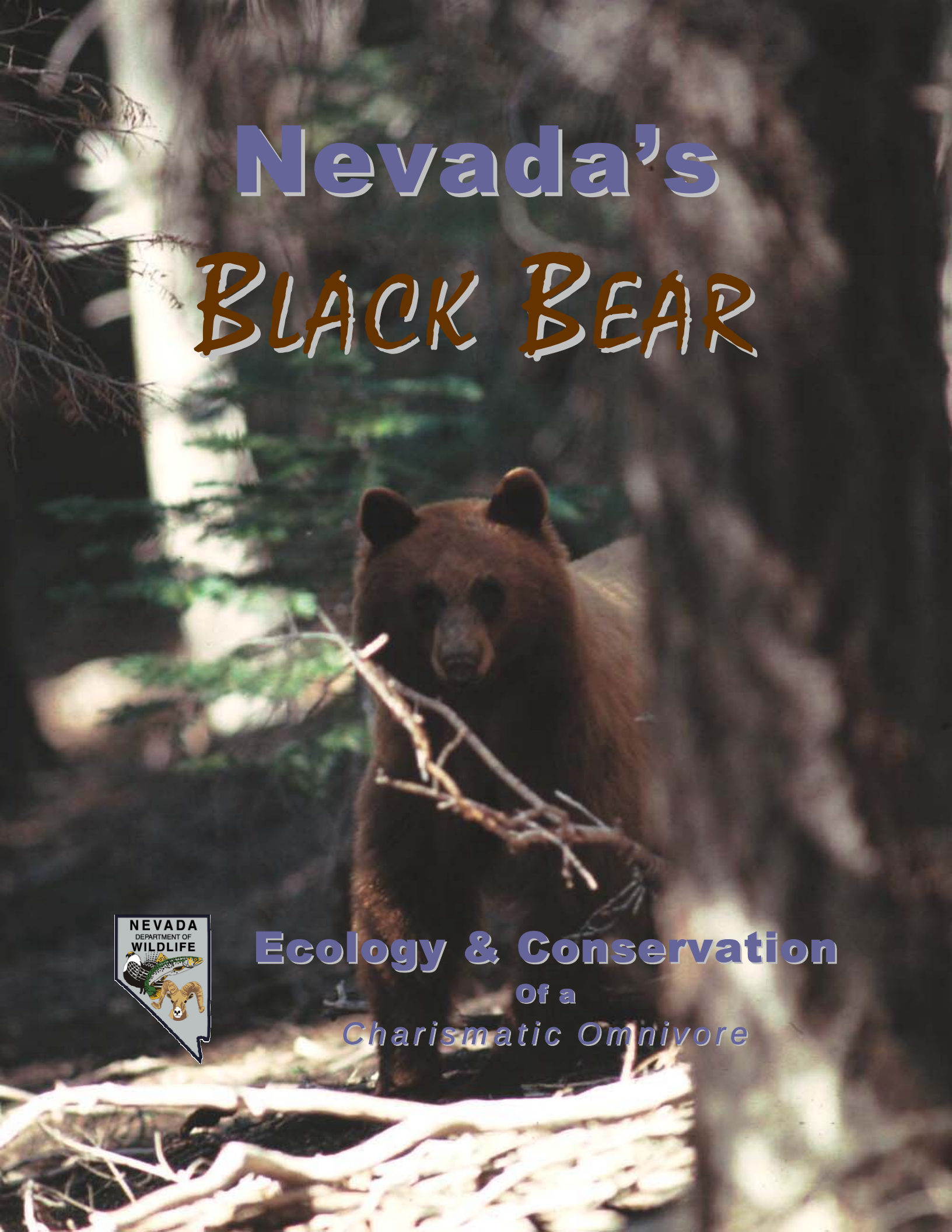
Nevada's Black Bear



NEVADA DEPARTMENT OF WILDLIFE

Ecology & Conservation

Of a

Charismatic Omnivore

Nevada's Black Bear

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Of a
Charismatic Omnivore

By

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December 2004

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Introduction

Few species of animal in North America evoke the emotionalism, conviction or controversy as the American Black Bear (*Ursus americanus*). The popularity of this high-profile species in film, literature and folklore has not only inspired debate between professionals, but it has produced an extensive amount of research on black bears, resulting in an abundance of data and information on their biology and natural history, possibly more so than any other species. Black bears are considered an indicator species, which means that their distribution and abundance are used to monitor habitat quality and to gauge the relative abundance of other species.

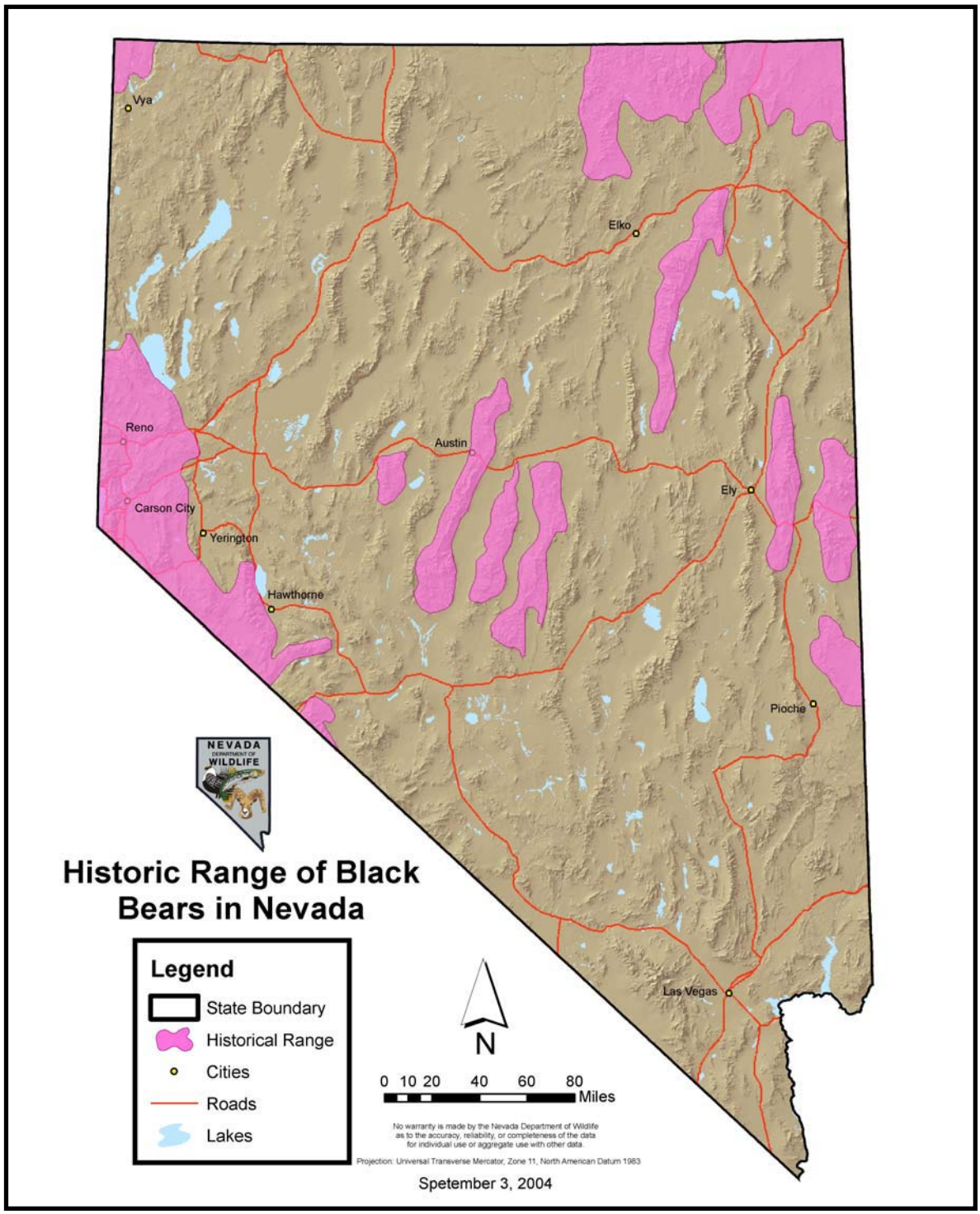
By nature, black bears are adaptable, curious and intelligent, and as such they are often found in very close proximity to humans. In many cases this has evolved not only into a very high tolerance of humans, but also into a habituation. Food-conditioned and human-habituated bears are often times at the very heart of the debate surrounding black bear management.

Black bears historically occurred throughout several mountain ranges in western, central and northeastern Nevada *(Figure 1)*. Historical records compiled by Robert McQuivey (1995, Nevada Department of Wildlife, unpublished data), list several references to not only black bears, but also grizzly bears (*Ursus arctos*). Both species were reportedly found in Nevada, near towns such as Tuscarora, Austin, Virginia City, Glenbrook and Dayton. Human encroachment, increased livestock grazing and extirpation as predators by pioneering settlers are the main reasons suggested that these animals no longer exist in much of their historic range.

Black bears are classified as game animals in Nevada (NRS 501.046 and NAC 503.020), and have been offered protection as such since 1929 (McQuivey 1995). However, there has never been an open season established in Nevada.

Until recently few Nevadans were aware of the presence of black bears, and bear/human conflicts

Figure 1
Historic Range of Black Bears in Nevada



were virtually unheard of until about 1987 (Goodrich 1990). At that time Nevada was in one of the most severe droughts in recent history, causing bears to begin to frequent urbanized areas in search of food. In addition, a highly publicized black bear research project by John Goodrich, University Nevada, Reno was undertaken to develop baseline ecological data and population statistics on Nevada's bears. Goodrich identified population distributions, habitat requirements and denning ecology within Nevada.

Since 1990, black bear complaints and bear/human conflicts have risen extensively, and in disproportion to increased human activity (Beckmann 2002). More recently, and due in part to the increase in bear complaints, the University Nevada, Reno and the Nevada Department of Wildlife (NDOW) completed another research project with the aim of determining population characteristics, demographics and denning ecology of urban-interface bears, and how these parameters differ from wild bear populations. These recent investigations identified major changes in black bear distribution, denning ecology and bear densities (Beckmann and Berger 2003).

Black bears provide recreational opportunities, both aesthetically and through harvest, throughout their North American range. In 1989, 27 states and 9 Canadian provinces reported a total of 41,000 black bears taken in legal harvests (Servheen 1989) with an estimated 10 million dollars of generated revenue. Most western states have black bear hunting seasons, including Utah, California, Idaho, Montana, Wyoming, Oregon, Washington, New Mexico and Arizona.

NDOW is in the midst of developing a Black Bear Management Plan (BBMP), of which this biological bulletin is the first step. The goal of the BBMP will be to maintain a healthy and viable population of black bears, and to provide guidance for management, including management options that are balanced with the diverse economic and recreational needs of the people of Nevada.

May 1887 – Belmont Courier

"Four cinnamon bears were recently seen in the Toiyabe Range of mountains by prospectors."

August 1881 – Tuscarora Times-Review

"An Indian killed a 700-lb cinnamon bear near Mountain City a few days ago."

August 1888 – Walker Lake Bulletin

"Bears are unusually numerous through the mountains this year, and are a source of…serious loss to the sheep men."

Figure 2 - Historical references – McQuivey, 1995

Management History

When pioneers, including livestock men and fur trappers, began populating what is present-day Nevada, bears and mountain lions, like most predators, were viewed as a nuisance and as a competitor. As a result, bears were shot, trapped and poisoned to the point of near extirpation in most of their historic range in Nevada. With changes in civilization and technology came changes in attitudes about wildlife, thus placing a value on species such as bears.

During the Thirty-Fourth session of the Nevada State Legislature (1929), Senate Bill Number 69 was enacted to provide for the protection and preservation of wild animals, including bears. Under this Act "black or brown" bears were classified as "game animals" and thereby protected. Annual reports of the United State Department of the Interior, Bureau of Sport Fisheries and wildlife's Predatory Animal and Rodent Control (PARC) program from the mid-20th century indicate that government trappers killed a few bears during this period; i.e., one in 1944 (Hansen 1945), and another in 1945 (Hansen 1946). Additionally, two bears were removed by PARC in 1960 (Edwards 1961), three in 1961 (Edwards 1962), and one in 1964 (Ford 1965).

In 1987 NDOW began a cooperative research effort on bears with the University of Nevada, Reno. The objective was to evaluate bear population demographics and statistics, and to determine management options. This study defined baseline ecological data for Nevada's bears and offered managers some much needed life history information. It also resulted in two publications for John Goodrich; a Master's thesis (1990) titled *Ecology, Conservation, and Management of Two Western Great Basin Black Bear Populations*, and Nevada Department of Wildlife Biological Bulletin #11 (1993), titled *Nevada Black Bears: Ecology, Management, and Conservation.*

Prior to 1997 bears were trapped and translocated, without tagging, as a standard operating procedure. This management option did not allow wildlife managers the option of permanently marking bears to determine whether or not the translocations were effective, or if the same bears were being recaptured. In 1997 NDOW changed the way it dealt with nuisance type bears by releasing them at or near the capture sight, and subjecting them to aversion conditioning. Public support for this method of dealing with nuisance bears was immediate, even more so since California commonly received negative publicity due to their policy of issuing depredation permits to home owners. Additionally, in 1997 the document titled *Black Bear Complaints – Program and Procedure* was signed and put into effect, giving NDOW employee's limited direction and support when handling bear complaints.

In 1998 the Nevada Department of Wildlife began marking bears, first with lip tattoos, and then with ear tags and tattoos, as a means of permanently identifying captured animals. Also in 1998, NDOW began its *"I'm Bear Aware"* program; involving informational brochures, slide presentations, booths at public events and presentations to homeowner associations. Informational items with the slogan "I'm Bear Aware – Are you?" are distributed under this program.

In 1999 another research effort was initiated, this time focused at investigating the differences between urban-interface (nuisance) bears and wildland bears. Doctoral candidate Jon Beckmann, also a UNR student, undertook this effort. There have been several publications thus far, including Beckmann's dissertation, as well as a paper on the effectiveness of translocation as a management tool, and one on the effectiveness of deterrent techniques. Two more publications are expected by spring 2005: one stating the results of DNA analysis showing kinship data between urban-interface bears; and another paper covering all the ecological, physiological and sociological changes noted between urban-interface and wildland bears.

Figure 3 – Free-range capture of a black bear

Natural History

Taxonomy

Today's American black bear, believed to be a descendant from the Etruscan bear (Ursus etruscus) of the Pleistocene Epoch, is one of eight recognized species of bears which currently occupy approximately fifty countries on three continents. All bears belong to the Order Carnivora and the Family *Ursidae*. The Subfamily *Ursinae* contains the Genera Ursus (true bears), which consists of American black bears (Ursus americanus), Brown bears (Ursus arctos), Polar bears (Ursus maritimus) and Asiatic black bears (Selenarctos thibetanus). Giant pandas (Ailuropoda melanoleuca) belong to the subfamily *Ailuropodinae*; Spectacled bears (Tremarctos ornatos) are in the subfamily *Tremarctinae*; and both the Sloth bear (Melursus ursinus) and the Sun bear (Helarctos malayanus) belong to the subfamily *Ursinae*. The scientific name of the American black bear is derived from the Latin word "Ursus" meaning bear, and "americanus" because the first Europeans arriving on the east coast of North America described black colored bears.

Distribution & Status

The American black bear, native to North America, is the most widespread species of bear. Estimated populations are between 735,000 – 941,000, with roughly 400,000 populating the United States (Williamson 2002). Historically they ranged from the east coast to the west

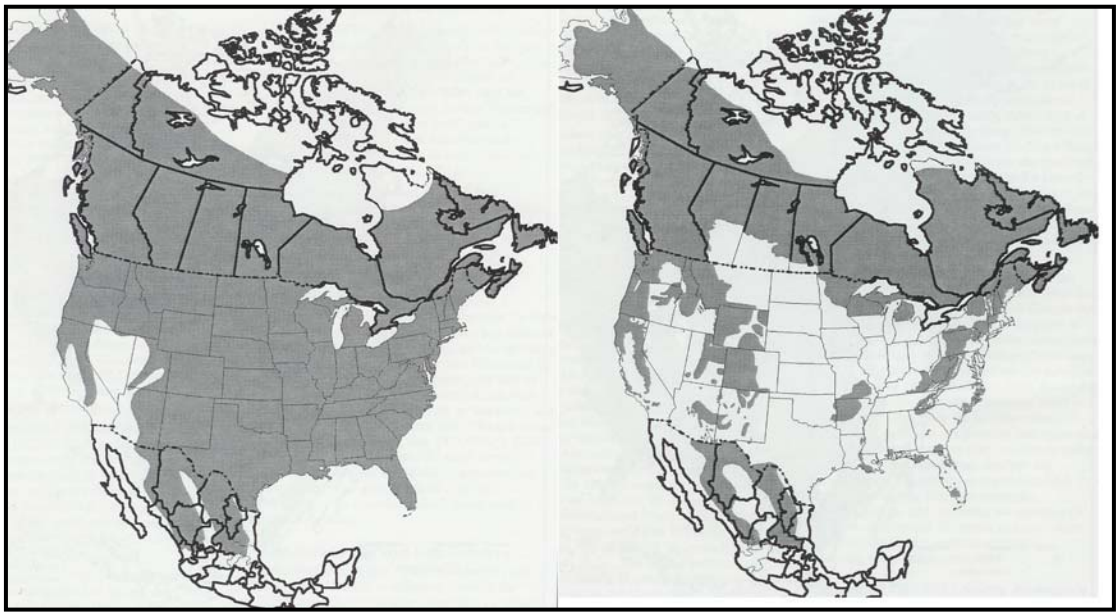


Figure 4 - Left - Historic range of the American Black Bear – Pelton and Van Manen, 1997
Right - Current range of the American Black Bear – Pelton 1994

coast, and from the Arctic Circle in Alaska, including Canada, to the northern states of Mexico. Current distribution has been reduced to all or parts of 41 states, 11 Canadian provinces, and 7 Mexican states (Brown 1993). Although extirpated from much of their historic range in North America by the beginning of the 20th century, many states have reported increasing population estimates in the last 15-20 years (Williamson 2002).

According to a TRAFFIC (the worlds largest wildlife trade monitoring program) survey 27 states and 11 Canadian provinces allow hunting of black bears, but only 1 state (Maine) and 9 Canadian provinces allow trapping as a legal method of take (Williamson 2002). Almost all states list black bears as a game species, although this classification does not necessarily mean they can be hunted in these states. Nevada is an example of where classification as a game animal offers protection from hunting and the sale of edible bear parts. Most states, 28 of 41, do allow for a private citizen to kill a bear that is damaging crops or property under certain circumstances. 15 states including Nevada make it illegal to kill a bear under almost any circumstance other than personal protection.

Bear hunting can be a source of considerable income for states that allow it, but the income varies considerably depending on the bear population, the number of tags sold, and the amount for which tags are sold. For example, in 1992 Idaho received $750,000 in funds from the sale of bear licenses, but Utah averaged only $11,000 to $13,000 per year (Williamson 2002). Throughout the United States 140,000 licenses were sold in 1995 for the take of black bears. In that same year the number of legally harvested bears was a little over 24,000. Interestingly the number of non-hunting kills that same year was 2,400. The hunting of bears continues to be a controversial subject. In recent years states like Colorado, Oregon, Massachusetts and Washington have passed ballot initiatives restricting the legal methods of take of black bears, while similar initiatives have failed in states like Idaho and Michigan. Very few states allow the hunting of black bears in the spring, while most Canadian provinces allow spring hunting.

Morphology & Characteristics

American Black bears are the smallest of the North American bears, (Brown Bear - *Ursus arctos*; Polar Bear - *Ursus maritimus*). Adult males average about 300-350 lbs (135-158 kg) and adult females average 150 lbs (68-90 kg) during mid-summer. Weights can vary considerably depending on nutritional value of food resources, season (time of year), sex, age and genetics. Exceptionally high weights have been recorded for the species including an 816 lb male in Minnesota and a 454 lb female in Pennsylvania (Utah Division of Wildlife Resources, 2000). Despite the size differences, there is no obvious way to distinguish males from females. Males

are called *boars*; females are referred to as *sows*.

Black bears have heavy, compact bodies with stout legs, the front legs being somewhat shorter than the back legs. They have large heads with rounded ears that are approximately 5" long, regardless of sex, weight or age (cubs excluded), and they have short necks and tails. Their eyes are small, compared to overall body size, are generally brown in color, and are close set. The pupils are round. Black bears lack the distinguishable shoulder hump of the brown (grizzly) bear. Their profile also reveals a short and straight Roman-nose, compared to the more concave, or dish-shaped forehead of the brown bear. They have broad feet with five toes *(Figure 5)*, and strong, curved, non-retractable claws. Black bears walk with a shuffling gait in a plantigrade fashion (flatfooted), and in a slight varus (pigeon-toed) manner, which gives the impression that they are clumsy. In light of this, they are extremely agile and fast runners, capable of sprinting at 35 mph (Brown 1993). They have protrusile lips (free from the gums) that are used effectively for picking berries, etc. Black bears have 42 teeth, with a dental formula of 3-1-4-2 on the upper jaw, and 3-1-4-3 on the lower jaw.

Figure 5 – The hind foot (left) and front foot (right) of a black bear.

West of the Rocky Mountains, Nevada included, black bears are generally cinnamon or chocolate brown in color, although they can range from black to blond. Within their North American range, black is the most common color, but there is also a white color phase (Kermode bears) in British Columbia, and a blue-gray color phase (Glacier bears) in Alaska and Yukon. A white V-shaped chest-patch is common in the species, especially in the black color phase. The fur is generally thick, consisting of short and long hairs, which can change very slightly in appearance and color depending on the season. The snout is usually a lighter color than the rest of the body. Siblings of different colors are common.

Bears in general are known for their keen sense of smell, considered one of the finest in the animal kingdom, and black bears are no exception. For instance, 100% of reported home invasions by black bears in Nevada have been into the kitchen area (NDOW, unpublished data). It is believed that in general, bears are near-sighted (from feeding close to the ground), although some experts suggest they may have vision equal to or better than that of humans. Often times they will stand on their hind legs to get a better view of what they are confronting, or to attempt to catch the scent. This is often wrongly interpreted as a sign of

aggression. Black bears see in color, and they have good peripheral and night vision. The life span of black bears is generally around 15-18 years, although captive bears have lived to be 44 (Brown 1993).

Navigation in many wild animals is renowned. Although there has been little research on the subject, there are several theories as to how bears are able to navigate long distances, usually back to the capture site after translocation. They can orient themselves with or without visual landmarks, and in unfamiliar areas (Rogers 1986). Brown (1993) reported bears returning to capture areas after covering distances of close to 200 miles.

Disease & Parasites

Black bears may contract a variety of viral and bacterial diseases, and parasites, although they are not considered to be a major factor in bear mortality. Mites, fleas and ticks are the most common, along with trichinosis (caused by the trichinella worm). Ticks and fleas are noticeably absent in most of the captured bears in Nevada, but they seem to be prone to contracting plague. Of 25 Nobuto blood samples tested in 2002-03 from bears captured in the Carson Range, 9 were positive, some with very high titers. (Washoe County Health Department 2003). Bears also have resistance to some diseases, such as canine parvo, canine distemper, Ringworm, Anthrax and metabolic bone disease.

Food & Habitat Preferences

Although classified as *carnivores*, bears are considered omnivores (they consume both plant and animal matter), and they are the only true large omnivore (Brown 1993). Bears are opportunistic feeders and generalists, meaning they will seek food from just about any food source, including predation and scavenging. Roughly 85% of their diet is vegetation.

Black bears generally eat what is seasonally available, beginning with grasses and forbs in the spring. As summer progresses, their diet will contain more of a variety of flowers, forbs, fruits and insects, primarily ants and their larvae. Black bears have been known to predate on deer and moose (Kolenosky and Strathearn 1987). Carrion, in the form of winter-killed ungulates and road kill, is also utilized. Black bears have also been known to take over mountain lion kills (personal observations). Both soft mast (berries) and hard mast (nuts) are very important to bears, especially as summer progresses into fall. These foods become increasingly significant as bears amplify their body mass through percent body fat. Climatic conditions resulting in crop failures of fruit-bearing shrubs or

pine nuts can result in bears entering urban areas searching for other sources of food.

Reproductive Biology

The mating season for black bears occurs during the months of June and July. Males become sexually mature at about 4-6 years of age. The age at first reproduction for females usually occurs at 4-5 years, although they have been known to mate at 2 years and have their first litter at 3. All bears, except the Sun Bear (*Helarctos malayanus*) exhibit a unique reproductive strategy called *delayed implantation*. After conception, the fertilized ovum (blastocyst) remains unattached to the uterine wall, floating freely within the uterus until late fall. At this time, if the sow's physical condition will support the combined stresses of pregnancy, birth and nursing, the ovum will attach to the uterine wall and embryonic development begins. If her body condition will not support this stress on her system, the egg will be resorbed (Brown 1993). Cubs are born in late January or early February (February 1st is used as a birth date for all bears) in the maternal den. They are born blind and nearly hairless (altricial) and weigh 8 to 12 oz (about 1/280th of the sow). Within 10 months they may be as big as 110 pounds (NDOW – unpublished data). Two cubs is the average litter size, but they may have litters between 1 and 4 cubs. Mother bears, and especially grizzlies, are known for their protectiveness of cubs. Bears are also very affectionate, strict and attentive mothers, and are very devoted to the teaching of their cubs. Black bear sows are typically very good mothers, however they may abandon the cubs when threatened. They have also been known to adopt orphaned cubs, both from other bears, and when the orphan is placed near a maternal den by biologists. Bear's milk has a very high fat content, averaging

Figure 6 – Two week old bear cub..

about 33%. Black bears wean their cubs at about 8 months of age (245 days). The cubs will stay with the mother for 16-18 months after birth, gaining social independence just before the breeding season of their second spring. As a result, litters are generally produced only every other year (Beck 1991).

Denning

Prior to entering hibernacula bears exhibit a type of hyperphagia, whereby their daily caloric intake is at a maximum

level, at times upwards of 24,000 calories daily. The fat layer that they accrue during this time will provide them with the energy needed to sustain several weeks or months in the den. The additional weight in fat can be substantial, with one Nevada bear gaining an average of 90 pounds a month for three months (NDOW – unpublished data).

Bears will typically enter dens around the

Figure 7 – Biologists enter a bear den

first of December, and will emerge toward the end of March. Female bears will tend to enter dens earlier and emerge later than male bears (Beck 1991). Black bears seem to choose den sites opportunistically (Goodrich 1993), depending on habitat types within their home range, but locations tend to be on fairly steep, north-east facing slopes above 6,000'. Den types vary, but in general they are prepared in a secretive location, providing a hidden and secure shelter.

Hibernation in bears (torpor) is a survival strategy to deal with the winter food shortage, and to offer a secure environment for female bears to give birth in and to raise their cubs. It is a state of dormancy characterized by physical lethargy or inactivity. While hibernating they do not eat, drink, urinate or defecate, but rather rely totally on their fat reserves acquired the previous fall. During this time their metabolism slows, although not nearly to the degree of true hibernators like bats and rodents. Their heart rate drops to eight to ten beats per minute, and in black bears the body temperature drops to around ninety degrees Farenheight, about ten degrees below normal (Brown 1993). Respirations also decrease, to about half that of an active bear.

While in hibernacula a bear's digestive system and kidney functions shut down almost completely, and they will lose 15-30% of their body weight. As the fat is broken down and processed, the wastes are absorbed through the urinary bladder and processed back into useable proteins and amino acids, thereby preventing a build-up of toxic urea. Bears even have the ability to increase their bone mass during hibernation by recycling the calcium in their blood (Brown 1993). A female bear's physiological capabilities during hibernation are truly amazing, as she will survive all the stresses of hibernation, and still give birth and nurse the cubs before emerging in the spring. For bears, like other mammals that enter torpor, timing of emergence from hibernacula depends on food availability, body condition, and environmental

conditions (Doan-Crider and Hellgren 1996, Beckmann 2002).

Home Range

The area that a bear must cover annually to meet all their requirements for food, water, cover and reproduction is called their home range. The size of this home range varies depending on habitat quality, and sex and age of the bear. Male bears will have much larger home ranges than females, in part because they spend much more time traveling to avoid other larger males, and because they will attempt to mate with as many females as possible. A male black bear's home range may be 5 times that of a female (Utah Division of Wildlife Resources 2000). The home range of any given male bear may overlap with that of other males, and may contain several female home ranges within it. Juvenile males will usually disperse much longer distances than juvenile females, which will often have home ranges overlapping with that of their mother.

Tree marking by bears is believed to be a chemical and visual form of communication. Black bears may bite, claw or rub a tree leaving very distinguishable marks, sometimes breaking whole branches. Trees marked in this way are found along well used bear trails and may be used year after year. Hair, urine and scat are often deposited, and may act as a way of marking. Occurrences of marking generally increase at mating and breeding time, and may be a means of advancing estrus in females. Other theories for marking include; a display of dominance, a bear signifying his presence or identification, or bears creating a hierarchy among males.

Behavior

Black bears are shy, secretive and solitary animals with generally low reproductive and mortality rates. They are also curious, casual, suspicious, clever, cautious, playful, independent and dangerous. They are creatures of habit and are therefore very easily food conditioned. Bears are also adaptable and can be very tolerant of human presence. Like raccoons (*Procyon lotor*) and coyotes (*Canis latrans*), bears are capable of learning to exploit the food based-rewards offered by human presence, thereby benefiting from these actions. This in turn may facilitate expansion of bear populations into urban areas.

Most researchers agree that bears are very intelligent, even though this intelligence may be a result of an overactive curiosity combined with an

excellent memory. Bears have the ability to learn from a single experience, including experiences with sources of food or incidences with humans. They can recognize people, uniforms and vehicles, and they can learn to open doors, windows and jars (Brown 1993, NDOW unpublished data). One thing is for certain, a bear's curiosity and intelligence is almost always related to obtaining food.

Bears are typically solitary animals, with the exception of a sow with cubs, or during mating. When food is plentiful and found in a clumped resource such as spawning fish, trash dumps or large berry patches, bears will tolerate another bear's presence, at times at very close range. Because of infanticide (male bears killing cubs), female bears with offspring will usually avoid adult males.

Nevada's Bears

Until the early 1900's black bear distribution in Nevada was spread throughout the forested/riparian areas of Northern Nevada, in mountain ranges such as the Jarbidge, the Toiyabes, the Rubies, and the Sierra Nevada. Present day populations are confined to the far western parts of the state including the Carson, Pinenut, Sweetwater, Excelsior and Wassuk mountain ranges (Goodrich 1993). The vast majority of black bear habitat in Nevada occurs within National Forest land along the Carson Front, although some lies within State, private, BLM and tribal lands. In recent years confirmed bear sightings have occurred in the Delano, Independence and Jarbidge Mountains of Elko County, as well as the Schell Creek Range of White Pine County, and the Vya Rim of northern Washoe County (Nevada Department of Wildlife, unpublished data).

Black bear habitat in Nevada consists of riparian areas, mixed conifer stands, and montane shrub areas, such as those found in the Carson Range where bear densities are highest. Marginal bear habitat, such as the Sweetwater range, consists of large, homogeneous stands of Pinion Pine (*Pinus monophyla*) and Sagebrush (*Artemisia sp.*) (Goodrich 1990). Within these habitats, bears utilize several species of flowering and fruiting shrubs, including Serviceberry *(Amalanchier spp.),* Bearberry or Manzanita *(Artostaphylos spp.),* Chokecherry *(Prunus virginia),* Current *(Ribes spp.),* Elderberry *(Sambucus spp.),* Buffaloberry *(Shepherdia spp.),* Snowberry *(Symphoricarpos spp.)*, Pinion pine *(Pinus monophylla),* Jeffrey pine *(Pinus jeffreyi),* Snowbush *(Ceanothus spp.)* and Mountain mahogany *(Cercocarpus spp.)* Although the current range of bears in Nevada *(Figure 10)* encompasses much marginal habitat east of the Carson range, enough data exists to know that bears populate these areas, at times as their sole home range *(Appendix 3)*. The elevational range for black bears in Nevada is from around 4000' to over 11,000'.

In Nevada, den types include large trees, both live and dead, cavities under boulders, boulder piles and brush piles (Goodrich 1993). Urban-interface bears have even denned under homes and decks (NDOW unpublished data).

As mentioned previously, much of what is known about Nevada's black bear population is the result of two studies completed in cooperative efforts between the University of Nevada, Reno and NDOW. The second of these, completed in 2002, explored the reasons behind recent observed changes in bear activity, mainly in the Lake Tahoe Basin. In the spring of 1999 the Nevada Department of Wildlife was approached by Dr. Joel Berger and Jon Beckmann, both of the Department of Environmental and Resource Sciences, University of Nevada, Reno, and asked to consider a joint research effort seeking to provide a basis for understanding how and why

large carnivores interact at the wildland-urban interface. The original proposal included gathering data on black bears, mountain lions and coyotes. These ambitious objectives were quickly and appropriately ammended to concentrate solely on black bears. Specifically, Beckmann's goals were to contrast wildland bears to urban-interface bears, testing predictions of resource-based models, including differences in home range size, behavior, denning ecology, mortality rates, as well as translocation and aversion technique effectiveness. He also investigated temporal changes in life history patterns and ecology spanning a period of 15 years, using Goodrich's (1990) results as an anchor. Data obtained on captured bears (sample size of 99 bears) from July 1997 to April 2002 were analyzed. These data included: age, sex and weight; denning and emergence dates; mortality rates; annual 95% home range and 50% core areas derived from telemetry data (% is relative to amount of time spent in certain areas); and time data from translocated bears. What was not known at the time was whether the increase in bear complaints along the Carson front was a result of higher populations of bears, higher densities of bears, or both. Or to what degree bear/garbage habituation fit into the equation.

Figure – 8 Biologist with two 6-week old bear cubs.

The research results indicate profound differences between wildland bears and urban-interface bears including: (i) declines in mean home range size for urban-interface bears *(Appendix 3);* (ii) increased body mass in urban-interfaced bears which averaged 30% heavier; (iii) changes in denning chronology where urban-interface bears spent significantly less time in hibernacula; (iv) bear densities increased 3+ fold in urban areas, with a 7000% increase in the frequency of urban-interface bears, while densities for wildland bears decreased; and (v) road mortalities increased by 1500% *(Appendix 1)*. These results, along with population estimates that are relatively close to estimates 15 years ago by Goodrich (1990) point to a shift, or redistribution of the bear population and not a population increase. It is believed that all of these changes were brought about by a rapid redistribution of bears, from wild to urban areas, and that the drought that ended in 1992 was the catalyst for this redistribution. In other words, climatic changes resulting in a depleted supply of natural food resources caused bears to seek out anthropogenic sources of food,

in the form of garbage. Once there, the bears did not leave. When looked at separately and in detail, the study results clearly support this idea.

The 2002 black bear population estimate for Nevada was 150-300 animals (180 ± 95% CI) (Beckmann 2002), probably the lowest of any western state. This number has not changed significantly since Goodrich's estimate (1990). Although population estimates have not changed significantly in Nevada, the distribution and density of bears in certain areas has. Low to intermediate densities for North America, defined as between 20-40 bears/100 km², was reported by Goodrich (1990) in Little Valley of the Carson Range. By 2002 this area of prime bear habitat contained very low densities (3.2 bears/100 km²), and mostly female bears. At the same time densities along the urban-interface of the Carson Range increased so much that it was the second highest reported density of black bears (120 bears/100 km²) in North America (Beckmann 2002, Garshelis 1994). Densities remain highest in the Carson Range, while the Virginia, Pah-Rah, Pinenut and Excelsior ranges maintain lower densities in mostly transitional habitat. It is important to realize that these high densities are not continuous throughout the Carson Range, but rather unique to the relatively small urban centers within the range.

Historically, Nevada bears have had home ranges from 2.6 to 52.5 square miles (Goodrich 1993). Areas of marginal habitat, like the Sweetwater Range, support fewer bears with larger home ranges when compared to areas of higher suitability. Goodrich (1990) identified Little Valley in the Carson Range as containing very good bear habitat, requiring less effort on a bear's part to acquire all its metabolic needs. Beckmann (2002) however, found that home range sizes for urban bears were reduced by up to 90% when compared to wildland bears *(Appendix 3)*. Home ranges have literally gone from mountains to neighborhoods, and within a relatively short period of time.

What may be even more unnerving than having several bears in an urban area is when the majority of those bears are large, healthy adult males. Approximately 85% of bears frequenting urban areas are males, and 1 in 4 of these weigh greater than 400 pounds. Exceptionally high weights have been recorded in Nevada in recent years, i.e., a 625 lb male and a 320 lb female. Although there are female bears in the urban areas, they normally do not occupy the same neighborhoods as the males. Conversely, in habitat such as Little Valley of the Sierra Nevada Mountains, Beckmann (2002) found all females.

Ecological changes in Nevada's bear population are taking place as well. Urban-interface bears are spending considerably less time in hibernacula than wildland bears, with denning entry dates of January 1 and December 4 respectively (Beckmann 2002) This held true for both males and females. In recent years emergence dates have been

much earlier for urban-interface bears, with activity in the spring starting as early as February. There may also be some correlation between earlier emergence dates and the age of those bears, with younger bears becoming active earlier, possibly to take advantage of the novel resources before the large dominant males become active (NDOW unpublished data).

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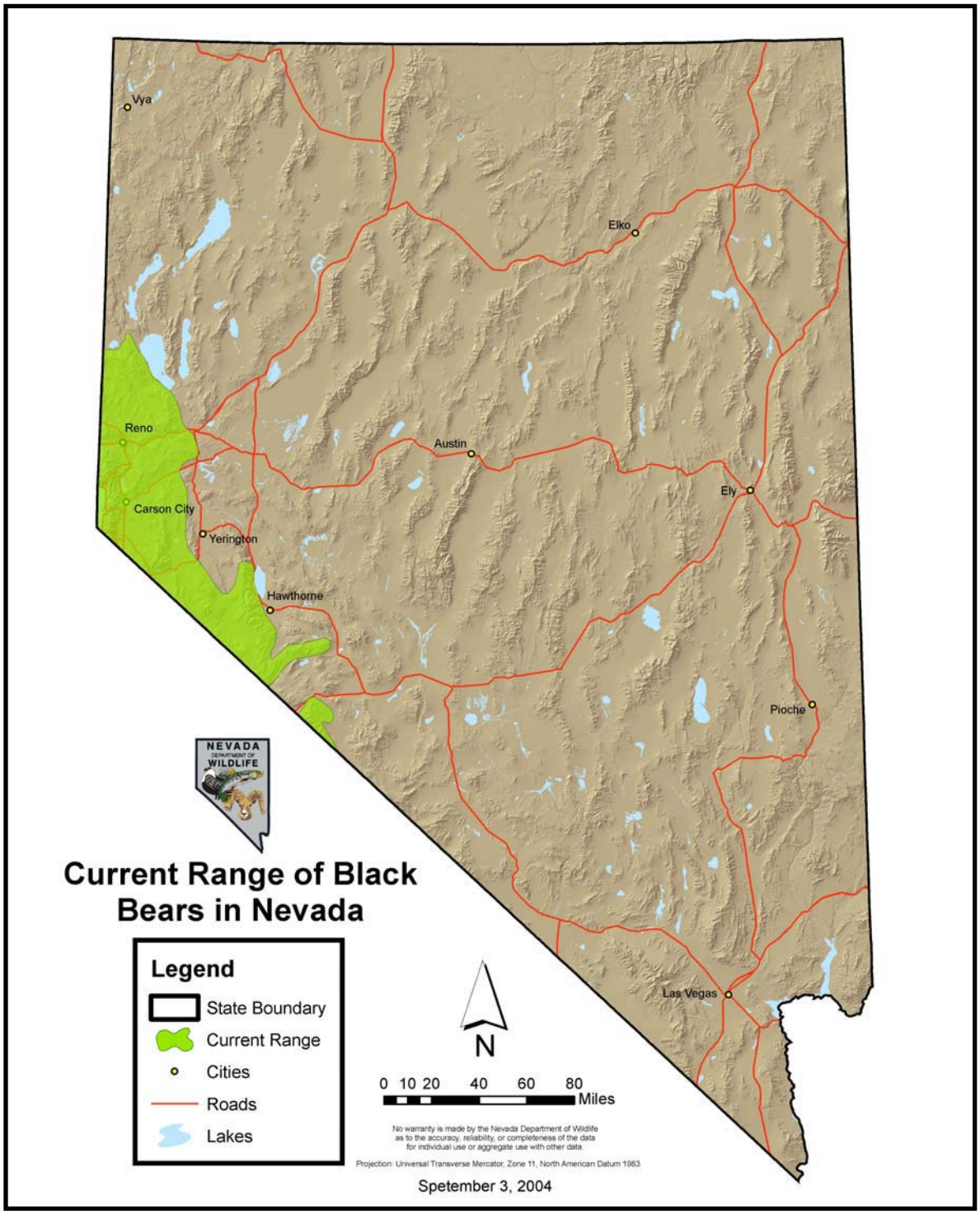
There have been instances where individual urban bears have remained mostly active all winter, emerging from their dens periodically, usually on neighborhood garbage night. Beckmann (2002) even documented cases when some of these bears actually gained body mass during the winter months.

Figure 9 – PROWL Volunteer with 560 lb Bear

Figure 10
The Current Range of Black Bears in Nevada



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Threats, Opportunities & Management Issues

Habitat Loss

Although extremely tolerant and adaptable to human population growth and encroachment, black bear populations in Nevada have been adversely affected by habitat loss. Black bears undoubtedly move freely between mountain ranges in western Nevada. This movement, along with the population as a whole, has become constricted and confined, with more and more humans moving into forested habitat, and an occasional bear transgressing back into historical habitat. Examples include sightings in recent years in places like Pyramid Lake, Fallon, Lake Lahontan, Tonopah, the Vya Rim and the Ruby Mountains.

Travel corridors have been identified recently, unfortunately in part, by increases in road kills. They are not necessarily restricted to a river bed or contiguous section of forested habitat. Bears have been hit on Interstate 80 thirty miles east of Reno, and on Hwy 395 in Washoe Valley. Radio-collared bears have been tracked traveling through the middle of Carson Valley and Eagle Valley, and there are the occasional bears caught several miles within urban areas like Reno and Carson City. These of course, are just the bears that are observed, and it remains a mystery how many more actually make it through undetected, possibly expanding their range eastward.

Habitat loss along the Carson Front has been very conspicuous, and has affected black bear populations. Housing developments have steadily progressed from the valleys ascending into the forested habitat of the black bear, and the conflicts between humans and bears have increased accordingly. These issues have manifested themselves in areas such as Galena near Reno, Franktown in Washoe Valley, Lakeview, Timberline and Kings Canyon in Carson City, Foothill in Carson Valley, and Double Springs/Holbrook Junction near Topaz Lake. Noticeably, none of these areas have regulations regarding the storage of garbage or the feeding of wildlife.

Figure 11– Road Mortality

Development is not the only contributing factor to habitat loss along the Carson Front. Fires near Carson City, Verdi,

Martis Creek and Job's Peak have resulted in the loss of thousands of acres of good bear habitat, further confining an already constricted bear population.

The Black Bear in Illegal Trade

The use of bear parts for medicinal purposes dates as far back as 3,500 B.C. in China. Bear bile, found in the gall bladder, is probably the most commonly known bear part used. This substance contains the active ingredient ursodeoxycholic acid, and is found only in the bile of bears. Other bear parts used include the paws, meat, brain, bone and spinal cord. Several Asian cultures, primarily Chinese and Korean, use bear parts to treat a variety of ailments, a few of which include hepatitis, arthritis, skin ulcers and sexual dysfunction. More localized uses of bear parts include jewelry, taxidermy, and Native American ceremonies.

Figure 12 – Gall bladder

The sale of bear parts is restricted nationally and internationally by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The American black bear is listed under the Convention, not because of their status, but because of their similarity in appearance to endangered bear species (McCracken et al. 1995). Although several states within the U.S. have laws governing the sale or trade of bear parts, most are loosely written and only reflect the local interests rather than a broader, national view, and few have laws specific to black bear trade (Williamson 2002).

Bears are killed illegally both for food and for commercial sales of bear parts. The poaching of bears in Nevada and the sale of bear parts does not appear to be a major problem, but it can be elsewhere. For example, in 1998, Oregon State Police broke up a poaching ring that resulted in the arrests of 12 people and the seizure of 28 gall bladders. They estimated that this poaching ring may have been responsible for killing 50 to 100 bears per year over a period of 5 to 10 years (Williamson 2002). The sale of bear gallbladders can be lucrative, netting the hunter up to $300, the middleman $400 and the retailer as much as $1,000. Brown (1993) reports that whole gallbladders may sell in China for $26 to $1000 per gram, and that in Korea one gallbladder auctioned for $64,000. There have been cases in Nevada of bear poaching and other illegal activities related to black bears, including instances where road killed bears had their paws cut off. This occurred, despite NDOW personnel having responded within two hours. Fortunately, very few states report a negative impact on black bear populations due to illegal trade. Also, the trend in the last few years has been for

states to write stricter laws regarding these issues (Williamson 2002).

Black Bear Attacks

Although extremely rare, attacks on humans by black bears do occur. There have been approximately 47 human fatalities from black bears since 1900 in North America (Herrero 2002). A majority of these have occurred in recent years: 23 between 1900 and 1980, but roughly 24 from 1980 to 2002. There has been an obvious increase in the frequency of attacks by black bears, and according to James Gary Shelton in his book *Bear Attacks II, Myth and Reality* (2001), it is due to the increased frequency of contact between bears and people. Bear behavior is extremely complex, and thus understanding bear attacks can be very difficult.

Even though grizzly bears usually act far more aggressively than black bears, the chances for most people encountering a grizzly bear are far less. There is approximately ten times the number of black bears compared to grizzlies. Herrero (2002) states that while grizzly bear attacks tend to be defense oriented (the bear is defending a carcass, cubs or space), black bear attacks are usually predacious in nature. Furthermore, almost all attacks on humans by black bears, where the person is seen as food, are committed by wild bears, meaning bears that have had little or no previous human contact. Ironically, reports of injuries by black bears to humans, but without causing death, are usually the result of food-conditioned and human-habituated bears that come into sudden and close contact with humans. Fortunately, these occurrences, which number several hundred in North America, have resulted in mostly minor injuries, whereas more than half of reported injuries to humans by grizzly bears are considered major (Herrero 2002).

Figure 13 - Charging female black bear

Black bears that are human-habituated and food-conditioned can exhibit an extreme tolerance of humans; however, the ability to attack, injure or even cause death is always present. Clearly, the best way to avoid serious encounters between black bears and humans is to decrease the chances of conflicts. This means preventing the food-conditioning that so often precedes injurious encounters.

Complaints

When and how NDOW employees handle bear complaints has been defined,

in large part, by past successes in management techniques and by research results. During the time period from Spring-1997 through Fall-2004, personnel have dealt with 197 bears, 314 times, including recaptures. Of these, 125 new captures have been made and subsequently marked and released. In this same time period there have been 104 documented mortalities *(Appendix 1)*, with 32 of these being previously captured bears.

Department personnel have handled over 1,000 complaints in the last ten years *(Appendix 2)*, and about 1,200 since 1987 when bear complaints started to increase. Complaints vary from sightings to home invasions, but approximately 95% of the annual complaints received are a result of bears becoming conditioned to human sources of food, mainly garbage. Damage estimates differ from year to year, reported at $2,800 in 2002, but $24,000 in 2003. This is a result of more damage being done, but it may also be a reflection of better reporting by the victims.

Several management options are available to Department personnel responding to bear complaints, as outlined in the NDOW document titled *Black Bear Complaints – Program and Procedure*. Most complaints are handled over the phone by giving advice. Informational brochures are also mailed out, both for site-specific instances and in mass-mailings. If an attractant such as garbage is available to the bear, then the reporting person (RP) is usually informed that no action by the Department is warranted. If the RP has taken steps to alleviate conflicts by securing the attractant, but is still experiencing a conflict, then a culvert trap may be set to capture the bear.

When a bear is trapped it is given an individual number, then permanently tattooed and ear-tagged with this number. Biological samples are then taken. These samples include a hair sample, for DNA analysis, and a tooth sample for aging purposes. In this technique the first upper pre-molar (PM1) is extracted, then analyzed by cross-sectioning the tooth

and counting the cementum annuli (Matson's Laboratory, Milltown, Montana; Stoneberg and Jonkel 1996), much like counting the rings on a tree. Morphological measurements are also taken on trapped bears, and sex and weight are determined.

Aversive Conditioning

The public often demands a non-lethal management option when dealing with nuisance wildlife. NDOW is sensitive to these issues and has been investigating different ways to manage nuisance bears

Figure 14 – The Karelian Bear Dog

exoterically since 1997. When possible, trapped bears are released on-site (area of capture) and submitted to aversive conditioning. This involves the use of non-lethal rubber shotgun rounds, noise makers and hazing by a Karelian Bear Dog with Department handlers. This technique was developed in Utah and is used widely among bear managers in several states (C. Hunt, WindRiver Bear Institute, Heber City, Utah 2003; M. Madel, Montana Fish, Wildlife and Parks 2003 personal communications). Aversion conditioning is not intended to, nor has it been successful in persuading bears to leave urban areas (Beckmann et al. 2004). It has shown success though, in modifying the behavior of certain bears by scorning bold behavior and rewarding their natural, shy behavior (C. Hunt, Wind River Bear Institute 2003; NDOW unpublished data). This is all that can be realistically expected since the urban areas where bear densities are highest offer both good, natural habitat (water, large trees and denning locations), as well as a year-around supply of food in the form of garbage. Aversive conditioning is most effective when it can be reinforced as needed, for example when a bear re-enters a specific area. This is seldom practical though considering the man-time involved. When NDOW does aversive conditioning an attempt is made to tree the bear (natural behavior). If the bear descends the tree in a short period of time then it is shot at and chased again, usually up another tree. Care is taken while releasing sows with cubs as to not separate the bears. In cases where separation has occurred, visual sightings several days later confirmed that they normally reunite.

An additional benefit to on-site releases with aversive conditioning, and potentially a greater benefit, is the public education that is achieved. When the very homeowners who are leaving trash unsecured for the bears realize that those bears will not be relocated, they are much more cooperative in taking steps to remove the attractants. In many cases they have organized neighborhood bear-education campaigns and assisted with NDOW's public education process.

Although translocation remains an option in Nevada, and is still used to some extent by other states, it is seldom successful in doing more than moving the

problem. Bears will almost always return to the point of capture, even with Nevada's basin and range topography (Beckmann and Lackey 2004). Large carnivores like bears and mountain lions have been known to travel several hundred miles in returning to capture areas. In Nevada, the greater the distance that a bear was relocated simply extended the time before it returned. One bear in particular, an adult male captured in South Lake Tahoe, was released near Mt. Grant in the Wassuk range near Hawthorne, but took only 18 days to return to the area of capture. (Beckmann and Lackey 2004). Even mother bears with cubs of the year have returned to the capture area within a few days, even though they may have been moved several miles (NDOW – unpublished data). When translocation is used it is usually to remove the bear for what is known to be a short period of time in order to determine, for example, which bear(s) may be causing damage or entering homes.

Occasionally, young bear cubs are orphaned. NDOW has been successful in the past with its procedure of returning these cubs to the wild when possible. This has been due in large part to the efforts of the staff at Animal Ark (Aaron and Diana Hiibel). The Hiibels care for the cubs by providing food and shelter for the entire rehabilitation period, and with minimal human contact. During mid-winter, usually in January, NDOW personnel will anesthetize the cubs in the den at Animal Ark and transport them to an artificial den in the back country. The bears are then able to emerge from the den the following spring, at or near dispersal age. Of the twelve orphaned cubs that NDOW has handled in this way only one is known to have returned to cause more problems.

Figure 15 – On-site release

Laws & Regulations

The laws and regulations that govern or affect the management of black bears in Nevada are U.S. Public Law, Nevada Revised Statues (NRS), Nevada Administrative Code (NAC), and Wildlife Commission Regulations (CR). The regulatory bodies that promulgate these laws are the U.S. Congress for U.S. Public Law; Nevada Legislature for NRS; and the State Board of Wildlife Commissioners for both NAC and CR.

Nevada Revised Statues

501.46 "Game Mammal" defined
As used in this title, "game mammal" means any mammal so classified by Commission regulation.

501.110 Classification of Wildlife
1. For the purposes of this Title, wildlife must be classified as follows:
   (a) Wild mammals, which must be further classified as either game mammals, furbearing mammals, protected mammals or unprotected mammals.

501.181 Duties; regulations. The commission shall:
1. Establish broad policies for:
   (a) The protection, propagation, restoration, transplanting, introduction and management of wildlife in this state.

3. Establish policies for areas of interest including:
   (a) The management of big and small game mammals, upland and migratory game birds, fur-bearing mammals, game fish, and protected and unprotected mammals, birds, fish, reptiles and amphibians.
   (b) The control of wildlife depredations.

4. Establish regulations...including:
   (a) Seasons for hunting game mammals....

501.379 Unlawful sales of wildlife.
1. Except as otherwise provided in this section:
   (a) It is unlawful for any person to sell...any species of wildlife, or parts thereof....

Nevada Administrative Code

503.020 Game Mammals
...the following wild mammals are further classified as game mammals:

2. ...black bear (Ursus americanus)

503.174 Sale of non-edible parts of legally killed game...

The sale of hide, hair, antlers...or other non-edible parts of game animals which were legally killed...is permitted.

Conclusions

Bear stories " are like fine wine, they improve with age."
Author unknown

Bears, as a charismatic mega fauna, have been capturing the imagination of people for centuries. They have appeared on flags and postage stamps, in literature and music, in art, in religion, and in myths and tales. They are the names of boats, planes, automobiles and sports teams. Modern bears have appeared in movies and cartoons, and occasionally in our financial market. Bears are even found in the Heavens.

Unfortunately, many of the bears we are dealing with in Nevada as wildlife managers are the ones that are at conflict with humans. As humans we are either luring bears in closer to us with food attractants, or we are constricting the population and leaving them with nowhere else to go. In essence, we have created a situation where several generations of bears have been taught that human foods are a reliable resource, possibly producing bears that are food-conditioned and human-habituated, and bears that are very tolerant of people, to the extent that some never leave human neighborhoods over the course of a year. Black bears are large, extremely powerful animals, and therefore these conflicts must not be taken lightly. Wildlife managers deal with the human population as much as the bear population, and often times must weigh the consequences of management decisions that can have a polarizing affect on the community. Some solutions have appeared in recent years, such as aversive conditioning, and although its effectiveness is debatable, the alternatives are even more so.

From a bear's perspective human trash is a year around food source, high in fat content and full of calories. It is dependable (available every week in the same location) and it is replaced after use. Rather than spend 15-20 hours per day foraging for natural type food sources, a bear need only spend 2-3 hours a day, and thus exert less energy while in urban areas. At first glance it would appear that human trash is good for bears, at least from a physiological perspective if urban bears have 30% more body mass than wildland bears. But from a population viability perspective the increased mortality rates sustained by urban-interface bears could be very

counter productive. Additionally, if the dominant males are spending >95% of their time in urban areas and thus away from females then they may potentially lose reproductive opportunities and the benefits of genetic dispersion.

The anthropomorphic sources of food, meaning garbage, fruit trees, apiaries and the outright feeding of bears, needs to be addressed at the state and/or county levels if we hope to gain control of the nuisance bear problem. This becomes very clear when >95% of bear complaints received by NDOW annually are associated to bears becoming habituated to garbage, and human conditioned. In those areas in the Lake Tahoe basin where bear-resistant trash containers have been installed in multitude, such as in resort areas, the number of complaints received by NDOW has been reduced significantly (Tahoe Village – Mike Paulson, personal communication; Zephyr Cove Resort – Chuck Paulson, personal communication; NDOW unpublished data). During Beckmann's study many of the radio collared bears remained in the area where they were first captured, even though few additional complaints were received. As these areas became more responsible with bear-proof containers many of the bears eventually emigrated to non-bear-proofed areas.

Figure 16 – Large male bear exiting trap

There has never been a documented attack by a black bear on a human in Nevada (one injury related to feeding a wild bear – NDOW unpublished data), but if there is a relation between bear/human conflicts and bear-caused injuries to people, then an incident of this nature might not be too far off. Black bears can become extremely tolerant of human presence, even adapting to human altered landscapes. This tolerance however, must never be misconstrued for tameness or docility.

Bear habitat, as with other wildlife species, is being degraded and eliminated in Nevada at an alarming rate, especially along the Carson front. Protection of habitat and travel corridors must be a priority, thereby giving them someplace to go if and when the trash becomes inaccessible. We know that bears, along with other wide ranging wildlife species, use rivers and creeks as travel corridors. We also know that even large animals can move through seemingly populated

suburban areas while avoiding detection. For example, a four year old male bear wearing a radio collar was detected in a small section of dense shrubs adjacent to a general store in Minden (NDOW unpublished data), and remained there for at least one day apparently undetected. However, most would agree that this is not a desired behavior. Adequate travel corridors must be maintained, for mule deer and lions as well as bears. Without these corridors the suitable habitat becomes increasingly segmented, reducing among other things the genetic variation in wild populations.

Black bear populations are hunted throughout their North American range, and often times these populations are healthier (Garshelis 1990). For Nevada's bears the solutions are complex. From a biological standpoint, the bear population in Nevada sustains a high percentage of anthropogenic caused deaths each year, even without hunting, and appears to be healthy and sustaining. The bears that are desired by most sportsmen are large males, and in Nevada this means the bears at the urban-interface (Beckmann 2002), although there are certainly some wildland males in areas such as the Pinenut and Sweetwater mountains. With the urban-interface bears, whether death comes anthropomorphically or not, does not seem to matter. Within days or weeks another bear, usually a large, adult male will appear and occupy the same neighborhood (Beckmann 2002, NDOW unpublished data). A legal harvest season would then not seem to be a solution to the nuisance bear problem, although the population as a whole may absorb the harvest.

Continued research must be encouraged as a means of responsible management and maintaining a solid, scientific knowledge base on black bears. Black bears have proven to be very adaptable to various habitats, evidenced by some of their documented movements across the state. We already know that they once populated several mountain ranges throughout Nevada, and when they are discovered, as has happened on recent occasions in areas far east of their current range, it creates some speculation as to whether they are expanding that range eastward.

NDOW does not have a specific policy for the management of black bears, and the *Black Bear Program and Procedure*, which personnel have been following since 1997, does not constitute policy.

Management decisions for the most part have been left to field personnel applying discretionary principles on a case by case basis. This has been successful. NDOW has never operated under a 3-strikes policy with bears, opting instead to encourage people to alleviate the attractant. NDOW has been very consistent when the decision is made to euthanize a bear. These circumstances arise when a bear has become so bold that it either enters a home in search of food or does considerable damage attempting to enter *(Appendix 4)*. There has never been a case where a bear acted aggressively toward a person, thus no bears have been euthanized for this reason.

We must decide which management direction we will take in respect to black bears in Nevada. Translocation is not a reliable option because bears will simply return to the capture area regardless of the translocation distance. Killing bears, whether it be a result of a management decision, a collision with a vehicle or from natural causes, does not work either because another bear will eventually move in, sometimes in as little as two weeks. Aversion conditioning with its' short term effectiveness is the method desired by the public, but it is not always cost efficient, and it does nothing to permanently remove bears from urban areas. The only method that has been proven time and again to be successful is to prevent bear's access to human sources of food; garbage, fruit trees, apiaries and pet food. Once a bear becomes habituated to these food sources it is very difficult to persuade that bear to discontinue the behavior.

Nevada is not unique in its nuisance bear problem, nor is it unique in the way that problem is managed. We do however, have the ability to steer our management practices in such a direction so that our future generations may be able to continue telling stories about bears that will *improve with age*.

bear - English

yaaka - Nez Perce

medved - Russian

beer - Dutch

orso - Italian

oso - Spanish

weeta - Shoshoni

karhu - Finnish

bjorn - Swedish

arkouda - Greek

maskwowiw - Cree

kuma - Japanese

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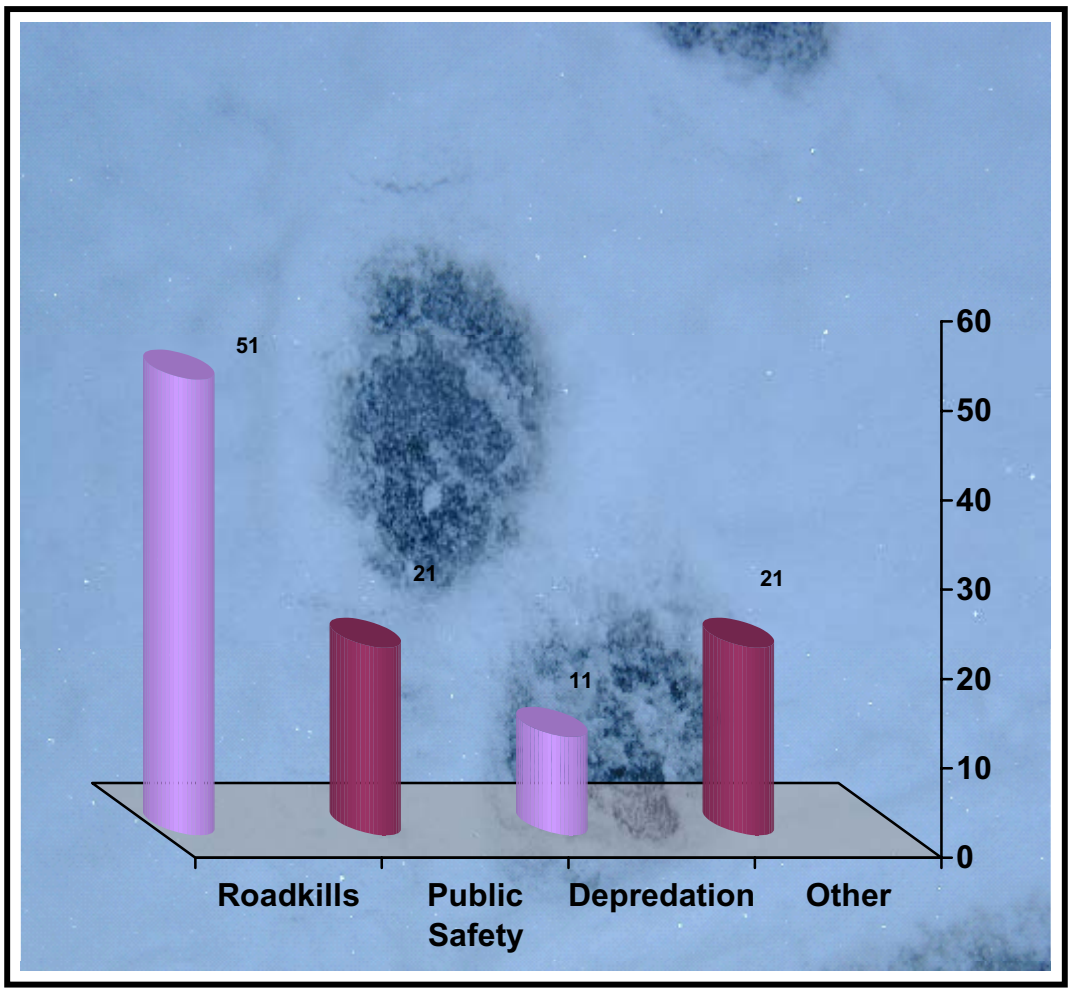
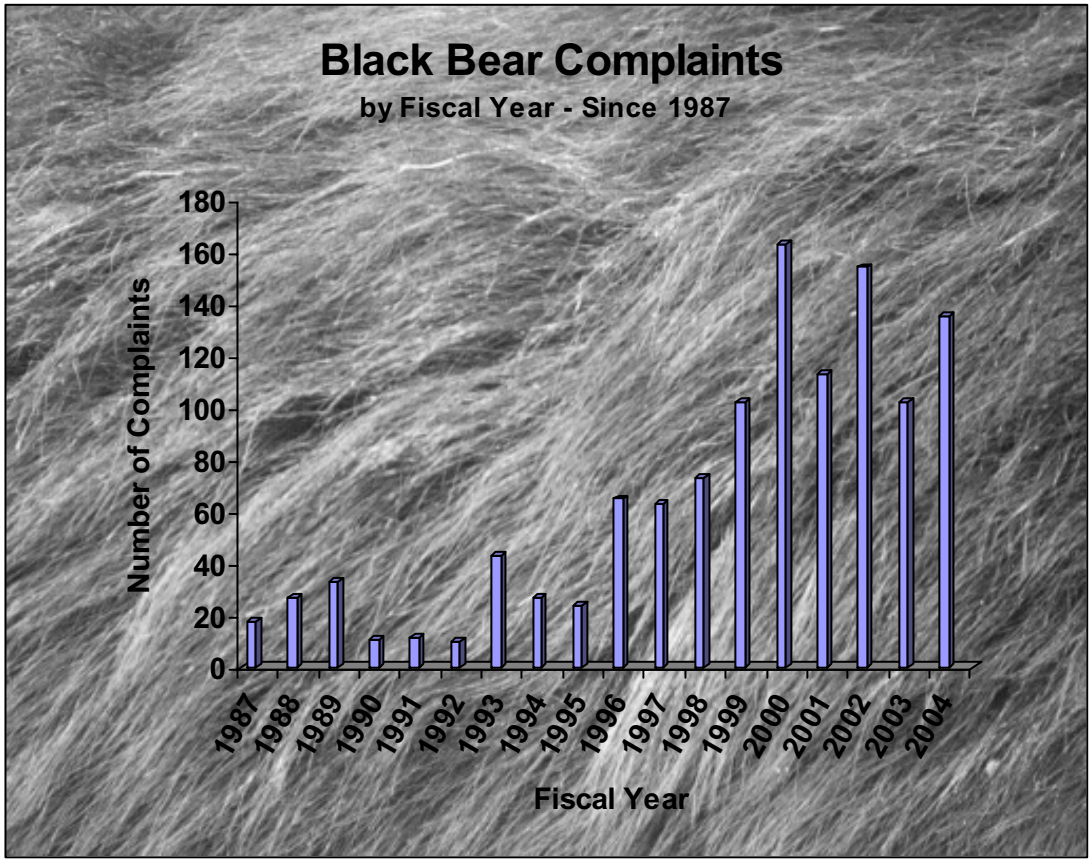
APPENDIX 1
BLACK BEAR MORTALITIES 1997-2004



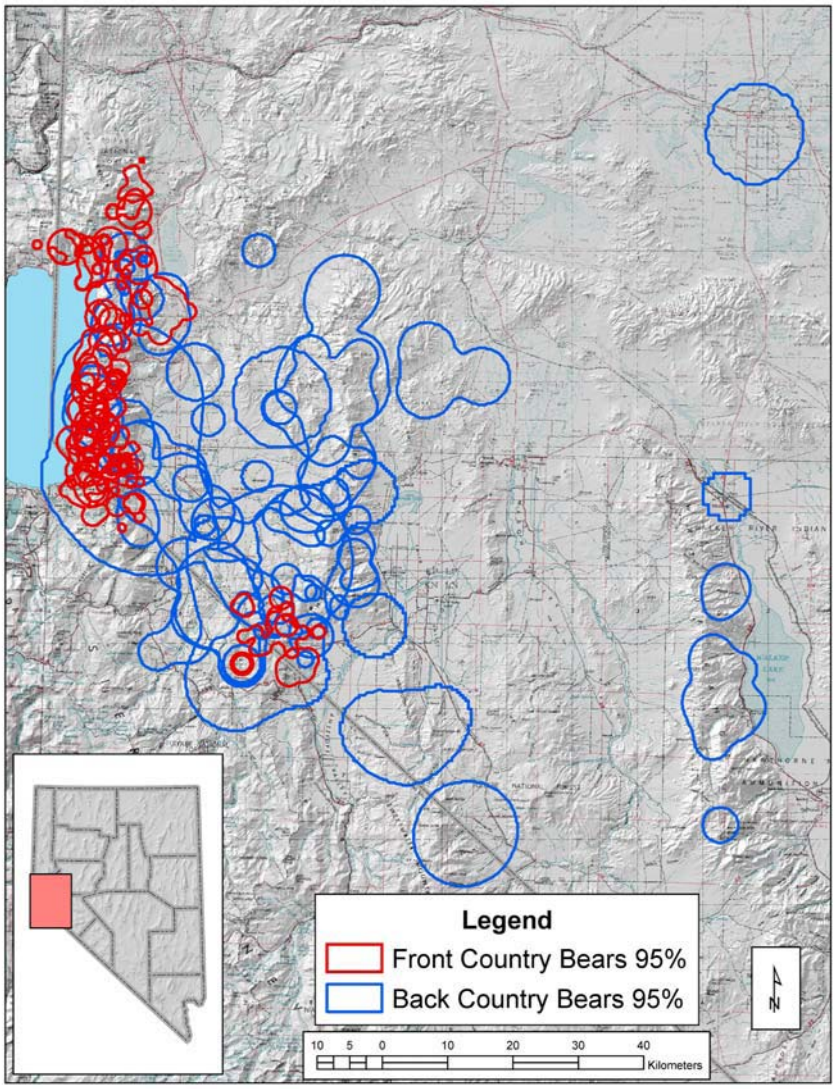
Notably, of the 104 documented bear mortalities, 100 had a known cause, and of these, 100% were from anthropogenic causes, this despite Nevada not having a hunting season.

APPENDIX 2
BLACK BEAR COMPLAINTS 1997-2004



APPENDIX 3
MAP SHOWING 95% HOME RANGES

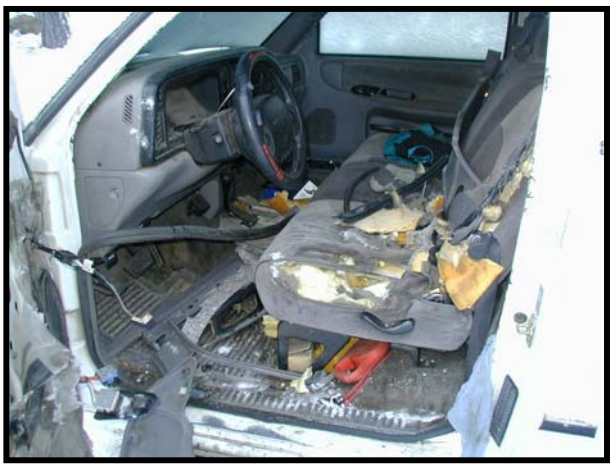
BECKMANN - 2002



APPENDIX 4
EXAMPLES OF BEAR DAMAGE

$4,000 in damage

$8,000 in damage to a total of
four homes, including this one



$2,000 in damage to pickup truck

150 pound goat killed and
partially consumed

APPENDIX 5
WILDLIFE CAPTURE DATA FORM - EXAMPLE

Nevada Department of Wildlife

Wildlife Capture/Chemical Restraint

75
GRN

Capture Data

Species BEAR Date 9-6-02 Time 2005 Location DEL MONTE - SW RENO

Animal Identification GRN 75 RT TAT/TAG Method FREE RANGED
(TAGS, TATTOOS, COLLAR FREQUENCY, EAR NOTCH, ETC.)

Recapture (Y) N Released (Y) N Release Location MT ROSE

Animal Data

Sex ♀ Estimated Age 20+ Weight 140 (lbs) / kgs (estimate / actual) Color CINN

Physical Condition E (G) F P Reproductive Condition DRY Ectoparasites NONE NOTED

Body Temperature 1st 99.7 °F 2nd 99.3 °F Pulse 84 bpm Respirations 12 rpm

Body Length (tip to tip) 59 " Height at Shoulder 25 " Girth: Chest 34 " Neck 19 "

Front Foot: Length 3.75 " Width 4.0 " Hind Foot: Length 6.75 " Width 3.75 "

Samples Taken TOOTH - RT PM 1 HAIR Envelope # 75
(INDICATE: HAIR, BLOOD, TISSUE, TOOTH, ETC.)

Remarks ASSIST WCSO WITH BEAR IN YARD, 395 @ DEL MONTE, FREE RANGED.
BEAR WAS RECAP FROM 1987 - GOODRICH BEAR #9

Drug/Medication Data

Time	Drug	Bottle #	Dose (mg)	ml	Route	Site
2005	TELAZOL/XYLAZINE	31-02	400/200	2	IM	FLANK
"	ACE-P	1-01	SPLASH	/	"	"
2040	LA-200	NA	300	3	IM	SHOULDER
2055	TOLAZINE	2-02	200	2	IV	SUBLINGUAL

Time Data

Ataxia 2007 Immobilization 2009 Reaction to Antidote 2056 Recovery 2215 Released 9-7-02

Darts/Drugs Lost, Missed or Discarded: Type and amount NA

Wildlife Agent LACKEY & LUSCETTI Assisting Personnel WCSO

Form BB - 01 November 2003

Nevada's
BLACK BEAR

Ecology & Conservation
Of a
Charismatic Omnivore

December 2004

NEVADA'S BLACK BEAR
BIOLOGICAL BULLETIN No.15