bunnell 1999, Black 2004) has found that vegetative matter is the most important item in their diet, followed by mast, insects and animal matter. Ogborn (1990) documented the importance of ants in the diet.

In the La Sal Mountains, Richardson (1991) found that animal matter was present in 2.3% of 859 bear scats. It was most important as a food item in summer and fall. Mule deer (*Odocelius hemionus*) remains were the most common mammal, occurring in 9 scats, or 1.1% of all scats. Other mammal remains included black bear (mostly from grooming), domestic cattle, rock squirrel, *Microtus sp*., cottontail rabbits, deer mouse,

least chipmunk, jumping mouse, domestic sheep, and pocket gopher. Bone size and teeth of deer remains indicated that both adults and fawns were eaten. The presence of maggots in the scats indicated that cattle could have been fed upon as carrion. Bird remains were found in 2.1% of the scats analyzed.

LeCount (1986) reported that there are three different ways that black bears obtain animal matter as food: 1) predation, where the bear kills a healthy animal; 2) pseudo-predation, where a bear kills an animal that is sick or otherwise stressed and would have died anyway; and 3) scavenging, where death comes from other causes.

Black bear predation on young deer, moose (*Alecs alecs*), caribou (*Rangifer tarandus*), and elk (*Cervus elaphus*) has been reported in several studies (Kolenosky and Strathearn 1987, Franzmann et al. 1980). Smith (1983) radio-collared 54 newborn mule deer fawns on the La Sal Mountains. He found that fawn survival was 54% during the first month of life. Of the 22 fawns that died, predation was the cause of death for 16 (73%). Coyote (*Canis latrans*) and black bear predation accounted for most of these deaths, although he did not indicate how many were taken by which species. One was taken by a cougar. With a peak fawning date of 24 June, all bear predation had ceased by 24 July. Coyote predation continued past 18 August. While most black bear predation consists of newborn animals their first month of life, Bates (1991), Richardson (1991), and Bunnell (1999) reported limited black bear predation on adult deer in Utah.

Projar (2004) in a three-year mule deer fawn survival study in west-central Colorado attributed 4% of the fawn mortality to bears. Likewise, Lomas (2007) in a similar study in north-central New Mexico reported 3% of the mule deer fawn mortality was due to black bear predation.

At times, black bears are effective predators on domestic livestock. In Utah, from 1992 to 1999 and 2000 to 2009, an average of 373 and 516 livestock kills, respectively, by bears were confirmed annually. Almost 97% of all livestock kills were domestic sheep. Bears typically attack sheep herds after dark when sheep are bedded for the night. The majority of sheep predation occurs in June, July and August. Lambs accounted for 58%, and ewes 39% of black bear kills, respectively. The average number of livestock taken in a single predation incident was 6. In an apparent rare event in eastern Utah, a nine year old adult female bear killed three 150-200 lbs calves over a nine day period. This radio-collared female had not exhibited this pattern of behavior in the five previous years when her behavior was monitored (Bunnell 1999).

While black bears on occasion act as predators, they are also preyed upon. Rogers (1987) reported that nine wolves killed a female bear and her cub in a den. Cub mortality due to predation was less than 12% in years of good nutrition. Richardson (1991) found two cases of black bear cannibalism in southeastern Utah. A radio-collared two-year old female was eaten by another bear, while another yearling female was apparently eaten by the adult female while in the den.

Most researchers indicate that black bears are poor predators. As omnivores, they have not evolved behaviors found in cooperative hunters (Rogers 1987). Their bulky, heavy bodies lack the agility needed for effective predation. Legs are adapted for climbing, turning rocks and tearing apart logs and stumps, rather than speed. Most mammals, both large and small, are generally too fast for bears to catch (Kolenosky and Strathearn 1987). A bear's distance vision is poorly developed. These limitations prevent black bears from taking most prey, other than newborns or other animals whose escape is hampered by behavior, injuries, disease or deep snow.

Denning

Denning and hibernation in black bears is an evolved means of dealing safely with a winter food shortage. It also offers a protected situation for females to give birth to and raise young cubs. The choice of den location, size, and type are affected by topography and ease of construction. Concealment appears to be a higher priority than avoiding thermal loss. Where large trees are available they are generally selected, and the dens are dug into the tree or in the root system. The other options are ground dens which are excavated into a brushy hillside, or dens in rocky areas where rock provides a part of the den structure. In Utah, dens are predominately rock related (Tohlman and Black 1998). Females select sites that are at a slightly higher elevation than males in a given area. Few dens are reused from year to year but a yearling female may use a den previously used by the adult female. Availability of acceptable den sites is not likely to limit bear densities.

Beck (1991) noted that at least some bears made periodic movements to den-sites in the summer to prepare them with a lining of green vegetation. He also suggested that the primary function of the den is to provide protection from predators rather than weather. Both wolves (Pacquet and Carbyn 1986) and grizzly bears (Ross et al. 1988) have been observed killing black bears in winter dens.

Females tend to enter dens earlier, and exit dens later than males (Beecham 1980, Beck 1991). The onset of denning may be delayed by two to three weeks if plentiful food is still available from late mast crops. In the Intermountain West, denning occurs in October and November. Female denning typically peaks in late October while male denning peaks in mid-November. The dens are left in April and May. The timing is affected slightly by elevation of the den and aspect with the higher dens being left later. Beck (1991) noted females exited dens about 14 days later than males. The peak of den abandonment for males is late April and the peak for females is mid May.

Home Range

Black bears are generally active early and late in the day. In areas of human activity they tend toward being more nocturnal. Several may be found in areas where food is concentrated, but otherwise are solitary. Black bear home range size varies widely

depending on sex of the bear and quality of habitat. Adult males may have a home range 5 times that of an adult female. Female ranges overlap other females, particularly their offspring. With their much greater range, the males have up to 100% overlap with other males and their territories will include several females. This range overlap helps assure breeding of all the females. Subadult males that are searching for a home range may temporarily share territory with adult males and females. The resulting density of bears varies widely depending on habitat quality. Home range varies from .15 bears per square mile in an Arizona study area to 1.7 bears per square per square mile in three disjunct areas in Virginia (Beck 1991). For the western states the average is around 0.8 bears per square mile. In a low density population in northern Utah, Pederson et al, (2010) found .03 bears per square mile.

Habitat

Pelton (1982) characterized black bear habitat throughout its range as having "relatively inaccessible terrain, thick understory vegetation, and abundant sources of food in the form of shrub or tree-borne soft or hard mast (fruit and nuts)". He summarized black bear food habits as "primarily grasses, forbs and insects in spring, soft mast in the form of shrub and tree-borne fruit in summer, and a mixture of soft and hard mast in fall". The spatial arrangement, abundance, and dependability of seasonally important food sources may explain much of the variation in black bear density, fecundity, home range size, and seasonal habitat use throughout the range of the species.

Western North America Perspective

The following is a review of information relating to black bear habitat, obtained largely from studies in Utah and other western states and provinces.

Food Habits

Understanding black bear food habits may be the key to understanding bear-habitat use. Foods eaten by black bear throughout their distributional range reflect the omnivorous feeding habits of the species. The spring diet consists primarily of grasses and forbs. The summer diet also includes grasses and forbs but includes increasingly more fruits as the season progresses. The fall diet consists primarily of a mixture of soft mast (fruits) and hard mast (nuts of deciduous and evergreen trees). Animal matter, primarily insects and carrion, generally comprises a smaller portion of the diet.

Spring (April-June) black bear diets in southwestern Colorado consist largely of grasses and forbs in oakbrush and aspen stands (Beck 1991). Bears in central and southeastern Utah forage on grasses and forbs in aspen, aspen-conifer and mountain brush, as well as riparian areas and low elevation timbered canyon bottoms (Bates 1991, Richardson 1991).

Aspen buds are frequently observed in spring bear scats in southeastern Utah. Ants, carrion, rodents and ungulates provide spring dietary protein sources in the Utah studies (Ogborn 1990, Black 2004). Rodents, winter-killed and new-born mule deer comprise a portion of the spring diet in central Utah (Bates 1991). In two western state studies, neonatal mule deer fawn mortality attributed to black bear predation was less than 5% (Projar 2004, Lomas 2007).

Summer black bear diets consist of insects (primarily ants), grasses, forbs, and the flowers of some shrubs, until berries ripen. Fruits and flowers constitute the bear-food group highest in fats and carbohydrates (Richardson 1991). Larval ants are also high in fats and protein, and are sought by black bears in summer. Bears actively hunt ants when larvae occur close to the soil surface in response to warming temperatures (Bates 1991, Richardson 1991).

When available, berries are heavily used by bears during summer months. Although berries are eaten by bears prior to ripening (Tisch 1961), most use occurs after fruits ripen.

In Utah, areas likely to produce abundant berries include canyon bottoms with perennial water, where species such as elderberry (*Sambucus spp*.), currants (*Ribes spp*.), raspberries and thimbleberries (*Rubus spp*.) and others frequently occur. In the low to mid-elevation mountain brush types, species such as squawapple (*Peraphyllum ramosissimum*), serviceberry (*Amalanchier spp*.) and others (Table 1), ripen in mid-summer and can provide an abundant source of food. Berry producing shrubs found at higher elevations are most productive in aspen stands, riparian areas, timber cuts, and along the edges of conifer stands in central and southeastern Utah, and southwestern Colorado. Aspen, mountain brush and oakbrush are the primary habitats that supply summer forage for bears in the intermountain west (Beck 1991, Bates 1991, Richardson 1991).

Fall diets are comprised largely of berries and hard mast. Berries ripen first at lower elevations and somewhat later as elevation increases. Seasonal bear movements may reflect their tracking of ripening fruits (Amstrup and Beecham 1976). Chokecherry (*Prunus virginiana*), which tends to bloom and fruit later than other brush species at similar elevations, is used heavily when available in Utah, Idaho and Colorado (Amstrup and Beecham 1976, Beck 1991, Bates 1991, Richardson 1991).

Hard mast species consumed by bears in Utah include gambel oak acorns (*Quercus gambelli*) and pinyon pine nuts (*Pinus edulis*). Fruits of these two species ripen somewhat later than the berry producing species (Table 1). Bears foraging at higher elevations, or in areas which do not contain oak, may make long movements to lower-elevation oakbrush communities in years when acorns are produced (Pelton 1982, Kellyhouse 1977, Beck 1991). Bears often remain in these areas until denning if mast is abundant. Bears feed heavily on hard and soft mast in the fall, prior to denning, and are physiologically capable of immense weight gains in a few weeks. Pinyon pine seed was reported as a bear food in the mountains of southeastern Utah, and the plateaus of the southern Dixie National Forest (Danvir et al. 1983). Bears may respond to abundant

pinyon nut crops as they do to abundant oak mast. Seeds of other pines, most notably whitebark pine (*Pinus albicaulis*) are used heavily when available in Montana (Tisch 1961). Limber pine seeds (*Pinus flexilis*) are also eaten in Montana, and may provide food for bears in Utah as well.

Factors influencing production of both hard and soft mast include temperature, light, moisture, soil nutrients, insect predators and disease (Shopmeyer 1974). Freezing temperatures during the flowering period and extreme dryness during spring and summer appear to significantly affect mast production. Either of these conditions may result in nearly complete crop failure. Although data concerning the frequency of catastrophic mast failures is lacking, interviews with commercial seed collectors and survey respondents estimated ten-year intervals between abundant acorn crops in portions of Utah (Danvir et al. 1983). Bates et al. (1991) observed oak mast failure in central Utah during all three years of their study. Beck (1991) and Richardson (1991) observed concentrations of bears in patches of abundant acorn production.

Table 1. Plant species used as food items by black bears in Utah.

Species	Flowering Dates	Fruit Ripening Dates	Interval (yrs.) Between Abundant Berry Crops	Habitat and Distribution Dates
Serviceberry (*Amalanchier* spp.)	May-June	July-Aug	1-5 yrs.	Common in arid areas, in canyons and foothills, 4000-8000 ft
Bearberry or Manzanita (*Arctostaphylos spp*.)	March-May	June-Aug	Annually	Dry-moist soils, usually grows in association with lodgepole or Ponderosa pine in Utah
Squawapple (*Peraphyllum ramosissimum*)	May-June	June-July	Annually	Dry foothills and mountain slopes, well-drained soils, 4000-9000 ft
Chokecherry (*Prunus virginiana*)	May-June	July-October	2-5 yrs.	Widely distributed, esp. abundant along streams and moist canyon bottoms 4500-8000 ft
Currant (*Ribes spp*.)	April-June	June-August	2-3 yrs.	Exposed slopes and ridges 4000-11,000 ft
Raspberry Thimbleberry (*Rubus spp*.)	May-July	July-Sept	Annually	Widely distributed, wooded and open slopes alike, 5000-11,000 ft
Elderberry (*Sambucus spp*.)	April-July	July-Sept	Annually	Commonly found along streams and canyon bottoms, moist soils, 5000-9500 ft
Buffaloberry (*Shepherdia spp*.)	April-June	June-August	1-4 yrs.	S. argentea found along streams and river bottoms 3000-7500 ft
Snowberry (*Symphoricarpos spp*.)	June-August	August-Oct	Annually	S.rotundifolia found on steep, rocky slopes, 5000-8000 ft S. longiflorus and S. rotundifolius found in rocky slopes, canyons and valleys 4000-10,000 ft S. orephilus an S. alba found on wooded mountain slopes, valleys and riverbanks 5500-10,000 ft
Whortleberry or huckleberry (*Vaccinium spp*.)	June-July	June-September	Annually *poor berry production	Largely restricted to Uinta Mountains, grows on forested slopes 7000-12,000 ft
Pinyon pine (*Pinus edulis*)	June	September	2-10 yrs.	Dry, rocky foothills and mesas, 5000 - 7000 ft
Gambel oak (*Quercus gambellii*)	February-May	August-Oct	5-10* yrs.	Widespread, 4000-8000 ft, central and southern Utah. Dominant tree on dry foothills and canyon walls, but best stands grow on moist, rich well-drained soils

Physical Characteristics of Bear Habitat in Utah

Elevation: In a survey of bear observations recorded by resource managers in Utah, eighty percent of bear survey observations occur between 7,000 ft and 10,000 ft (Danvir et al. 1983). About 12% occur between 4,600 ft and 6,988 ft and 8% occurred between 10,000 ft and 12,000 ft. The only geographic unit in which the elevational distribution of observations differed markedly from this trend was in the Bookcliffs east of Desolation Canyon where elevation rarely exceeds 8,000 ft. Bears were commonly observed below 7,000 ft in the eastern Bookcliffs.

Bears in central Utah use low elevation (7,102 ft) mountain brush in summer and higher elevation (7,152 ft) aspen and conifer in spring and fall (Bates 1991). Bears in southeastern Utah are similarly found in higher elevations spring and fall (8,727 to 8,858 ft) and lower elevations (8,202 to 8,530 ft) in summer (Richardson 1991).

In contrast, bears in southwest Colorado use low elevation oakbrush (8,202 to 8,530 ft) spring and fall, summering in higher elevation aspen communities (8,858 ft) (Beck 1991). Similar patterns of low elevation use in spring and fall, with higher elevation use in summer has been observed in Idaho (Amstrup and Beecham 1976, Reynolds and Beecham 1977).

Topography: Most observations of black bear occur in areas of marked topographic relief. Eighty-five percent of those who responded to a survey on Utah bear observations indicated that bears were generally found in areas with steep, rugged topography including mountain slopes, cliffs, escarpments, and canyons (Danvir et al. 1983). Forty-three percent stated bears were most frequently observed in and near canyons, regardless of elevation.

In studies performed in Idaho, Utah and Colorado, black bears predominantly used steeper, more rugged topography and made seasonal elevational movements in response to food resources (Amstrup and Beecham 1976, Bates 1991, Richardson 1991, Beck 1991). Bears in central Utah used progressively steeper slopes as the year progressed, whereas bears in southeastern Utah and southwestern Colorado made significant use of canyons.

Moisture: Although black bears obtain winter metabolic water from fat stored the prior fall, they require free water during the summer. Richardson (1991) found bears using areas closer to water in the fall and areas farthest from water in spring. Bates (1991) found bears, especially females, associated with creeks in spring and summer. Survey results (Danvir et al. 1983) indicated that bears in Utah most frequently occurred in areas containing moist soils and associated vegetation. Eighty percent of observations recorded in this survey fell within areas characterized by moist to wet soils. Forty-seven percent of observations were associated with perennial water, primarily streams in canyon bottoms. Soils within frequently used bear range are typically loamy soil associations on mountains and plateaus that receive sufficient precipitation to remain moist through all or part of the summer months. Precipitation level and soil characteristics largely dictate vegetative composition and availability of succulent forage. Vegetation types occurring on moist soils, such as riparian woodlands, wet meadows, mountain meadows and aspen

provide year-round bear foraging areas for grasses, forbs and soft mast (Jonkel and Cowan 1971, Kellyhouse 1977, Pelchat and Ruff 1983, Smith and LeCount 1983, Beck 1991).

Food shortages resulting from summer droughts may affect the manner in which bears use their range. Annual home range sizes can double when food is scarce (Pelchat and Ruff 1983, UDWR unpublished CMR data) Summer drought was believed to have resulted in the dispersal of black bear cubs and yearlings out of the Bookcliffs into lower elevation areas in September and October of 1976 (Fair 1977).

Vegetation: Interspersed oakbrush, mountain brush, aspen and conifer communities tend to be used year-round in Utah and southwestern Colorado (Danvir et al. 1983, Bates 1991, Richardson 1991, Beck 1991). Black bears in southern California prefer canyon oak habitats for food and cover year-round (Novick et al. 1981). In Alberta, aspen communities are considered to be the most important plant community for black bears (Pelchat and Ruff 1983), containing important food items and used year-round. Large contiguous stands of mature conifers, such as the dense lodgepole pine (*Pinus contorta*) stands on the Uinta Mountains, and high elevation spruce-fir stands (*Picea engelmanii-Abies lasiocarpa*) were generally felt by bear survey respondents to support low bear densities (Danvir et al. 1983). Most observations in extensive coniferous forests occurred in canyons, where the diversity and interspersion of vegetative types is generally greater. Jonkel and Cowan (1971) found black bears in Montana preferred spruce-fir communities to lodgepole pine and were generally associated with forest edges. Bears used all seral stages of the spruce-fir/pachystima association, except recent burns and clearcuts. Barnes and Bray (1967) estimated bear density to be greater (1.4 bear/mi ^{2}) in a spruce, fir, whitebark pine, aspen and meadow interspersion than in monotypic lodgepole pine (1 bear/ 20 mi.^{2}). Bears in central and southeastern Utah preferred mesic, north-slope conifer patches and 'stringers' as resting areas year-round (Bates 1991, Richardson 1991).

Most bear survey observations in pinyon-juniper woodlands were reported from the Bookcliffs, La Sal Mountains, and Abajo Mountains, where mast-producing mountain brush species intermix along mesa rims and in canyon bottoms (Danvir et al. 1983). Richardson (1991) noted use of pinyon-juniper primarily by adult male bears in late fall. There appears to be little black bear occurrence above timberline or in sage-steppe. Infrequent use of these types, particularly by females with cubs, may be due to lack of security cover. Both black and grizzly bears are believed to have evolved from a common forest-dwelling eurasian ancestor (Ursus etruscus) (Herrero 1972). Ancestral grizzly bears evolved to an open-ground dwelling species, where aggressive behavior became the principal means of protection from other predators. Black bears continued to evolve in woodland habitats, therefore tree-climbing behavior offered protection (Herrero 1972). Climbable trees or shrubs provide security to black bears, particularly females with young. While male bears will utilize sparser Arizona chapparal, females with young remain in denser stands of riparian woodland or shrub oak, presumably for security as well as forage advantages (Smith and LeCount 1983). LeCount et al. (1984), Bates (1991) and Richardson (1991) found black bears preferred shrub dominated feeding sites having dense horizontal cover. Bears in southeastern Utah selected areas of dense cover

within all vegetation types, and by all sex and age classes, especially females with cubs (Richardson 1991).

High interspersion of preferred habitat types (such as aspen, conifer and brush patches) may improve bear-habitat quality. Richardson (1991) found bears and bear foods more common along patch edges in summer. Jonkel and Cowan (1971), Lindzey and Meslow (1977) and Bates (1991) similarly found bears associated with edges.

Females with cubs, as a group, tended to select areas having a rich diversity of plant species, a high interspersion of plant communities, proximity to water, hiding and climbing (escape) cover, and areas removed from roads (Bates 1991, Richardson 1991). Females used high elevations more than expected (Richardson 1991). Females utilized steeper, moister, higher elevation, more species-rich sites than did male bears.

Accessibility: Most survey respondents (85%) indicated that black bear observations generally occur in rugged canyons, on plateaus and mesa rims, and steep mountainous areas which are not accessible by vehicle and with little human use (Danvir et al. 1983). Black bears avoided roads in summer and fall in an Idaho study (Young and Beecham 1983). Bates (1991) noted that female bears avoided roads during spring. Bears of both sexes avoided roads and trails in fall. Young (1995), however, noted significant use of roads by bears in the Bookcliffs, and in fact used tracks on roads as an abundance index. Females tended to den in areas removed from human activity, and remain in these areas during spring. The apparent association of bears with canyons and similar steep, rugged topography may be related to several factors. Bears studied in mountainous terrain exhibited seasonal elevation shifts dictated by the abundance and phenological development of forage species (Amstrup and Beecham 1976, Bates 1991). Within the elevation range that most bear observations occur, a wide range of topographic relief results in a greater interspersion of aspen, mixed conifer, and mountain brush. Bears may be able to obtain seasonally abundant foods within smaller home ranges in areas characterized by canyons than in terrain with less topographic relief. Areas with less relief may necessitate longer movements by bears to obtain seasonally abundant foods. Canyons and escarpments may serve as security cover as well as allowing bears to travel through areas which are otherwise heavily used by humans.

Denning habitat: Bears in Idaho, Arizona, California, Colorado and Utah primarily den in excavated or naturally occurring chambers in hillsides, under rocks, trees or shrubs (Beecham 1980, LeCount 1980, Novick et al. 1981, Beck 1991, Black 2004.) Bears in southwestern Colorado denned in all elevations and plant communities (Beck 1991). Bears in central and southeastern Utah generally denned at higher elevations in aspen or coniferous habitats (Bates 1991, Richardson 1991). Den sites are often located on steeper slopes, in areas of minimal human disturbance (Novick et al. 1981, Bates et al 1991, Beck 1991).

Relationship between food, seasonal movements and home range size: Resident black bears apparently make short-term exploratory excursions into ‘new’ territory periodically throughout the non-denning period (Amstrup and Beecham 1976, Pelchat and Ruff 1983, Beck 1991). These activities allow bears to discover changes in food availability and distribution through time. Studies in the mountainous portions of Idaho, Utah and

Colorado (Amstrup and Beecham 1976, Reynolds and Beecham 1977, Bates 1991, Richardson 1991, Beck 1991) describe predictable, seasonal movements (in elevation and between vegetation types) in response to vegetation growth, flowering and fruiting of preferred bear foods. Rather long excursions to abundant, but patchy, chokecherry and oak mast crops have been observed in the Idaho, Utah and Colorado. Tolerance of other bears apparently increases at abundant food sources. Richardson (1991) observed 9 telemetered bears feeding in a 7.4 acre patch of acorn-rich Gambel's oak. Beck (1991) observed annual migrations of bears from summer ranges lacking oakbrush into areas with abundant mast. These bears commonly moved distances of 9-25 mi to feed for several weeks prior to denning. Beck (1991) describes bears residing in a 193-386 mi^2 area concentrating in a single 10 mi^2 oakbrush stand each fall. Pelchat and Ruff (1983) saw similar 17 mi movements by bears to preferred seasonally abundant foods.

Lindzey et al. (1983) found that home range size of black bears in coastal Washington (coniferous forest) is influenced by food availability resulting from successional changes following logging. Bears selected more recently logged areas where berry producing shrubs (and berries) were most abundant. Home range sizes were smaller, and bear density greater, in more recently logged habitat dominated by early seral stages.

Relationship between food, fecundity and bear density: Studies in forested habitats suggest that food supply influences bear fecundity and density. Lindzey et al. (1983) noted a rapid population increase and high cub production following a period of logging on an island in coastal Washington. Bear density and cub production declined as preferred bear food plants were replaced by coniferous trees. Rogers (1987) determined that the principal non-hunting factor limiting bear density was starvation of cubs and yearlings, and nutrition-related reproductive failure of adult female bears. Research from Montana (Jonkel and Cowan 1971) and Colorado (Beck 1991) suggest that fall food availability influences fall bear condition (weight) and subsequent cub production. Cub production in the Bookcliffs similarly appears to be dependent on prior-year food availability and body condition of breeding-age females (Black 2004).

Management of Black Bear Habitat

Management of plants and plant communities involves using human creativity in the application and manipulation of the following "tools" and processes; succession, fire, rest, grazing (herbivory), animal impact and technology, to achieve desired conditions (Heady 1975, Savory 1988, Augustine and McNaughton 1998). Successful management of black bear habitat requires sound vegetation management, management of access and behavior of recreationists in "bear country", and maintaining connectivity between seasonally important large blocks and patches of habitat.

Forest management: Forested habitats supply escape and resting cover, food, and denning habitat to black bears. Aspen stands are probably the most important forest community in Utah, providing both cover and food. Aspen communities can provide abundant herbaceous forage, berry production and animal matter (insects and ungulates) for bears. Coniferous forests appear to have high cover values, but lower food value. Successional replacement of aspen stands by conifers can significantly reduce bear-food production in aspen communities. Both fire and selective logging of conifers can be used to maintain aspen vigor.

In portions of the state where conifer stands are uncommon, large-scale logging may be detrimental to bears (Bates 1991). Since black bear foods are often abundant on forest edges, selective cuts appear to be preferable to clear cutting of timber (Young and Beecham 1983, Hugie 1983). Small-scale openings in timbered habitats, providing early seral shrub-borne mast and herbaceous forage in close proximity to cover, can be beneficial (Lindzey and Meslow 1977, Young and Beecham 1983, Hugie 1983). Hugie (1983) found bears preferred abandoned roads and small clearings having early seral stage growth, but avoided clearcuts greater than 15 ac in size. Young and Beecham (1983) found bears used shrub fields resulting from selective cuts more than expected in spring and summer, but avoided clearcut areas all seasons.

Mountain shrub communities containing oak, chokecherry and other mast-producing species should be managed to avoid successional shifts to pinyon-juniper monocultures. Fire, selective cutting and mechanical treatements can all be used to retard succession to pinyon-juniper. Dependable mast-producing areas should be identified and managed for taller, older-age shrubs to maintain fruit production despite browsing by wild and domestic ungulates. While many mast-producing shrub species will vigorously resprout and produce fruit following winter defoliation by ungulates, excessive growing season utilization can significantly reduce both foliage and fruit production (Willard and McKell 1978, Kay 1995). Animal density of both wild and domestic herbivores should be managed to maintain diversity and vigor of both woody and herbaceous vegetation in all seasonally important vegetation types. Season-long livestock grazing can have negative impacts on both woody and herbaceous vegetation. Season long grazing may reduce seasonal bear food availability and increase the likelihood of predation. Jorgenson (1980) found bears and sheep competed spatially and temporally for food and space when grasses and forbs were limited, resulting in depredation, dead sheep, and dead bears. Conversely, livestock grazing can be used to reduce herbaceous competition, reduce suckering and promote apical dominance and seed production in shrubs (Urness 1990). Herded livestock, which are moved across the landscape, can maintain herbaceous plant diversity and vigor, and may reduce opportunities for predation.

Recreation management: Minimizing road density, human habitation and human access in high quality bear-habitat should reduce human contact with bears. Minimizing contact should increase longevity of breeding female bears, since they tend to utilize smaller ranges in less accessible areas when possible (Bates 1991, Beck 1991).

Graber and White (1983) noted that black bears in the coniferous forests of Yosemite spend a disproportionate amount of time near people and their high quality concentrated foods. Bear diets are generally high in carbohydrates and lacking in fats and protein.

Consequently, bears seek out not only animal matter, but also human foods and garbage at campsites (Pelton 1982). Bears feeding on protein-rich sources (like contents of campground dumpsters) show significant weight gains (Rogers 1976). Augmenting bear habitat with human food-sources can result in increased size, fecundity and density of black bears (Herrero 1980). Since bears are extremely curious and learn quickly, it is important to avoid introducing these high quality food sources into bear habitat. Once bears become successful at exploiting human food-sources, they will continue to do so. With increased recreational demand in Utah's forested lands, education and enforcement of rules designed to minimize bear-access to human food-sources is essential in order to have both recreation and viable bear populations in bear country.

Landscape management: Successful bear management requires maintaining an adequate density of breeding females in high quality bear habitat. High quality bear habitat in Utah may be characterized as large interconnected blocks of land exhibiting high interspersion of aspen, mountain brush and coniferous plant communities with a healthy herbaceous and shrubby component; well connected movement corridors between seasonal food sources and less accessible areas with variable topography. This requires management and planning at multiple scales, i.e. managing for healthy plants at the patch level, and managing at scales large enough to allow movement between blocks of important habitat. Connecting seasonal food sources maintains bear-condition, production and density; connecting habitat blocks maintains genetic diversity.

Utah Bear Harvest and Mortality

The black bear has been a protected species in Utah since 1967, when a group of sportsmen petitioned the Utah State Legislature to protect both cougar (*Puma concolor*) and bear. Management methods have evolved since then, from unlimited permits with a spring and fall season from 1967 to 1989, to a limited entry spring and fall hunt from 1990 to 1992, a limited entry fall only hunt from 1993 to 2000, a limited entry fall and experimental spring hunt from 2001 to 2005 and then a limited entry statewide spring and fall hunt from 2006 to 2010.

Black bear harvest and mortality statistics in Utah have been collected since 1967 (Table 2). Since 1969, the number of permits sold has been as low as 43 (1969) and as high as 687 (1989). The lowest number of hunters afield was 31 in 1969, and in 1989 the highest was 556. Success has been as high as 58% (1969) and as low as 6% (1970). The lowest number of bears harvested was 9 in 1970, and the highest 150 in 2009. Since 1969 there has been an average of 220 permits sold, 178 hunters afield, 51 bears harvested and 25% hunter success rate. The long-term average of bear per hunter was 0.24. Percent female in the harvest has ranged from 18% to 51% with a long-term average of 33%. Depredation and other mortality has been as low as 0 (1973) and as high as 78 (2002 &

Table 2. Black Bear Harvest/Mortality Statistics in Utah, 1967 through 2009

Year	Permits Sold	Hunters Afield	Hunting Harvest	Percent Success	Bear/ Hunter	Percent Females	Depredation and other mortality	Total Bear Mortality	Pursuit Permits
1967			15				12	27	
1968			12				9	21	
1969	43	31	25	58.1%	0.81		27	52	
1970	155	119	9	5.8%	0.08		18	27	
1971	59	48	17	28.8%	0.35		16	33	
1972	96	77	19	19.8%	0.25		7	26	
1973	125	114	25	20.0%	0.22		0	25	
1974	134	117	29	21.6%	0.25		9	38	
1975	161	144	22	13.7%	0.15	41%	2	24	161
1976	107	96	10	9.3%	0.10	42%	7	17	48
1977	149	127	26	17.4%	0.20	33%	6	32	77
1978	222	185	40	18.0%	0.22	33%	10	50	114
1979	240	196	26	10.8%	0.13	19%	5	31	91
1980	217	177	26	12.0%	0.15	28%	6	32	95
1981	263	227	39	14.8%	0.17	30%	4	43	95
1982	229	188	38	16.6%	0.20	39%	6	44	93
1983	219	176	18	8.2%	0.10	44%	9	27	98
1984	217	184	26	12.0%	0.14	31%	6	32	33
1985	269	230	29	10.8%	0.13	27%	10	39	86
1986	332	302	72	21.7%	0.24	45%	6	78	90
1987	326	262	44	13.5%	0.17	35%	25	69	156
1988	491	394	69	14.1%	0.18	35%	28	97	173
1989	687	556	97	14.1%	0.17	30%	10	107	187
1990	142	119	22	15.5%	0.18	18%	16	38	355
1991	142	119	35	24.6%	0.29	23%	15	50	364
1992	142	124	32	22.5%	0.26	19%	25	57	524
1993	162	136	35	21.6%	0.26	51%	12	47	570
1994	168	153	42	25.0%	0.27	40%	20	62	552
1995	175	156	53	30.3%	0.34	34%	34	87	627
1996	181	174	68	37.6%	0.39	43%	35	103	630
1997	192	176	50	26.0%	0.28	44%	31	81	638
1998	202	181	46	22.8%	0.25	42%	42	88	635
1999	220	199	57	25.9%	0.29	30%	35	92	264
2000	214	194	75	35.0%	0.39	35%	72	147	285
2001	214		68	32.0%		37%	61	129	340
2002	232		83	36.0%		33%	78	161	359
2003	226		86	38.0%		31%	33	119	378
2004	240		105	47.0%		21%	61	166	373
2005	252		80	32.0%		23%	37	117	414
2006	242		86	36.0%		33%	43	129	353
2007	262		127	48.0%		28%	78	205	363
2008	318		134	44.0%		30%	31	165	391
2009	338		150	44.0%		31%	55	205	338
Total	9005		2172				1056	3228	10436
Average	220	178	51	25%	0.24	33%	25	75	298

2007). Total annual bear mortalities has been as low as 17 (1976) and as high as 205 (2007 & 2009)

Utah's black bear population appears to have increased since 1990, as indicated by a) a trend of increasing hunting harvests, coupled with sustained hunter success, b) a preponderance of young age classes in recent bear harvests, c) evidence of reproduction by research bears in the Book Cliffs during most of the period, d) increasing numbers of bear/livestock conflicts and rising numbers of bears killed in control efforts despite declining numbers of sheep on the State's open range and, e) increasing numbers of human-bear conflicts and rising numbers of bears trapped, moved and euthanized as a consequence. However, results of population reconstruction for Utah bears (reconstructing a minimum population to support the harvest age distribution) suggest the bear population from 2000 to 2006 may have stabilized.

Assessment

At the first meeting of the Black Bear Advisory Committee the following list of issues and concerns were reviewed from the previous plan and amended to reflect current opinions. In addition, regional wildlife managers and biologist listed their issues and concerns to be addressed by the advisory committee. Subsequent meetings focused on developing a plan goal, objectives, strategies and management system to address all the identified issues and concerns.

Issues and Concerns

<u>Outreach and Education</u>

- Human safety
- Need for public education
- Need for improved sex and age determination by hunters
- Lack of a tradition for utilization of the meat from harvested bears

<u>Habitat Management</u>

- Loss of habitat (need to manage)
- Need for monitoring habitat (food production)
- Effects of livestock grazing on bear densities
- Lack of enforcement on travel plans, campground rules, and grazing timing
- All suitable habitat not occupied, and areas of low density of bears
- Bear hunter impacts on roads

<u>Nuisance Management (Largely Policy Driven)</u>

- Nuisance bear management
- Coordination with land management agencies on nuisance bear

translocations
- Techniques for dealing with nuisance bears
- Collaboration with public land management agencies needs improvement

Livestock and Agricultural Depredation

- Impact on livestock operations (prevention, compensation)
- Need to learn more about bears in Utah (ecology, biology, behavior) in general and relative to livestock depredation
- Appropriateness of depredation control on public land
- Adequate funding for livestock damage compensation
- Impacts from bears on agricultural crops (primarily watermelons and bee hives).

Recreation

- Management of pursuit (numbers, timing, distribution, and permit prices)
- Summer pursuit issues including conflicts between user groups, affects on bears, and impacts on non-targeted wildlife (ungulate neonates)
- Collaboration with public land management agencies needs improvement
- Methods of hunting i.e. spot and stalk, baiting, hounding
- Timing of hunting (effects on bears, spring season, other game hunter conflicts)
- Maintain traditional hunting heritage and opportunity
- Conflicts between bear hunters and big game and turkey hunters
- Whether they should be hunted (pro & con)

Population Management

- Need to learn more about bears in Utah (ecology, biology, behavior) in general and relative to livestock depredation
- Improve reliable population measurement method(s)
- Protection of adequate breeding females
- Need to manage metapopulation (connecting corridors)
- Adequate funding for management
- Effects of livestock grazing on bear densities
- Concerns about individual bears as opposed to population management
- Assuring continued viability of species in Utah
- All suitable habitat not occupied, and areas of low density of bears
- Collaboration with public land management agencies needs improvement

Research

- Effects of harvest strategies on population structure and social dynamics
- Effects of hounding at various stages of bear life cycle
- Adequate funding for research
- Improve reliable population measurement method(s)
- Techniques to limit / manage human-bear conflicts
- Effects of bears on prey species

Goal, Objectives, Strategies and Management System

The Black Bear Advisory Committee developed the plan goal, objectives, strategies and management system to address identified issues and concerns. Following are the results. The plan goal is found at the beginning of this document. Elements from both Idaho and Wyoming Black Bear Management Plans were incorporated into the population management system (IDFG 1998, WGFD 2007).

Outreach and Education

Objective 1:

Increase awareness and appreciation within the general public for the role of bears in Utah's ecosystems by a minimum of 10% through 2023.

Strategy:

1. Pursue development and implementation of the new Wild Aware Utah (WAU) Program; an effort generated by the Conservation Outreach Section of the Division of Wildlife Resources.

Objective 2:

Reach and educate a minimum of 10% of the general public about bear safety by 2023.

Strategies:

1. Pursue development and implementation of the new WAU Program; an effort generated by the Conservation Outreach Section of the Division of Wildlife Resources.
2. Continue to coordinate / standardize bear safety information materials amongst state and federal agencies and others.

Objective 3:

Continue to educate all bear hunters on how to determine the age/sex of bears to increase harvest selectivity through 2023 and continue to educate Division employees tagging bears.

Strategies:

1. Obtain high quality digital images of bears for sex and age identification purposes.
2. Produce an online orientation course for bear hunters.
3. Evaluate the relative effectiveness of mandatory and voluntary education efforts

4. Publish and refine information about sex and age identification techniques in the Bear Guidebook.
5. Modify harvest reporting form to gather data on effectiveness of orientation course.
6. Survey unsuccessful bear hunters to gather data on effectiveness of orientation course.
7. Explore ways to reward hunters for selective harvest.
    a. bonus points
    b. reduced waiting period
8. Train Division employees responsible for tagging bears at least every other year.
9. Consider different color ear tags for male and female yearlings marked through the reproduction and survival study (denning) to provide an opportunity to improve sex identification in the field.
10. Investigate making collared females off-limits to harvest.

Objective 4:

Increase the utilization of bear meat from harvested bears by 10% through 2023.

Strategies:

1. Collect baseline hunter harvest meat utilization data by modifying the black bear mortality form to include a question about meat consumption.
2. Publish techniques on how to utilize bear meat on the UDWR web site and in the Black Bear Guidebook.
3. Encourage organizations (Utah Federation of Houndsmen, Guides and Outfitters, etc.) to publish techniques on how to utilize bear meat in their newsletters and promote consumption to clients and members.
4. Monitor hunter response concerning bear meat consumption from data collected on the black bear mortality form.
5. Explore ways to reward hunters for utilizing the meat.
6. Identify charities that will accept bear meat.

<u>Habitat Management</u>

Objective 1:

Seek to prevent the loss of occupied and suitable unoccupied bear habitat and to improve existing bear habitat through 2023.

Strategies:

1. Define crucial bear habitat and review and update the Division's statewide suitable bear habitat coverage map by 2014.
2. Evaluate the potential for currently unoccupied habitat and habitat with low bear densities to support bear reintroductions / augmentations while considering human safety, economic concerns, and other wildlife species.
3. Use the results of Strategies 1-2 and Black Bear Research Objective 1, Strategy 2 to identify target areas for habitat improvement projects that would benefit bears and other wildlife associated with aspen and hard and soft mast producing communities, through the Utah Watershed Restoration Initiative.
4. Provide recommendations to land management agencies on ways to improve bear habitat and when projects, plans and practices may negatively influence the quality and quantity of bear habitat.
5. Coordinate law enforcement efforts in support of land management agency travel plans targeted at reducing wildlife habitat impacts in accordance with existing MOUs.

Human-Bear Conflict Management

Objective 1:

Work to attain a minimum of a 25% reduction in the number of human-bear conflicts that resulted in the removal (lethal or nonlethal) of a bear through 2023.

Strategies:

1. Train existing Division employees involved in black bear nuisance management on the policy for handling black bear incidents (W5WLD-03). Review the policy by June 19, 2013.
2. Encourage land management agencies and other organizations (e.g. Boy Scouts, Girl Scouts…..) to train employees and volunteers regarding the prevention of human-bear conflicts.
3. Continue to monitor black bear incidents through reporting and database updates.
4. Evaluate and report progress by comparing the 2009-2011 three-year average removal rates to subsequent three-year periods (four over the life of the plan) at the black bear Regional Advisory Council and Wildlife Board meetings.
5. Continue to provide land management agencies and the general public with standardized bear literature, signs and placards to deliver a consistent message about how to safely recreate and live in bear country.

6. Encourage land management agencies and private campgrounds to provide bear proof storage containers and dumpsters (provide literature for designing bear proof containers).
7. Continue to develop and evaluate aversive conditioning techniques to discourage human-bear conflicts.
8. Coordinate with affected agencies when bear translocations are being considered as defined in Division policy (W5WLD-03).
9. Develop a GIS coverage map that identifies areas of high human / bear conflict to help focus preventative efforts by 2016.

Livestock and Agricultural Depredation

Objective 1:

Reduce the level of depredation on livestock by a minimum of 10% caused by bears.

Strategies:

1. Remove depredating bears by targeting offending individuals in accordance with the MOU with Wildlife Services. Track removal locations in support of Strategy 9.
2. Encourage land management agencies and livestock operators to utilize best management grazing practices to minimize bear depredation opportunities.
3. Encourage the implementation of nonlethal methods to reduce bear depredation on livestock such as:
    a. Use of herders
    b. Guard dogs (where potential for impacting other wildlife is low, e.g. deer fawns and elk calves)
    c. Moving animals away from conflict
4. Work to develop and test new non-lethal techniques and evaluate the effectiveness of existing non-lethal techniques.
5. Continue to compensate operators for livestock losses from confirmed bear depredation.
6. Work to improve the detection of livestock killed by bears.
7. Evaluate the effectiveness of spring bear hunt season extensions designed to shift mortality from depredation to sport harvest in units with high livestock losses from confirmed bear depredation.
8. Based on results of Strategy 7 either continue or discontinue spring bear hunt season extensions.
9. Develop a GIS coverage map that identifies areas of high livestock / bear conflict to help focus preventative efforts by 2016.
10. Evaluate the impacts of recreational pursuit (+ and -) on livestock depredation.

11. In areas with chronic livestock depredation coordinate a dialogue between the Division, the land management agency, Wildlife Services and the livestock producer focused on identifying / developing non-lethal ways to decrease depredation and the lethal removal of bears.

Objective 2:

Reduce the level of agricultural depredation by a minimum of 10% caused by bears.

Strategies:

1. Provide recommendations (e.g. electric fencing, guard dogs, aversive conditioning…..) to agricultural operators on ways to reduce or eliminate damage from depredating bears.
2. When damage becomes extensive and abatement techniques have proven ineffective consider removing offending animal using sportsmen or agency personnel.
3. Investigate a rule change that would allow commercial fruit producers, in areas that the Division identifies as having chronic depredation problems, to lethally remove bears that are found in the act of depredating on commercial fruit crops.
4. Develop a GIS coverage map that identifies areas of high agricultural / bear conflict to help focus preventative efforts by 2016.

Recreation

Objective 1:

Maintain the quality and quantity of black bear recreational opportunities, both consumptive and non consumptive through 2023.

Strategies:

1. Continue to offer a variety of black bear hunting opportunities, including hounding, baiting, pursuit and spot and stalk as management tools.
2. Review and modify as needed, the black bear baiting Certificate of Registration (COR) requirements (e.g. distance from developed campgrounds, type of bait, timing for bait removal, land management agency approval requirements, adherence to off road travel restrictions, etc……..).
    a. Require GPS coordinates to depict the location of a bait station beginning in 2011.

3. Increase watchable wildlife opportunities for the public by incorporating volunteers into statewide research projects where appropriate (e.g. collaring, denning, DNA population estimates, other research, etc….).
4. Implement bear harvest and pursuit strategies designed to reduce conflicts between other resource users (recreationists, bear and big game hunters) (e.g. hunting, pursuit, pack size, season dates).
5. Coordinate with land management agencies to implement land use restrictions designed to reduce conflicts between resource users.

Population Management

Objective 1:

Maintain a stable bear population while considering other wildlife population objectives, the level of human-bear conflict and source-sink population dynamics.

Performance Targets:

Performance Target	Light Harvest	Moderate Harvest	Liberal Harvest
Adult Male (≥5 yrs old) in the sport harvest category	>35%	25 – 35%	<25%
Female in the sport harvest category	<30%	30 – 40%	40 – 45%
Population Growth Rate (DNA study)	+10 to +20%*	-10 to +10%	-10 to -20%

*Only applies if units have been moved from liberal to light within the last 2 recommendation cycles.

Management System (Figure 2):

1. Select one of the following harvest strategies for bear management units at the beginning of each three-year recommendation cycle:

    a. Light Harvest Strategy

        i. ≤ 25% of the units statewide managed under this strategy.
        ii. Manage based on performance targets referenced in the harvest strategy.
        iii. Select limited entry permit system and apply at least 20% of the available permits on each (spring and fall) hunt.
        iv. Select regular or shortened season formats.
        v. Criterion used to select this strategy include providing opportunity to harvest adult male bears, a low level of human-bear conflict, low bear population in need of harvest protection or population is acting as source for adjoining bear management units.

vi. The Division will attempt to manage a maximum of 2 of the following units under this strategy during each 3-year recommendation cycle:
    1. San Juan
    2. LaSal
    3. Book Cliffs
    4. Boulder

b. Moderate Harvest Strategy

i. ≥ 50% of the units statewide managed under this strategy.
ii. Manage based on performance targets referenced in the harvest strategy.
iii. Select limited entry or quota system (quotas can be applied to either spring or fall hunts but not both) and apply at least 20% of the available permits on each (spring and fall) hunt. Quotas should not be used on units dominated by public land (risk of overshooting) or units with high levels of recreation. Other harvest methods such as spot and stalk should be explored.
    1. For the first three-year recommendation cycle, a maximum of three units statewide in the moderate and liberal harvest strategies may be managed under a quota system. The Division will attempt to test the quota system by having one as straight quota, one as split strategy (limited entry followed by quota) and one as a quota with a female sub quota.
iv. Select regular or extended season formats. Criteria used to select the extended season will be when Wildlife Services bear mortalities have exceeded sport harvest on the unit during two of a three-year recommendation cycle or a high level of human-bear conflict has occurred.
v. Criterion used to select this strategy includes moderate levels of human-bear conflict and a stable bear population.

c. Liberal Harvest Strategy

i. ≤ 25% of the units statewide managed under this strategy.
ii. Manage based on performance targets referenced in the harvest strategy.
iii. Select limited entry or quota system (quotas can be applied to both spring and fall hunts). Apply at least 20% of the available permits on each (spring and fall) hunt. Quotas should not be used on units dominated by public land (risk of overshooting) or units with high levels of recreation. Other harvest methods such as spot and stalk should be explored.

1. For the first three-year recommendation cycle, a maximum of three units statewide in the moderate and liberal harvest strategies may be managed under a quota system. The Division will attempt to test the quota system by having one as straight quota, one as split strategy (limited entry followed by quota) and one as a quota with a female sub quota.

iv. Select regular or extended season formats. Criteria used to select the extended season will be when Wildlife Services bear mortalities have exceeded sport harvest on the unit during two of the three-year recommendation cycle or a high level of human-bear conflict has occurred.

v. Criterion used to select this strategy includes high levels of human-bear conflict, an increasing bear population, source population (refuge) adjacent or within the unit, chronic livestock issues on private land or when Wildlife Services bear mortalities have exceed sport harvest on the unit during two of a three-year recommendation cycle or a high level of human-bear conflict has occurred.

2. Harvest variables (adult male ≥ 5 years and female in the sport harvest category) indentified in the performance targets at the bear management unit level over a three-year period will be evaluated as follows:

   a. When both variables are within the normal range, permits will be stabilized or adjusted upward or downward by ≤ 20% depending on the location within the range for the desired population level.
   b. When one variable is inside the normal range and one variable is outside the normal range, permits will be stabilized or adjusted upward or downward by ≤ 20% depending on the location within the range for the desired population level.
   c. When both variables are outside the normal range in opposite directions, permits will be stabilized or adjusted upward or downward by ≤ 20% depending on the location within the range for the desired population level.
   d. When both variables exceed the normal range in the same direction, permits will be adjusted upward or downward by 20 – 40%.
   e. When moving to a new harvest strategy at the end of a three-year recommendation cycle, permits will be adjusted upward or downward depending on the new management direction but not to exceed ±50%.
   f. When working with a small sample size (< 10 individuals) over the three-year period, decisions to adjust permits will be based on best professional judgment.

3. The statewide rollup of harvest variables (adult male ≥ 5 years and female in the sport harvest category) will not be outside the performance target ranges identified in the moderate harvest strategy. Additional adjustments at the unit level may be necessary to move variables within normal range during the following three-year recommendation cycle. This will be accomplished by adjusting permits an additional ± 10% at the unit level.

4. As funding allows, the bear population study (DNA hair snare study) will inform harvest recommendations as follows:

    a. The population growth rate performance targets are located in each respective harvest strategy. They are considered a supplemental metric to harvest data.
    b. Determine the harvest strategy identified for the bear management unit containing the reference site. For the first three-year recommendation cycle the Division will attempt to manage, at least one unit containing a reference site under the light harvest strategy and one under the liberal harvest strategy.
    c. If the population growth rate for the reference site is within the desired range for the selected harvest strategy (light, moderate and liberal) then no additional adjustment in permits.
    d. If the population growth rate for the reference site is ± 5% of the desired range for the selected harvest strategy (light, moderate and liberal) then adjust permits upward or downward an additional 10 – 20% for all bear management units associated with the reference site.
    e. If the population growth rate for the reference site is ± 15% of the desired range for the selected harvest strategy (light, moderate and liberal) then adjust permits upward or downward an additional 20 – 40% for all bear management units associated with the reference site.

Reference Site	**Bear Management Units**
Kamas	2/3/4/5, 6/7/8a
Flaming Gorge	8bc, 9
Strawberry	11,16, 17
La Sal	10, 13,14,
Boulder	21/22, 23, 24, 25/26, 27, 28/29,

Management Units

1. Box Elder	10. Book Cliffs	19. West Desert	28. Panguitch Lake
2. Cache	11. Nine Mile	20 SW Desert	29. Zion
3. Ogden	12. San Rafael	21. Fillmore	30. Pine Valley
4. Morgan Rich	13. La Sal	22. Beaver	
5. East Canyon	14. San Juan	23. Monroe	
6. Chalk Creek	15. Henry Mts.	24. Mt. Dutton	
7. Kamas	16. Central Mts.	25. Plateau	
8. North Slope	17. Wasatch	26. Kaiparowits	
9. South Slope	18. Stansbury	27. Paunsaugunt	

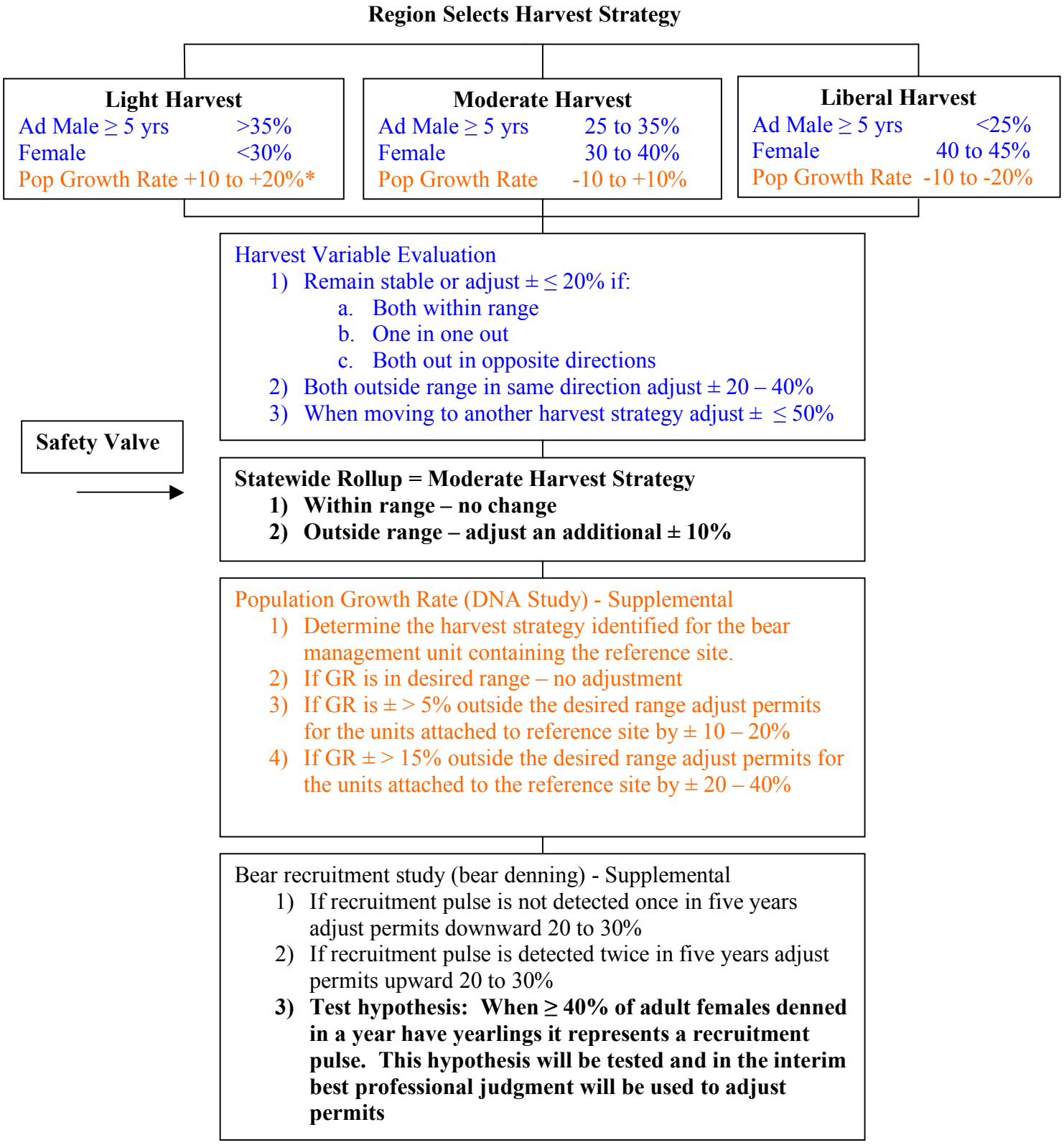
5. As funding allows, the bear reproduction and recruitment study (when the statewide sample size ≥ 25 individual females ≥ 4 years of age denned per year) will inform harvest recommendations as follows:

    a. The bear denning data are considered a supplemental metric to harvest data.
    b. If a recruitment pulse is not detected at least once during a five year period, total permits will be adjusted downward by 20 – 30% at the next recommendation cycle.
    c. If a recruitment pulse is detected twice or more during a five year period, total permits will be adjusted upward by 20 – 30% at the next recommendation cycle.
    d. Detection of a recruitment pulse will be refined during the life of the plan. Hypothesis: When ≥ 40% of the adult females denned in a year have yearlings it represents a recruitment pulse. This hypothesis will be tested during the life of the plan. Until refinement of the trigger occurs, decisions to adjust permits from study results will be based on best professional judgment.

Strategies:

1. Select the appropriate harvest strategy and manage to the performance targets identified in the management system.
2. Evaluate performance target ranges, harvest strategies and management system after 2016.
3. Test different harvest strategies and hunting methods experimentally on select bear management units.
4. Develop a GIS coverage map that identifies areas containing source-sink populations to help focus future harvest strategies after 2016.
5. Explore shorter check in period for units managed under the quota system.
6. Explore non-resident cap for units managed under the quota system.
7. Investigate requirement to have the hunter provide a GPS coordinate for the harvest location.

Figure 2. Black Bear Management System Decision Tree



*Only applies if units have been moved from liberal to light within the last 2 recommendation cycles.

Black Bear Research

Objective 1:

Continue to improve basic understanding of black bear management and ecology through applied research.

Strategies:

1. Continue to support research efforts that utilize harvested bears (e.g. femur study, U of U study) and publicize the study results.
2. In addition, focus on the following research topics, as funding allows, during the life of the plan.
    a. Identify population connectivity and travel corridors
    b. Explore source / sink population dynamics
    c. Human-Bear conflict management
    d. Techniques for reducing livestock and agricultural depredation
    e. Document impacts to other resource users from summer bear pursuit activities, and implement actions to reduce impacts if warranted
    f. Short term population density estimates using DNA hair snare techniques
    g. Potential impacts of selective versus non-selective hunt strategies
    h. Dispersing yearling survival as compared to survival of established adults
    i. Effects of bear on prey species such as deer fawns and elk calves
    j. Monitor productivity of hard and soft mast producing communities
    k. Short and long-term black bear use of wildfires or vegetation treatments in aspen, mixed conifer and mixed mountain browse habitats
    l. Effects of roads and energy development activities (habitat fragmentation) on black bear use
    m. Continue to monitor the survival of rehabbed bear cubs
    n. Determine if there is a relationship between baiting and human-bear conflicts (i.e. does baiting increase the potential for human safety issues in the area of the bait).
3. Explore partnerships to leverage research funding.
4. Continue to use universities to conduct research.
5. When possible use employees involved in the Division's continuing education program to conduct research.

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