PROCEEDINGS
of the

8th Western Black Bear Workshop

Cecily M. Costello, Editor

PROCEEDINGS OF THE EIGHTH WESTERN BLACK BEAR WORKSHOP

15-17 April 2003

Chico Hot Springs Resort, Pray, Montana

Cecily M. Costello
Editor

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Preface

The 8th Western Black Bear Workshop was held on 15-17 April 2003 at beautiful Chico Hot Springs Resort, Montana, not far from the northern entrance to Yellowstone National Park. The Workshop was attended by 70 people representing ecosystems from Alaska to New Mexico. Although attendance was down, compared to recent Workshops in Washington and Oregon, participants were still rewarded with a diverse set of topics and points of view. The agenda included sessions for presentations and posters, which have been included in this volume as status reports, abstracts, or peer-reviewed papers. In addition, attendees were offered a special workshop demonstrating use of Program MARK for estimating survival and population size (led by Gary White of Colorado State University and Mark Haroldson of the USGS Interagency Grizzly Bear Study Team); two panel discussions related to bear-human interactions; a banquet program by Paul Schullery of Yellowstone National Park entitled "Yogi lives: the evolving image of bears in Yellowstone"; and a field trip into the northern range of Yellowstone Park (led by Mike Yochim of Yellowstone Association Institute, Kerry Gunther and Doug Smith of Yellowstone National Park, and Toni Ruth of Wildlife Conservation Society). I would like to thank all of the participants, sponsors, and members of the organizing committee for their help in making this Workshop a success.

Among interested individuals unable to attend the Workshop, lack of funds (especially for out-of-state or foreign travel) appeared to be the most common impediment. For this reason, I invited submission of written status reports from agencies not represented at the meeting. As a result, I have included reports from Arizona, California, Nevada, Northwest Territories, and Texas in this volume, along with the seven reports presented at the Workshop. I would like to thank all of the authors and referees for contributing to the Proceedings, especially those authors of peer-reviewed papers who endured a long revision process. I would also like to thank Karrie West (Interagency Grizzly Bear Study Team) for help with technical editing, and Ray Paunovich for providing the original photograph used in the cover design.

Cecily Costello
Workshop Chair

HISTORY AND RESPONSIBILITY

HOWARD QUIGLEY, Beringia South, P.O. Box 160, Kelly, Wyoming 83011, USA, hquigley@attglobal.net

A sincere welcome to all of you and thank you for coming to this important workshop. I am not only here to welcome you and say thanks for coming, though. I am here to drop some perspective into the mix before we get started with the workshop sessions. Just the fact that you are here says you believe the black bear is important. And, your presence says that the things we can do in this forum are worth your time.

For those of you that are here for the first time, please take advantage of the wonderful environment around us here. The Greater Yellowstone Area is considered one the largest intact ecosystems of the world, and the most intact ecosystem in the temperate zone of the globe. It is the home of the first national park in the world, Yellowstone National Park. It is also the home of expanding wolf and grizzly bear populations. In fact, with the re-introduction of the wolf in 1995 and 1996, it is not only one of the most intact ecosystems of the world, but it now contains a complete complement of the native vertebrates, perhaps with the exception of the black-footed ferret on east side.

The Greater Yellowstone Area has a lot to offer, so, if you haven't spent much time here, please get out and see some of it. For those of you that live in and around here – as I see there are quite a few in the audience – get out and show some of these folks around and use this as an excuse to brag about the area and maybe learn more about it yourself.

There are other significant aspects of this area that have to do with our objectives and interests related to this workshop, also. I think you can make a pretty good case for this being the epicenter for much of our understanding of bears in the beginning of our quest to understand them better. It's a touchstone of sorts for the science of bear research and management. But, it's not only the early scientific understanding that the area produced; it's also the exposure that bears were given by the work of the Craigheads in particular. Thus, yes, I want to welcome you here, and encourage you to please try to experience some of the area. Try to take in some of the history, especially the history of scientific inquiry performed here.

Secondly, what I've been asked to do is to give some perspective to the meeting, and set a sort of frame of mind for productive engagement in what you have in front of you for the next few days.

As with any workshop or conference, there was a lot of planning and scrambling involved in getting to this point. So, thanks to the organizers, especially Cecily Costello, for getting us to this point. Now, it's up to all of you to make it worthwhile. And, I guess I should say, I didn't plan on standing up here; it wasn't what I planned when I got the call at the Hornocker Wildlife Institute three years ago inquiring whether we would host the workshop. Since this is normally the place where you put somebody to reflect, to give perspective, and to rally the troops to move forward, I had originally strongly recommended that we get one of the old stalwarts of bear biology from the region. Well, the jokes on me; maybe I'm older than I thought. I did sort of expect a Craighead, or a Jonkel up here. But, I'm honored to be here.

To help with that image though – the feel of heritage and perspective – I did query a few people to see if they would contribute something. From the Craighead experience, I asked Maurice Hornocker for something, anything from a gem of philosophy, an anecdote, an experience from the early days. Maurice gave it all wrapped into one package, like he is sometimes known to take a simple example and find life's philosophy in it, or some comment on the human condition.

He related a story about how he and John Craighead would sometimes take a little respite from their normal research activities during the winter and head to one of the backcountry cabins or research facilities and spend some time exploring and investigating the area. Sometimes they had a bear or two to keep track of in these areas, but it was also a sort of getaway, too. One November, as he remembered it – and this would have been 38 or 39 years ago – they were in the backcountry tracking a grizzly in the Old Faithful area.

As they were poking around just north of Old Faithful, and they saw a black bear moving slowly around a potential den site, and, they surmised, preparing to den.

They came back later and shined a light into an old, inactive geyser cone and, sure enough, there was a black bear denned inside. So, with a collar and equipment they squeezed inside and crawled back quite a ways to work this sow. They could see way back inside. It was pretty tight in places for them to move, but nice and warm and a good place to for a bear to den. Maurice said he was doing fine until he looked back over his shoulder and he saw this little tiny light way back down the tunnel. It hit him how far they had come into the cave, and how tight the situation really was. He began feeling very closed in and claustrophobic, but, did not want to show John that he was having problems and he just kept doing what he was supposed to do. They got out fine.

There was one point he wanted to make with this little parable of life, and he wanted me to express to all of you. That is…don't look back.

I also asked Chuck Jonkel for some input. He sent me some lists of current issues of the Great Bear Foundation, which were informative and assisted in the comments I'll make later on. The main point he made and wanted me to express to all of you was that many of the important early issues with bear conservation and management are still the same and still require a great deal more of our attention. He especially emphasized the need for increased attention to the bear-human interface. Then, Chuck added that he wanted everyone to remember the year 1963, because that was the year that he, the Craigheads, and Al Erickson began their work on bears.

Lastly, I asked Steve Herrero to provide something. He reflected on the early days and implied that it might be important to remember that at the Second International Conference on Bear Research and Management in Calgary, November, 1970, he reviewed the scientific literature. The review included all of the in-house research reports that had been produced for agency files and all the unpublished university theses, on both American black bears and brown (grizzly) bears. There were less than 100 articles on the two species for him to summarize. He said the prominent people in black bear research were Al Erickson, Chuck Jonkel, and Doug Pierson, who died in a plane crash while conducting bear research for the state of Washington.

Steve went on to say that a literature search like that now would "yield 10s of thousands of valuable research publications on American black bears and grizzly bears." He added that research and understanding of bears has come a long way, and so has bear and people management. He wanted us to know that this is something of which we can all be proud.

Well, that's what three of the elderly statesmen of bear biology said. But, allow me to spin this into something, maybe synthetic, maybe not.

Maurice Hornocker said, don't look back. Chuck Jonkel pointed to what he calls "persistent issues". And, Steve Herero, with a characteristic "cup is half full" approach admired our advancements. What does this mean? For Maurice's "don't look back"…well, I disagree somewhat; we have to look back or we'll repeat the same mistakes or redo things that don't need to be redone. But, the other side of that comment would be, "keep going", or keep up the momentum. We don't know everything; look ahead to the next questions, the next horizon. And, I truly believe we need that message.

For Chuck Jonkel's comments, he is right: we have issues that keep coming up and we need to make sure we are dealing with them.

And, for Steve Herrero's message, yes, we have come a long way, and we do deserve to take a moment to take a deep breath to appreciate that, and to be proud.

Lastly, I just want to do two things: touch on some issues, and then send you off to work on making this workshop a success. First, let's touch on some issues, and then some final perspective. The question we asked for the organization of the workshop, and that we need to always ask ourselves as professionals is, "What do we need to focused on?" First, it doesn't hurt to understand and focus on the success of the species. Almost 22 years ago – while I was working on the giant panda project – I started a magazine article that ended up being titled, "Super Survivor", about black bears and my research in Tennessee. That's what we have: a super survivor. We have a large carnivore that can be almost ubiquitous on the landscape; it's still here despite us, and with a little help from us. The grizzly is gone from most of its range; the wolf is gone from most of its range.

But what does this success bring? It brings the responsibility to keep educating people about black bears. It doesn't matter whether it's the absentee landlord with a big home on the hill, or the traditional rancher. We have to find a way to get to them with the information they need to live in bear country. It's still true: a fed bear is a dead bear. And, we know how to prevent the latter. We just have to get through to people. We aren't doing it yet in most cases. We have to deal more intensively with the bear-human interface; that interface is only going to get more widespread in the future and more intense with interactions and potential interactions.

And, on the issue of monitoring bear populations, we are advancing nicely with monitoring techniques. It doesn't matter whether its harvest statistics or hair snag/DNA approaches, we are moving forward, testing, and advancing the science of the issues. We need to pay attention and maintain the momentum. And, the session tomorrow afternoon with Gary White and Mark Haroldson is part of advancing this approach so I encourage all of you to try to participate.

Third, we need to take on issues. And, there are lots of issues when it comes to bears. We just need to take the issue on; we don't need to take sides, just provide expertise and information. We need to be part of the problem solving. For instance, why can't we do an assessment of the baiting issue? Why can't we produce something that objectively evaluates the situation? Do we have to sit back and let it unfold as an emotional and political issue? The same goes for hound hunting: why can't we make an objective assessment, from the experts, to address these sticky issues? Why can't we undertake research to answer some of these thorny issues?

And, fourth, there's this new murmur we hear out of a variety of political and biological corners. It says, "There are too many black bears." What does that mean? Can there be too many black bears? What causes us to say such things? Aren't we working under the assumption that bears are naturally regulated by food supply and possibly social organization? Aren't we assuming we are keeping artificial food sources limited? Then what does this mean to have "too many black bears"? If we are going to condone some action to reduce the number of bears, then we had better have good reason, or we should be making strong counter arguments to this statement.

So, my plea for action here is to not be afraid to take these things on, to not be afraid to interact on these issues. Perhaps some working groups could help move us forward in supplying information for these issues.

Lastly, I want to say, remember that we are creating the shoulders for the next generation of bear biologists. We used the shoulders of the previous generation of biologists to stand on to this point; we stand on their shoulders right now and peer into the unknown – the questions – of the future for bear biology. We are becoming the shoulders for the next group. That means we not only have the responsibility to do good science, take on the persistent issues and speak up, but also to train.

I remember 23 years ago this summer, in late June, we had moved from Yosemite Valley to the high country to see what bears were doing in the summer elsewhere. I had just gotten a copy of Jonkel's *Black Bear in the Spruce-Fir Forest*, and at night I read that with my flashlight until I fell asleep. The following February, somehow I found the money to get to Kalispell to the International Bear Conference. I sat in awe as I listened to the likes of the Craigheads, Jonkels, Peltons, and Herreros. I was not only inspired by this amazing species, but by the people working with them. The moral of this story is to inspire! You are inspiring the next generation through your passion for these animals. Take that responsibility seriously. It does make a difference; it creates shoulders.

ARIZONA BLACK BEAR STATUS REPORT

VASHTI SUPPLEE, Arizona Game and Fish Department, 2221 W. Greenway Road, Phoenix, AZ 85023, USA, vsupplee@gf.state.az.us

Classification

Black bears (*Ursus americanus*) are currently classified as big game in Arizona. Until 1928, bears were classified as predatory animals and could be shot or trapped at any time. In 1929, a new game code classified all bear species as big game, provided a month-long open season, and prescribed a bag limit of 1 bear/year. Bears could not be trapped, but they could be taken with dogs. Later regulations were more restrictive; cubs were protected in 1934, and the bear season was closed south of the Gila River in 1936.

The status of bears deteriorated drastically during World War II. In 1944, month-long fall and spring hunts were authorized and the following year, bears lost their designation as big game. In 1949, a year-long season was authorized (except during seasons for other big game species) for Apache, Greenlee, Graham, and eastern Coconino counties. After reinstating spring and fall bear seasons in 1950, the Arizona Game and Fish Commission again opted for year-long seasons from 1951 to 1953. After 1954, bear regulations became more restrictive, tags were required to take a bear, and in 1968 the black bear was again classified as big game.

Distribution and Abundance

In Arizona, the black bear is found in most woodland habitats, including pinyon-juniper (*Pinus* spp.-*Juniperus* spp.), encinal, coniferous forest, and chaparral (Figure 1). An interesting note to black bear distribution in Arizona is the absence of any sizeable population of black bears north of the Colorado River.

Highest black bear densities, numbering up to 1 bear/2.6 km^2 of suitable habitat, occur in the White Mountains, below the Mogollon Rim in the Sierra Ancha and Mazatzal Mountains, and in the "sky island" mountain ranges in southeastern Arizona.

Population Monitoring

Estimation of black bear populations is not done in any methodical or standardized fashion. Densities have been established in key habitat types through radio-telemetry research projects. Information from these studies has been used to develop "best professional opinions" of relative densities. The current statewide estimate is approximately 2,500 adults occupying approximately 32,600 km^2 of habitat.

Track count surveys were attempted in key black bear population areas in the 1990s for monitoring population trend. Results were variable and the techniques have been abandoned. Reestablishment of survey protocols is currently being explored.

Figure 1. Current range of black bears in Arizona.

Management Plan

Arizona has management guidelines for black bear and a policy for nuisance animals. State law governs disposition of depredating animals. Black bear management strategies and objectives are described in the *Arizona Wildlife 2006 Strategic Plan* (Arizona Game and Fish Department [AGFD] 2001).

Hunting Laws and Regulations

Black bear are classified as big game and there is an annual bag limit of 1 bear. Cost of a black bear tag is $13.00 for residents and $183.00 for non-residents. A legal animal is any bear except a female with cubs for fall and spring seasons. Pursuit with hounds is legal in fall hunts only. Baiting is not permitted.

During fall and spring, most hunts are for general firearms, although more areas are being opened for archery only (Table 1). Fall bear hunts require a bear tag that is valid in all open areas. Hunt tags may be purchased from license dealers. Annual sale of bear tags ranges between 4,150 and 4,500 tags. Spring hunts are limited entry through a lottery permit draw system. Approximately 380 firearms and 140 archery permits are allocated. All hunt areas for fall and spring hunts may close before the last day of the season if the female harvest objective is reached.

Arizona has female harvest objectives for each bear hunt area. Hunters must report all harvest within 48

hours of killing a bear, using a toll-free telephone number provided by the AGFD. When the number of female bears reported killed equals the harvest objective, the corresponding unit(s) close at sundown the following Wednesday. Hunters may check for closure of hunt areas using the toll-free telephone number.

Table 1. Dates and legal methods for fall and spring bear hunting seasons in Arizona.

Season	Approximate dates	Legal method
Fall archery	Aug–Sep	Archery only, Pursuit with hounds
Fall firearms	Aug–Oct or Aug–Dec	All legal firearms or archery, Pursuit with hounds
Spring archery	Apr or May	Archery only
Spring firearms	March–Apr	All legal firearms or archery

Harvest Summary

Harvest numbers are obtained through the mandatory reporting requirement. The AGFD provides a toll-free telephone number for reporting harvest and also requires submittal of a premolar tooth for aging. Beginning in 2003, teeth will also be used to verify the reported gender of the animal.

From 1992–2001, hunter harvest ranged from 117–320 (Table 2). The year 2000 has been named "year of the bear." Arizona experienced drought conditions that resulted in hard and soft mast failure in late summer and early fall. Over 40 animals were "rescued" in the metropolitan Phoenix area, rehabilitated, and released the following spring. A similar number of bears either died due to starvation, various mishaps in suburban settings, or euthanization by officials from various law enforcement agencies, including the AGFD.

Depredation Trends, Policies, and Programs

Arizona is a cooperating state in the "Bear Aware" program. The focus audience is the general recreating public. Nuisance bears are identified as individuals that present human safety concerns or individuals that are "in trouble" in suburban or urban settings. The AGFD has a nuisance bear policy.

Depredating bears may be killed by a livestock owner or his agent once evidence of depredation has been verified by a AGFD officer. State law requires that these kills be reported to the AGFD.

Two counties have adopted ordinances prohibiting the feeding of wildlife. Otherwise it is legal for the public to feed any big game species in Arizona.

Table 2. Number of documented black bears mortalities from sport harvest, depredation, or other causes, Arizona, 1992–2001.

Year	Sport harvest	Depredation	Other mortality
1992	121	1	
1993	117	1	3
1994	236	2	14
1995	197	1	
1996	254	3	18
1997	224	2	6
1998	142	0	9
1999	181	0	
2000	320	2	43
2001	178	0	1

There is 1 wildlife rehabilitator with facilities for black bears. The year 2000 has been the only recent period with such large numbers of animals ending up in rehabilitation. Most bears are placed in zoos or other captive educational facilities. The bears returned to the wild in 2000 were radio-marked and monitored. Results will be published when the study is complete.

Research Programs

Currently, the AGFD is monitoring the rehabilitated bears from 2000. All other black bear research has ended. A final report is pending for a research project evaluating effects of forest fire on the Four Peaks population previously researched in the 1970s (LeCount 1982).

Conclusions

The greatest challenge for black bear management in the future is habitat fragmentation and encroachment of human development in historic black bear use areas.

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CALIFORNIA BLACK BEAR STATUS REPORT

DOUGLAS UPDIKE, Wildlife Management Programs, California Department of Fish and Game, 1812 9th Street, Sacramento, CA 95814, USA, dupdike@dfg.ca.gov

Classification

In California, black bears (*Ursus americanus*) were classified as furbearers in 1917. There were no restrictions on how, when, or how many bears could be killed until 1948. In 1948, bears were classified as game animals, hunting seasons were established, and regulations were established requiring a license to hunt or trap bears, and a bag limit of 2 bears/year. However, in the northwestern counties of Humboldt and Del Norte, bear hunting was allowed year-round during 1953–1961. Trapping, other than for damage control, was outlawed in 1961. Regulation changes, resulting from our increased knowledge of bear abundance, included reducing the bag limit from 2 to 1 bear/year in 1968, prohibiting the killing of cubs or females with cubs in 1972, and prohibiting the practice of training dogs to pursue bears (other than during the regular bear season).

Distribution and Abundance

The North Coast/Cascade subpopulation occurs north and west of the Sierra Nevada Mountains (Figure 1). Roughly half of the statewide black bear population resides in this portion of the state. Previous and ongoing studies indicate bear densities range from 0.4–1.0 bear/km^2. Almost all bear habitat in this area is publicly owned or used for timber production. Large wilderness areas are located within each of the U.S. National Forests of this region.

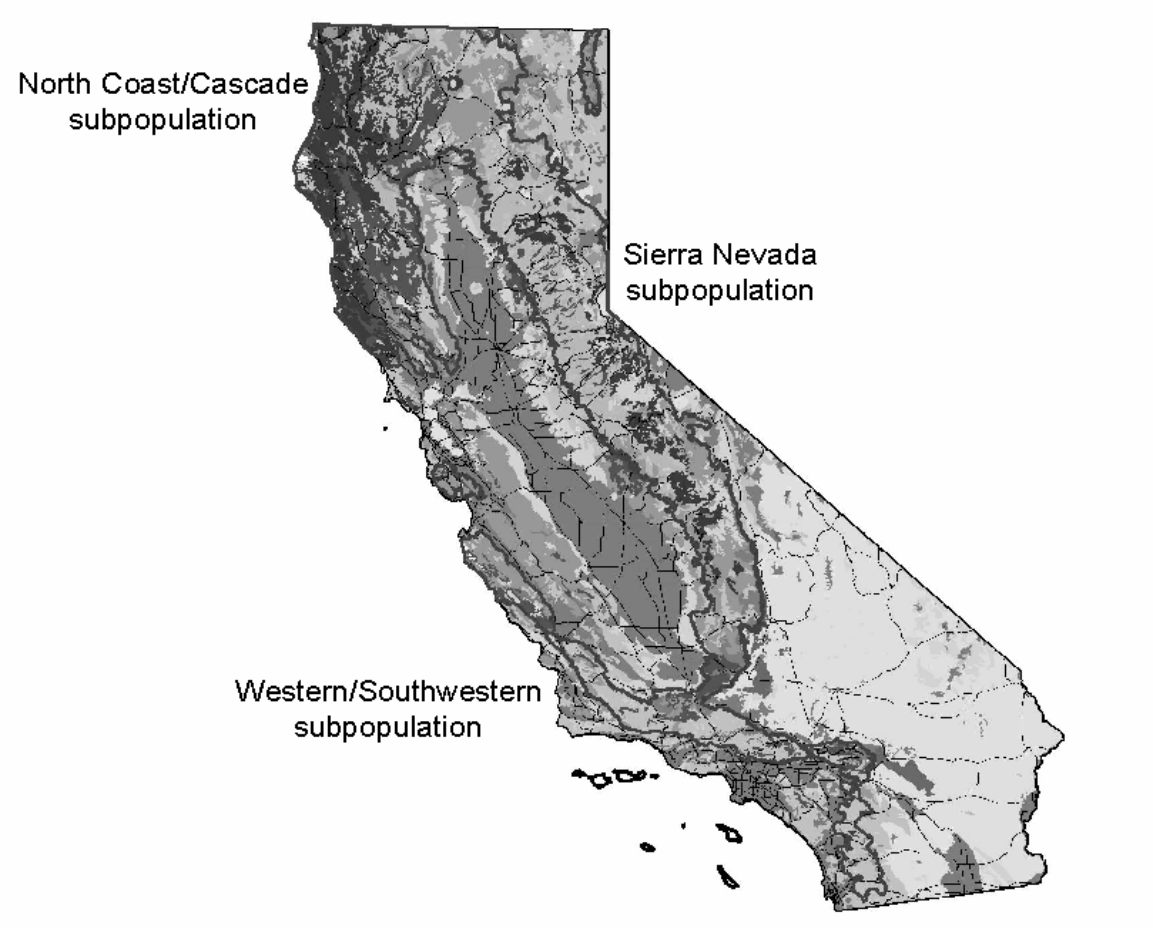

Figure 1. Distribution of black bears in California (represented by the dark-banded polygons).

The Sierra Nevada subpopulation extends from Plumas County south to Kern County. Black bears inhabit the entire region. About 40% of the statewide black bear population inhabits the Sierra Nevada Mountains. Bear densities are lower than those in the North Coast/Cascade subpopulation, with 0.2–0.4 bears/km^2. Over two-thirds of the bear habitat is administered by the U.S. Forest Service and 2 large National Parks are located within this region.

The Western/Southwestern subpopulation extends south and east from Santa Cruz County to San Diego County. Prior to 1950, black bears were probably absent from this area, where they were likely excluded or limited by the larger California grizzly bear (*U. arctos californicus*). After the grizzly bear was extirpated around 1900, black bears appeared in Ventura and Santa Barbara Counties. The California Department of Fish and Game (CDFG) supplemented this natural range expansion by moving black bears into southern California during the early 1930s. The populations currently inhabiting the San Gabriel Mountains, San Bernardino Mountains, and areas south into San Diego County are believed to be at least partially descended from these translocated bears. Probably <10% of the statewide black bear population inhabits the Western/Southwestern region and bears are restricted to the Central Coast and Transverse Mountain Ranges. In the Western province, bears were detected by bait stations with decreasing frequency as latitude increased. Based on studies of black bears in chaparral habitats in Arizona and southern California, bear density is probably <0.1 bears/km^2.

Population Monitoring · Management Plan

Each successful bear hunter is required to present the bear skull to a CDFG employee to have a tooth (preferably an upper first premolar) extracted for age analysis. Knowing the age of bears taken by hunters is important for monitoring the status and trend of the bear population. The CDFG uses a statistical analysis of age and sex data, obtained from hunter harvest, to develop an estimate of harvest rate (or the percent of the population that is killed by hunters). Accurate information from the bear harvest and the percentage of the population that is harvested can then be used to make an estimate of the total population size (Figure 2). This technique is based on the principle that the change in sex ratio, observed as age increases, is caused primarily by a consistent sex bias in the harvest. Male bears are killed at a higher rate than they occur in the population as a result of hunter selectivity, and because male bears have larger home ranges and a correspondingly higher probability of being encountered by hunters. Sex ratios will be biased towards males until fewer males are available for harvest. Thus, males dominate the younger age classes observed in the kill, while females make up a greater proportion of the older age classes. The harvest rate is estimated as the age at which the proportion of males is equal to the proportion of females. The population is estimated by multiplying the total harvest by the harvest rate.

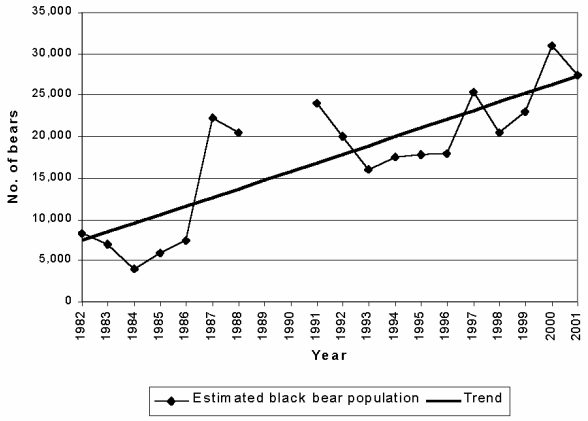

Figure 2. Estimated black bear population size, California, 1982–2001.

California has a statewide management plan for black bears (California Department of Fish and Game 1998). The plan recognizes a variety of values and uses of the bear resource. The plan encourages land managers to consider black bears in their land use decisions, suggests continued hunting and wildlife viewing opportunities, acknowledges the need for law enforcement to reduce illegal killing of bears, encourages research efforts and recognizes the need to address bear depredation issues. The plan uses a matrix of population parameters to monitor the black bear population (Table 1).

Table 1. Decision matrix for monitoring the black bear population, California.

Monitoring technique	Threshold of concern
Median age of hunter-killed bears	Female age <4.0 years old; or statistically significant reduction in median age for combined sexes
Percent females in harvest	>40 percent
Total harvest	<1,000 or statistically significant reduction; only if reduction is independent of administrative action
Kill per hunter effort and population index	Statistically significant decline in both kill

The annual status of the bear resource is compared to the decision matrix. Should any 2 of the thresholds of concern be exceeded, a recommended change in the hunting regulations would be warranted to reduce bear harvest.

Hunting Laws and Regulations

The bear hunting regulations in California provide for the following:

1. Allows for an unlimited sale of black bear hunting tags for a general bear hunting season in designated areas of the State. The general bear season opens concurrently with the general deer season in the A, B, C, D, X-8 through X-9b, and X-12 deer hunting zones. For the remainder of the bear hunting area, the season will begin on the second Saturday in October. The bear season will close on the last Sunday in December or when 1,700 bears are reported taken. The in-season closure mechanism (1,700) should provide reasonable hunting opportunity while insuring that the take of bears is below the population's ability to replace bears killed;
2. Persons possessing a valid bear tag are also authorized to hunt during an archery-only season which would begin on the third Saturday in August and extend for 23 consecutive days. The areas open to archery-only bear hunting would be identical to those open to hunting during the general bear season. The cumulative number of hunt days will range from 102 to 143 (average 130) days depending upon location;
3. Bears may be taken using methods authorized in sections 353 and 354, Title 14, CCR. Those methods are described as: rifles using center-fired cartridges with soft-nosed or expanding bullets; muzzle-loading rifles, pistols using center-fired cartridges with soft-nosed or expanding bullets; bow and arrow; crossbows; and shotguns using single slugs;
4. The use of more than one dog to take bears is permitted after the close of the general deer season;
5. The bag and possession limit is one bear per season per hunter;
6. The take of bears weighing less than 50 pounds or females accompanied by a bear weighing less than 50 pounds is prohibited;
7. Only CDFG employees validate bear tags;
8. All bear tag-holders (both successful and unsuccessful) are required to return their bear tag to the CDFG immediately after it is countersigned by a CDFG employee, or if the hunter is unsuccessful, by the following February 1;
9. All successful bear hunters are required to present the skull of the bear they killed to a CDFG office/officer within 10 days of taking the bear;
10. Successful bear hunters are required to indicate on their bear tag if they used the services of a licensed guide and/or used dogs to aid in taking their bear;
11. The use of bait to take or attract bears is prohibited.

Harvest Summary

Annual black bear harvest has ranged from approximately 400 to 1800 bears during 1957–2001 (Figure 3). Currently, the hunting season is closed when there are 1,700 bears reported taken or the last Sunday in December, which ever comes first. In 5 of the last 6 years, the 1,700-bear limit has been met. In 1989, there was no bear hunting season, and in 1990 there was a general bear hunting season, but no archery season.

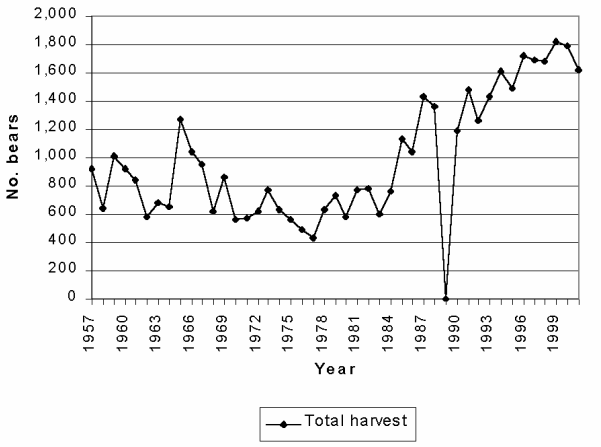

Figure 3. Number of harvested black bears, California, 1957–2001.

In California, most female bears do not produce cubs before the age of 4 years. The median age of hunter-killed female bears has increased since 1983, when it was only 2.5 years. This indicated there were relatively few female bears reaching the age of reproductive maturity. Some research in northern California reported in 1989 showed the median age of bears trapped in Redwood National Park (where hunting is not allowed) was 4.3 years. In Yosemite National Park studies reported in 1982 and 1990 showed the median age of trapped bears was 3.6 years, 4.9 years if cubs were excluded. Since the mid-1980s, several changes have been made in hunting regulations to reduce illegal killing of bears. The median age of all

bears harvested in California during 2001 was 4.7 years old, and 6.1 years old for females.

One important factor for monitoring the bear population in California is the sex ratio of the bear harvest. It is an important indicator of the health of the bear population. In the period 1957–1980, the proportion of females in the harvest usually exceeded 40%, but during the 1980s and early 1990s, the proportion was generally lower than 40% (Figure 4). This reduction in the proportion of females is believed to be due to reduced mortality in the population because of changes in the regulations and other factors causing the bear population to increase in size. The increase in the proportion of female bears in recent years is believed to be due to a regulatory change in 1996 that opened the bear general season with the deer general season.

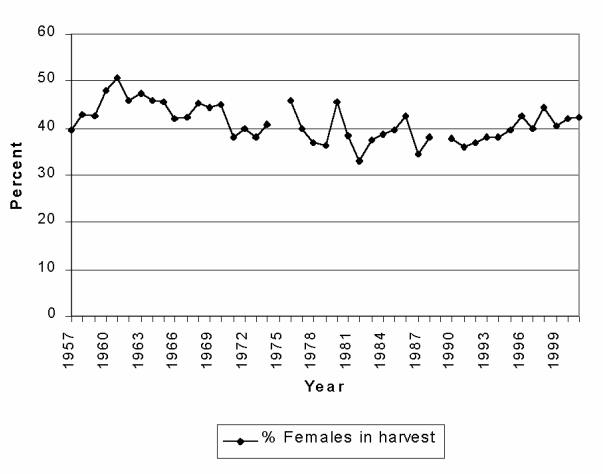

Figure 4. Proportion of females in the black bear harvest, California, 1957-2001.

Depredation Trends, Policies, and Programs

It is natural for a bear to investigate all attractive smells and consume whatever seems like food. The only real solution to a bear problem is to eliminate the attractant. Black bears are legally designated as a game mammal in California. As such, bear hunting follows a regulated process that includes obtaining a tag and restricting hunting to a specified season. However, Section 4181.1 of the Fish and Game Code states that landowners may kill a bear encountered in the act of molesting or injuring livestock. In the case of a problem bear, the law provides for the issuance of a depredation permit to landowners or tenants who experience property damage from bears. The permit allows the permittee or designee to kill the offending bear regardless of the time of year. But a depredation permit is the last step in a series of steps taken to eliminate the problem.

The CDFG bear depredation policy represents a progressive response system based upon the degree of damage being caused. Bear situations are categorized and then addressed. In the first category, a bear strays into a populated area and cannot readily return to bear habitat. This bear has simply found itself it the wrong place. In most situations, removal of the antagonists or distractions from the area will allow the bear to return to nearby bear habitat with no other incident. Designated a "no harm no foul," techniques to remove the bear may include, but are not limited to: the use of sound makers, pepper spray, rubber slug shot shells or sling shot projectiles to drive the bear away or haze the bear out of the area. Tranquilizing and removing the bear can be used if other methods are determined to be unsafe or have been unsuccessful.

In the second category, a bear becomes habituated to humans and may be a nuisance problem (no property damage involved) by tipping over garbage cans, invading compost piles, walking across porches, and so forth. Previously captured bears that have returned to areas of human habitation are included in this category. In these cases, the landowner or tenant is informed of reasonable corrective measures which may include, but are not limited to: area clean-up, removal of trash or other food attractants, bear-proofing food storage areas, electric fencing, and temporary closure of campsites. As mentioned above, techniques to remove the bear may include, but are not limited to: the use of sound makers, rubber slug shot shells, or sling shot projectiles to drive the bear away or haze the bear out of the area.

In the third category, a bear causes real property damage (e.g., to dwellings, structures, vehicles, or apiaries) or is a repeat offender (the bear has been previously captured or hazed by DFG employees). If the damage is minor and there are no other previous reports of damage — the first action is implementation of reasonable corrective measures to remove attractants as outlined for the second category. Corrective measures must be made prior to, or in addition to, issuing a depredation permit. When a bear has caused extensive or chronic damage to private property (e.g., livestock killed or injured, or entered into a home or cabin) or repeated damage where corrective or bear-proofing efforts have failed, CDFG issues a depredation permit.

Depredation permits over the past 25 years have been issued for a variety of reasons. Fifty percent of the depredation permits were issued for damage caused to structures or other property (e.g., vehicles, trailers, or recreational vehicles). Livestock represented the next most common category with 15 percent. Livestock includes cattle, sheep, goats, pigs, and horses. Orchards and fowl (chickens, geese and ducks) each represented 11 percent of the total, and beehives represented 8

percent. Crops, safety, and pets represent the final 5 percent.

Several counties in California have adopted ordinances to try to eliminate the attractants for bears. A model ordinance was developed by the Tahoe Council for Wild Bears, and this ordinance seems to address the problem quite well (Appendix A).

A bear is killed about 40% of the time a depredation permit is issued. Over the 25-year period 1977–2001, males represented 81% of bears taken on depredation permits (Figure 5). This is partly due to the larger home ranges of male bears and greater aggression between males, causing them to move to less suitable areas.

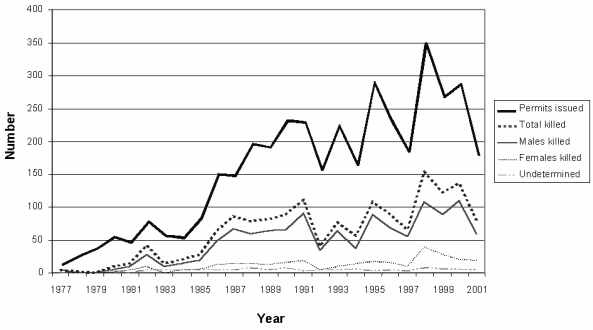

Figure 5. Number of depredation permits issued and black bears killed, California, 1977-2001.

The CDFG has a new statewide campaign to make people more aware of the problems they may be causing by attracting wildlife, bears in particular. The campaign is called "Keep Me Wild." The campaign consists of a brochure, posters, stickers, and radio and TV advertisements.

The CDFG does rehabilitate healthy, orphaned bear cubs. The policy and criteria state cubs of the year may be candidates for rehabilitation if the following conditions are met:

1. There is a consensus between CDFG personnel in the region and the Wildlife Investigations Lab (WIL) Supervisor or his designee that a given cub is suitable for rehabilitation.
2. If consensus is not reached, the final decision about whether a cub meets these criteria will be made by the WIL Supervisor.
3. Orphaned cubs are encountered before August 1, when cubs are about six months old. After August 1, cubs of the year are usually capable of surviving on their own and should be evaluated as candidates for rehabilitation on a case-by-case basis. Cubs must be healthy and of normal body weight for their age.
4. Orphaned cubs have had little or no contact with humans. This means that the cubs have not imprinted on humans.

Unless the WIL otherwise allows, all orphaned cubs which are candidates for rehabilitation shall be transported to the WIL, the animals should be held in a secure container and kept in a quiet place with little or no human contact. Cubs should be given food and water as appropriate. It is unlawful for the public to pick up and possess wildlife.

All rehabilitated orphaned bear cubs shall be ear-tagged by the rehabilitating facility prior to transportation for release into the wild. Marking of bear cubs is required. Rehabilitated cubs should be released in suitable habitat (near snow line is preferred) within 75 miles of the site where they were originally captured. The release site shall be coordinated with the land management agency. Release of rehabilitated orphaned cubs requires placing animals in natural or artificially constructed dens during the most appropriate time of late fall or winter. Den sites should not be disturbed after cubs are placed in the den. Release of rehabilitated cubs is supervised by CDFG personnel prepared to address questions from the news media.

A successful rehabilitation of an orphaned cub is for the animal to never be a nuisance/depredation problem and live long enough to reproduce. Too few cubs have been rehabilitated and released to conclude about the success of the program. We plan to continue to rehabilitate cubs as it generates public support for the CDFG.

Research Programs

Current research in California includes investigations into the solutions to conifer damage by bears, genetic heterogeneity and relatedness, efficacy of aversion techniques on bears and the conclusion of a cub mortality and den selection study.

Public Attitudes Towards Hunting and Management

Recent surveys conclude that the majority of Californians are against bear hunting and hunting with the use of hounds. In the past decade, 3 bills have been introduced to eliminate the use of dogs while hunting. In 1993, SB 67 (Petris) would have placed a moratorium on hunting black bears with dogs until the CDFG completed a study. In 1997, SB 1143 (Sher) would have prohibited the use of dogs to take bears, fur-bearing mammals. In 2003, AB 342 (Koretz) would eliminate the use of dogs for taking mammals or training dogs for the purpose of taking mammals. The first 2 of these bills failed in subcommittees, however the third bill has not been heard in the Assembly subcommittee as of the time of this report.

Conclusions

California's bear resource is thriving and expanding. The statewide population size has more than doubled in the last 20 years (Figure 1). Black bears continue to expand into areas that were historically occupied by California grizzly bears, and people are having more bear encounters now than ever before. The public demands solutions to bear/human interactions, but the public is generally unwilling to be responsible for their actions of attracting bears. We need more effective means (funding) for communicating with the public to help them to be more responsible. As California continues to be more urbanized, this challenge grows.

More refuse ordinances need to be established by local government, and those ordinances need to be strictly enforced.

Literature Cited

CALIFORNIA DEPARTMENT OF FISH AND GAME. 1998. Black bear management plan. California Department of Fish and game, Sacramento, California, USA. Available at http://dfg.ca.gov/hunting/bear/index. htm.

Appendix A. A model ordinance for prevention of wildlife access to refuse, developed by the Tahoe Council for Wild Bears, California.

CHAPTER ___ PREVENTION OF WILDLIFE ACCESS TO REFUSE

Section 1. Definitions

"appropriate County or City disposal site" [include named city or county dumps or transfer sites]

"approved wildlife-resistant container" as used in this Chapter shall mean a fully enclosed container with a lid which can be completely closed. The lid must have a latching mechanism, which prevents access to wildlife. Both the container and the lid must be constructed of metal or equivalent. Any container which is over filled so as to prevent latching is not a wildlife-resistant container. Wildlife-resistant containers must be approved by the [e.g., sheriff, county environmental health officer – will be County specific]. A list of approved wildlife containers will be made available by the _____. The _____ has authority to revise the list of approved wildlife-resistant containers.

"approved wildlife-resistant enclosure" as used in this Chapter shall mean a fully enclosed structure containing four walls and a roof, with one side accommodating a door. The walls of the enclosure must extend to the ground and the door can have no more than a 3/8-inch gap along the bottom. The latching devise must be of a sufficient strength and design to prevent access by wild life. Ventilation openings shall be kept to a minimum and must be covered with a metal mesh or other material of sufficient strength to prevent access to wildlife. Wildlife-resistant enclosures must be approved by the [e.g., sheriff, county environmental health officer].

"attractant" any substance which could reasonably be expected to attract wildlife or does attract wildlife, including but not limited to food products, pet food, feed, compost, grain or salt.

"enforcement officer" [will be county specific and may include animal control, County Sheriff, City Police, environmental ranger etc.]

"person" as used in this Chapter will include any natural or juridical person, including but not limited to, corporations and other business entities, the United States, the state, the county, the district and any office or agency.

"refuse" as used in this Chapter will include all substances and materials which are an attractant to wildlife. [Depending on existing statutory language 'refuse' may need to be changed to 'garbage' or 'rubbish' – definitions change greatly from County to County. Look for an acceptable definition in existing law]

"special event" as used in this Chapter shall mean a large outdoor gathering such as a concert, conference, fair or festival with an expected or actual attendance in excess of 50 people. [optional: may want to exclude private events such as weddings]

"wildlife" as used in this Chapter shall include any mammal which is not normally domesticated in this state, including but not limited to, bears, coyotes, foxes, mountain lions, opossums, raccoons and skunks.

Section 2. Disposal of Domestic and Commercial Refuse

A. All domestic and commercial refuse must be placed in one of the following:
   1. A building, house or garage that is inaccessible to wildlife.
   2. An approved wildlife-resistant container.
   3. A container that is placed in an approved wildlife-resistant enclosure.
   4. Deposited at an appropriate County or City disposal site.

Section 3. Special Events Refuse Disposal

A. All outdoor special events shall be kept free from the accumulation of refuse.

B. Refuse must be collected from the grounds of the event at the close of each day and deposited in an approved wildlife-resistant container, an approved wildlife-resistant enclosure or deposited at an appropriate County or City disposal site or placed in a building which is inaccessible to wildlife.

Section 4. Construction Site Refuse Disposal

A. All construction sites must have a designated container that receives refuse. The container must be either an approved wildlife-resistant container, stored in an approved wildlife-resistant enclosure or emptied at the end of each day and stored in a building or trailer.

Section 5. Wildlife-resistant Containers or Enclosures Available for Public Use

A. Wildlife-resistant containers or enclosures will be available for refuse deposit at the following [County/City Dump or Transfer Station] locations when the facilities are open and accessible to the public:
   1. [named dump or transfer station]
   2. [named dump or transfer station]
   3. [named dump or transfer station]

B. The provision of approved wildlife-resistant containers or approved wildlife-resistant enclosures at the above locations does not relieve any person from complying with any requirement of this Chapter.

Section 6. Additional Provisions to Minimize Bear-Human Conflicts

A. No person shall fail to take remedial action to avoid contact or conflict with bears after being advised by the [enforcement officer] that such action is necessary. Remedial action may include, but is not limited to removal of cooking grills, pet food, bird feeders or any other attractants.

B. Further, after an initial contact or conflict with a bear, no person shall continue to provide, or otherwise fail to secure or remove, any likely food sources or attractants, including, but not limited to, grills, pet food or bird feeders.

Section 7. Enforcement

A. [Enforcement officers/agency - name shall issue citations and summons and assess penalties for any violation of this Chapter.
B. [Enforcement officers/agency – name] have the authority to assess the need for remedial action necessary to avoid bear contact or conflict pursuant to Section 5 of this Chapter.

Section 8. Penalties

A. Any violation of this Chapter shall be subject to the following [mandatory] penalties:
    1. First violation: Written citation and warning that if preventative measures are not implemented, offender may be required to install an approved wildlife-resistant container at his/her expense.
    2. Second violation: Offender will be required to install an approved wildlife-resistant container at his/her expense.
    3. Third violation: Offender will be required to install an approved wildlife-resistant container at his/her expense and pay a fine equal to the cost of an approved wildlife-resistant container.
B. In addition to the fines above the enforcement officer will issue a summons for the third and each subsequent violation of this Chapter, which occurs within two years.
C. Each day that a violation continues or occurs will be considered a new violation for the purpose of assessing penalties under this chapter.
D. All fines paid will be deposited into a special account to be used for assisting low-income families with installation of approved wildlife-resistant containers and paying for the development and dissemination of educational materials.

Section 9. Enactment

This Chapter will become effective on _____.

COLORADO BLACK BEAR STATUS REPORT

JERRY A. APKER, Colorado Division of Wildlife, 0722 South Road 1 East, Monte Vista, CO 81144, USA, jerry.apker@state.co.us.

Classification

From statehood in 1876 through the early 1930s black bears (*Ursus americanus*) received no legal protection from hunting exploitation even though attempts were made to classify them as a game animal first in 1899 and later in 1926. The earliest statutory reference to black bears came in 1933 and authorized landowners to kill bears of either species (*U. americanus* or *U. arctos*) found on grazing lands, provided landowners report the bear's death within 30 days. Basically the legislature codified what had, in fact, been "law of the land" since initial territorial settlement. Some form of this provision has remained in Colorado statutes to this day, although wording has varied from "bears on grazing lands" to "bears posing a threat to livestock" to "bears harassing livestock." In 1935, black bears were declared a game animal. In 1944, black bears were reclassified to big game, and have remained in this classification since.

In 1996, the Colorado Department of Agriculture (CDA) was granted "exclusive jurisdiction over the control of depredating animals that pose a threat to an agricultural product or resource." Thus, CDA has exclusive authority to determine the disposition of an individual bear if it is depredating on livestock, while the Colorado Division of Wildlife (CDOW) retains authority to manage black bear populations and all forms of recreational or scientific use.

Distribution and Abundance

Medium scale vegetation classification from satellite imagery and ground truthing has been completed for Colorado and is updated periodically (Colorado Division of Wildlife 2003). Based on vegetation classes, we estimate about 104,600 km^2 of habitat suitable for black bear. Density estimates have been obtained in habitats believed to represent high-quality habitat (39 bears/100 km^2) such as aspen-Gambel oak (*Populus* spp.-*Quercus gambelii*), and for poor-quality habitat (4 bears/100 km^2) such as spruce-fir (*Picea* spp.-*Abies* spp.) and lodgepole pine (*Pinus contorta*). Vegetation classes such as mesic upland shrub, ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Psuedotsuga menziesii*), pinyon pine (*Pinus edulis*), shrub- or forest-dominated wetland/riparian, and community intergrades of all the foregoing are believed to be medium-quality habitat. These plant communities were subjectively assigned intermediate, albeit conservative, densities of about 6 bears/100 km^2. Juniper (*Juniperus* spp.) woodland represented the poorest-quality habitat and was subjectively assigned a density of 2 bear/100 km^2. Extrapolation of these densities to vegetation classes in Colorado result in a possible population of about 12,000 black bears (Appendix A). The statewide population is believed stable.

Based on the vegetation-bear density projection, each Data Analysis Unit (DAU) is assigned a relative black bear abundance rating of high, moderate, or low with intergrades where estimated bear density within the entire DAU is close to break points. High abundance is assigned at DAU densities over 7 bear/100 km^2, moderate abundance at 4–7 bear/100 km^2, and low abundance <4 bear/100 km^2 (Figure 1). The DAUs are assemblages of Game Management Units (GMUs). Extrapolating population projections at the DAU or GMU level creates some suspicious results and the utility of vegetation-bear density projections at these levels must be viewed cautiously. Such projections do not factor in patch size, juxtaposition, or other fine-scale considerations. These considerations likely play an equal or more significant role in actual bear populations as the pure forage or cover value of any particular vegetation type.

Population Monitoring

Colorado does not regularly estimate black bear populations because no reliable, cost-effective, sample-based population estimation technique currently exists. A projection of the possible population is made as previously described. Hunter kill and total mortality is examined at the DAU level for characteristics that would indicate changes in DAU populations. Bear mortality is documented through mandatory checks and mandatory reports for non-hunter harvest and kept in a database. The database for hunter kill has been kept since 1979, and for non-hunting mortality since 1991. Mortality data is examined on 3- to 10-year running averages due to relatively high annual variation.

Management Plan

A statewide management plan was adopted in 1990. Although there have been substantial changes to management options since then, the plan provides background for DAU-specific management plans.

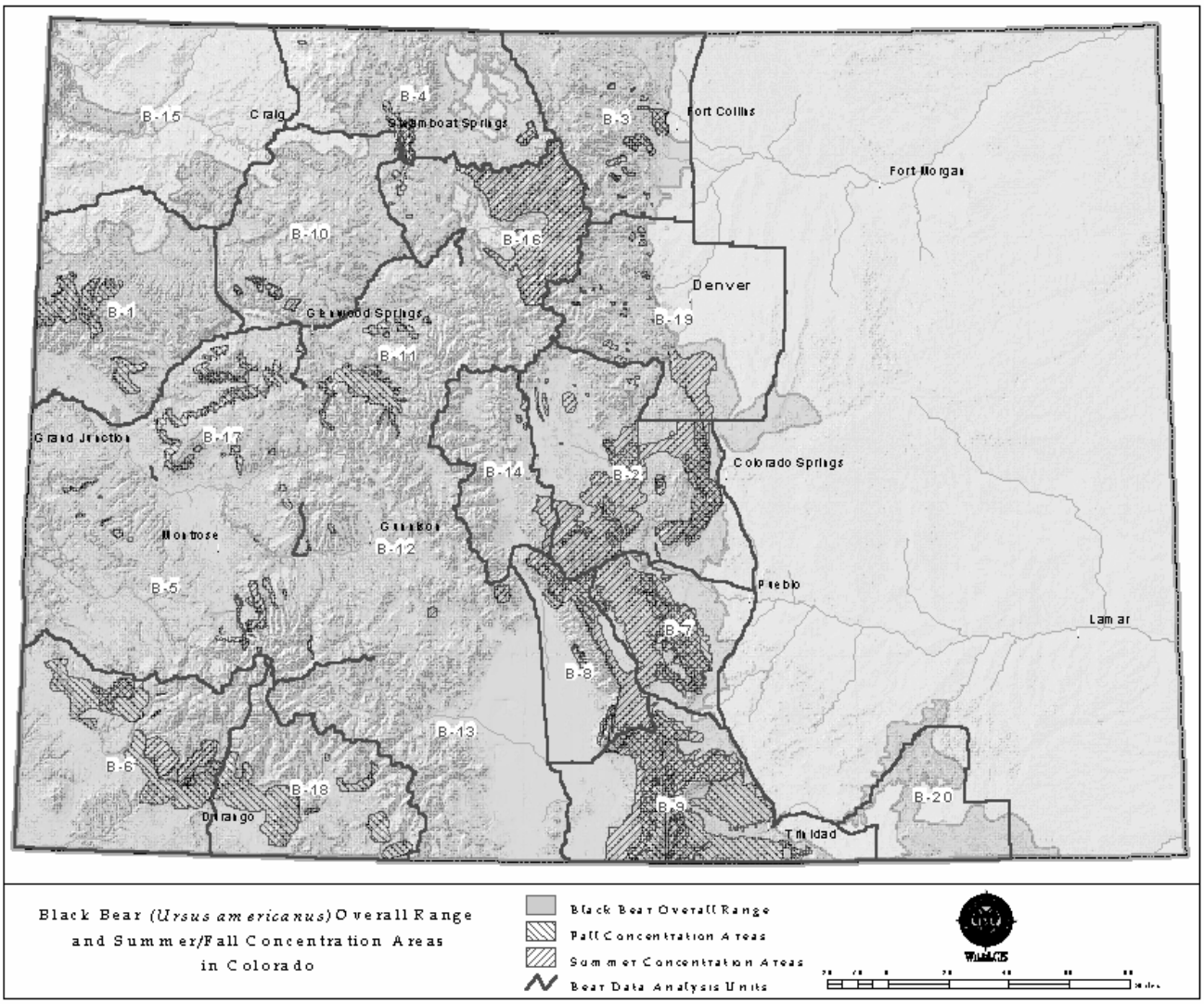

Figure 1. Black bear Data Analysis Units and relative bear densities derived from vegetation-bear density population projection, Colorado.

Implementation of DAU plans began in 2001. Plans currently contain objectives for hunter harvest, total mortality, game damage, and human-bear conflicts. Objectives are stated as the maximum level on a 3-year running average. Changes to management plans require Wildlife Commission approval.

Recent high hunter harvest and non-hunting mortality in some DAUs revealed conflicting direction depending upon which objectives managers weighed most heavily. These conflicts pointed out a shortfall within the plans in that they do not state a specific strategic goal for the DAU. Currently this must be inferred in the text of the plan, if possible at all. Within the next year all management plans will be required to develop a strategic goal. We consider this an essential step for informing management decisions within a DAU about season structure and annual license allocation.

Hunting Laws and Regulations

In 1993, spring bear season, use of bait, and use of dogs were prohibited by citizens ballot initiative. Black bear hunting seasons may not occur prior to September 2. Colorado has a limited license black bear hunting season from September 2–30 for rifle hunters. Archery and muzzleloading rifle hunting methods have shorter, unlimited license seasons within the foregoing period. Concurrent with deer (*Odocoileus* spp.) and elk (*Cervus elaphus*) seasons, hunters may purchase an unlimited license valid for the season, unit, and method in which they hunt deer or elk. A hunter unsuccessful in the limited season may use their license during a deer or elk

season if they have a deer or elk license. The bear license is then valid only during the same time, in the same unit, and by the same method of take as their deer or elk license.

For the past 4 years there have been about 2,700 limited black bear licenses allocated. Bear licenses were totally limited only in 1992. Since then license sales have increased considerably (Figure 2), declining only in 2001 and 2002 when non-resident license fees were increased for deer and elk. A resident bear license is $30.00. A non-resident bear license is $250.00. Bag and possession limit is 1 bear/year. Legal methods of take include rifle, handgun, shotgun, muzzleloading rifle, hand-held bow, and crossbow – certain technical restrictions apply to each method of take. Use of mechanical calls is legal. There are no guide requirements for resident or non-resident hunters. There is no pursuit season in Colorado.

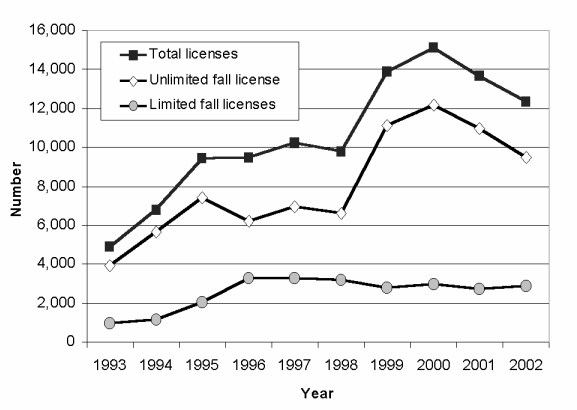

Figure 2. Black bear license sales for different season types, Colorado, 1993–2002.

Beginning in 2003, 7 DAUs will change to limited archery and muzzleloading rifle licenses during their September seasons. This change was made because limited licenses have been reduced in these DAUs when harvest exceeded objectives. This change disproportionately affected only rifle hunters, while at the same time archery and muzzleloading-rifle hunter harvest increased significantly in these DAUs. We expect license limitations on archery and muzzleloading-rifle methods to take effect in additional DAUs in the future and may occur statewide. A final change, beginning in 2003, is implementation of a new, much less restrictive eastern plains black bear season.

Harvest Summary

As mentioned in previous sections of this report, Colorado has a mandatory reporting requirement for black bear mortality. Hunters must report kills within 5 working days. At a minimum, the unfrozen head and hide must be presented for inspection, report completion, and sealing. In addition to hunter kill, landowner and U.S. Department of Agriculture Wildlife Services are also required to report kills within 5 days. Similarly, CDOW employees must document any lethal control actions or discovered mortality of any cause on a mandatory report form.

Data from mandatory reports have shown a significant increase in black bear mortality in recent years. From 1999–2002, hunter harvest has averaged 823 per year, a 58% increase over the previous 4-year (1995–1998) average of 519. Total known mortality during these same periods increased 69% from an average of 640 to an average of 1,080 per year. Notably, non-hunting mortality now comprises one third of total known mortality (Figure 3). Speculation abounds regarding the causes of increases in hunter harvest and non-hunting mortality. Causes listed by various interests and CDOW managers include increased hunting effort; increased vulnerability of bears due to local, regional, and statewide food failures; increased vulnerability due to increased human occupancy or activity in black bear habitat; and increased bear populations.

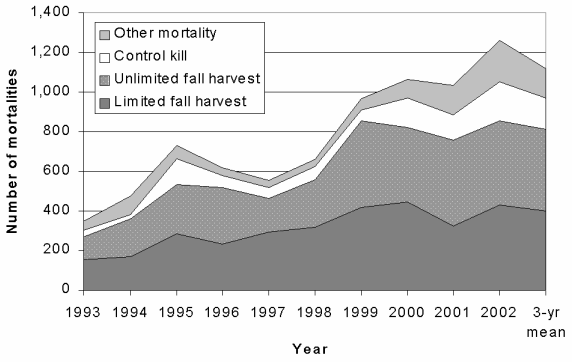

Figure 3. Black bear mortality and most recent 3-year average, Colorado, 1993-2002.

Colorado monitors the proportion of female in hunter kill and total known mortality. After remaining essentially flat at about 37% of total mortality through the mid-1990s, females now comprise, on a 3-year average, about 43% of total mortality. The proportion of females in hunter harvest has consistently been slightly higher, although not significantly, than that in total mortality (Figure 4).

Depredation Trends, Policies, and Programs

Colorado is liable for damage caused by big game, with certain limitations and restrictions. From 1972–2001, CDOW had to pay for damage by black bears to any real or personal property. Along with livestock, this included vehicles, buildings, grills, appliances, hot

tub covers – you name it – we have paid for it. Beginning in 2001, state liability was limited to agricultural products and property used in the production of raw agricultural products. Liability was also changed so that the state is not liable for more than $5,000/animal.

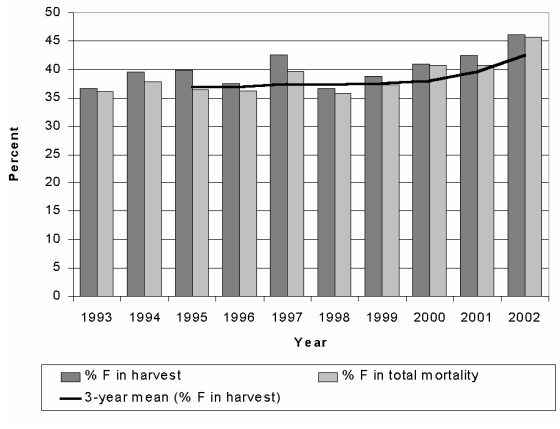

Figure 4. Proportion of black bear females in hunter harvest and total known mortality, Colorado, 1993-2002.

As with bear mortality, bear damage claims and dollar amounts paid increased from the early 1990s through 2000. With additional limitation of liability damage claims, dollars paid have declined and we anticipate they will decline further before stabilizing. Damage claims for loss of sheep remain the most significant type of damage claim (Figure 5) accounting for about half of all bear damage costs. We analyzed damage costs to determine if inflation appeared to over-emphasize costs or if the increases appeared to be real. Inflation did not appear to be major factor.

We also looked at sheep damage claims in relation to September lamb prices (Figure 6). We have not subjected these to regression analysis. While there appears to be a positive correlation during 1992–2001, the correlation is not apparent in earlier years. The positive correlation in recent years may have been triggered by the loss of wool price supports, which were debated by Congress in 1991 and 1992, enacted in 1993, and were phased out in 1994 and 1995.

Bear-human conflict management is predicated on a policy of applying educational efforts first at the individual and community level. Education efforts may employ volunteers, CDOW employees, or designated agents and may also involve more structured efforts through "Bear Aware" initiatives. If these efforts fail or the situation requires rapid capture and handling of a bear, we operate under a 2-strike rule. Bears that are captured for translocation are marked with numbered and color-coded ear-tags prior to release. If a bear must be handled again or is found in conflict again, it is euthanized. Data has been kept since 1995 on reported bear-human conflicts (Appendix B). These represent minimum numbers of reported conflicts because documentation declines if CDOW employees are overwhelmed with conflicts. Numbers of relocated bears are kept, but the data was not complied well enough for presentation in this report.

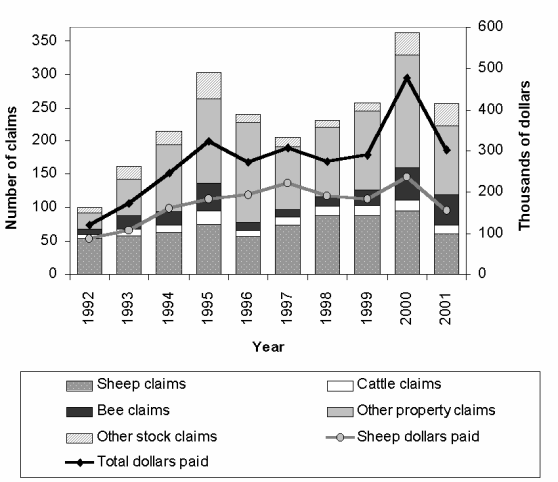

Figure 5. Types and number of black bear damage claims (cost of sheep claims and all claims paid indexed to year 2000 dollars), Colorado, 1992-2001.

It has been illegal to feed mammals in Colorado for many years. Recently, state laws were enacted that specifically made it illegal to feed bears. The laws also made it illegal to intentionally or unintentionally allow a food attraction to continue to be available to bears, once someone has been advised about it by a CDOW officer. Colorado legislature is currently considering a law that would allow for graduated penalties if such a problem continues repeatedly.

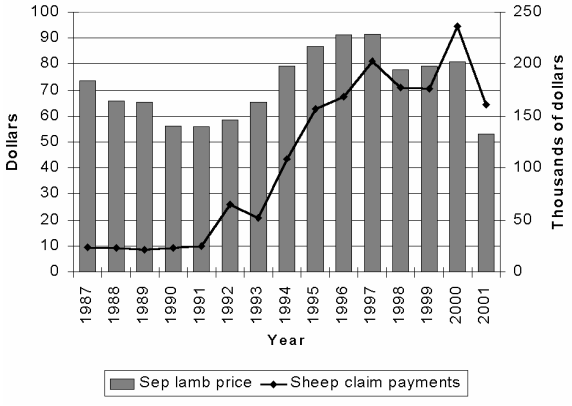

Figure 6. Comparison of sheep damage claims from black bears to September lamb prices, Colorado, 1987-2001.

The CDOW has regulations for licensed rehabilitators. There are only 3 rehabilitators with facilities licensed for handling black bears. All are privately run, but irregularly CDOW may provide equipment, supplies, or financial assistance. Protocols exist for release of rehabilitated bears that generally follow those developed by the Idaho Fish and Game Department (Alt and Beecham 1984, Maughan 1994). Direct monitoring of released rehabilitated bears has not been done extensively, although all are ear-tagged before release.

Research Programs

There are no current research investigations being conducted on black bear. The CDOW is in the process of hiring a research scientist specializing in carnivores, with emphasis on puma (*Puma concolor*) initially. Black bear investigations will also be part of this employee's future work.

Public Attitudes Towards Black Bear Hunting and Management

No public opinion surveys have been conducted in recent years.

Conclusions

Current carnivore research priorities are focused on puma in Colorado. Modest black bear investigations may be conducted but no large scale, intensive projects are anticipated for at least the next 5 years. To better inform management decisions related to black bear, CDOW sees the need for population and population characteristic estimation techniques and population trend indices – all of which need to be reliable, accurate, and cost-effective.

Our sense is that the greatest, near-term bear management challenge is the social tolerance for increased bear-human conflicts combined with the apparent increasingly positive values our citizens hold towards black bears. These at times appear to present conflicting challenges, or demands from opposing perspectives. Yet both perspectives expect managers to have precise information about black bear ecology, local and statewide population status. Managers are expected to make credible, science-based decisions about black bear management that reduce or eliminate bear-human conflicts, but also maintain robust bear populations.

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Appendix A. Black bear habitat (Colorado Division of Wildlife 2003) and density-based population projection for Colorado.

Vegetation class	Area (km^2)	Percent area	Bear density (bears/100 km^2)	Number of bears
Aspen	12,661	5	38.6	4,887
Blue spruce (*Picea pungens*)	29	0	3.9	1
Bristlecone pine (*Pinus aristata*)[a]	228	0	3.9	9
Douglas-fir	4,323	2	4.8	208
Forest-dominated wetland/riparian	1,144	0	3.9	45
Gambel oak	8,491	3	38.6	3,277
Juniper woodland[a]	4,664	2	1.9	89
Limber pine (*P. flexilis*)	12	0	3.9	0
Lodgepole pine	8,723	3	3.9	340
Lodgepole pine clearcut[a]	162	0	3.9	6
Mesic upland shrub[a]	1,160	0	6.4	74
Mixed conifer[a]	1,832	1	3.9	71
Mixed forest[a]	831	0	6.4	53
Pinyon-juniper	25,038	9	4.8	1,202
Ponderosa pine	13,883	5	6.4	889
Shrub dominated wetland/riparian[a]	522	0	3.9	20
Spruce-fir	18,719	7	3.9	730
Spruce-fir clearcut[a]	92	0	3.9	4
Subalpine meadow[a]	2,047	1	3.9	80
White fir (*Abies concolor*)	40	0	3.9	2
Total	104,604	39		11,987

[a] Vegetative class not included in 1991 estimates of black bear habitat and densities.

Appendix B. Documented black bear-human conflicts by Data Analysis Unit (DAU), Colorado, 1995-2002.

	Year							
DAU	1995	1996	1997	1998	1999	2000	2001	2002
B-O1	1	4	0	4	0	5	0	1
B-02	79	68	80	346	246	222	85	170
B-03	72	60	101	81	8	43	6	3
B-04	3	3	14	17	7	24	50	14
B-05	48	7	8	27	3	4	1	24
B-06	4	15	7	12	3	28	26	21
B-07	107	21	42	30	9	16	123	135
B-08	41	34	13	14	11	13	19	79
B-09	202	26	31	39	4	28	59[a]	51
B-10	7	4	3	14	1	5	4	4
B-11	6	5	10	7	0	142	61	117
B-12	5	3	0	13	0	42	2	5
B-13	70	28	8	37	15	17	5	36
B-14	24	43	9	37	16	49	84	118
B-15	0	11	2	2	1	0	0	0
B-16	11	4	8	13	0	54	4	12
B-17	11	4	10	24	1	14	4	7
B-18	201	39	23	204	123	29	58	49
B-19	173	154	75	129	53	119	97	136
Unknown	0	0	0	7	2	2	4	18
Statewide	1,065	533	444	1,057	503	856	633	1,000

[a] Over 1,200+ additional bear-human conflict phone calls were received by the CDOW from June 1 to August 31, 2001 but due to the volume of calls only bear relocations and mortalities were officially reported.

IDAHO BLACK BEAR STATUS REPORT

STEVE NADEAU, Idaho Department of Fish and Game, 600 S. Walnut, Box 25, Boise, ID 83707, USA, snadeau@idfg.state.id.us

Abstract: Black bears (*Ursus americanus*) in Idaho were classified as a big game animal in 1943, with intensity of harvest and regulations varying annually. Bears are distributed widely throughout the coniferous forests of northern and eastern Idaho. Annual harvest of bears in Idaho increased from 1993–2002, and totaled 2,348 bears in 2002. In addition to sport harvest, an average of 20-30 bears were killed each year due to bear depredation and management actions. Bears populations are monitored using a combination of harvest data, trend surveys, and mark-recapture techniques. The latest *Bear Management Plan* called for testing age structure changes resulting from various intensities of harvest, developing new monitoring techniques, and using adaptive management to address concerns. Statewide surveys indicate strong support of conservative bear management, however public open house meetings and commission meetings were dominated by hunter concerns for bear predation on elk (*Cervus elaphus*) calves.

Classification

Black bears were classified as a big game animal in 1943, with a bag limit of 1 bear/year. In 1973, resident hunters were required to have a tag in their possession while hunting black bears in those Game Management Units (GMUs) that had summer hunting closures. Resident bear hunters in much of southern Idaho, where seasons remained open to year-round hunting, did not need a tag. Year-round hunting seasons and a 2-bear bag limit were eliminated in 1986. In 1993, bear season lengths were reduced throughout most of the state to protect females.

Since 1998, bear seasons in Idaho have become more lenient again; with a 2-bear bag limit permitted in 9 GMUs, and lengthened seasons allowed throughout most of the state.

Distribution and Abundance

Black bear distribution has not changed significantly in the last 30 years. Black bears are distributed within the forested areas of the state, ranging mostly from the Canadian border south to the Snake River Plain. Nearly two thirds of the state is federally owned, with most of the north and central regions belonging to the U.S. Forest Service. Most of these federally managed lands are high-density bear habitat. Habitat conditions range from the wet, maritime-influenced climate of the northern "panhandle" area (where bear densities are high), to the more continental climate of both heavily-timbered central Idaho and the ecotone of ponderosa pine (*Pinus ponderosa*) and sagebrush (*Artemisia* spp.) north and east of Boise (where bear densities are lower). Near Yellowstone National Park in east-central Idaho, bear densities are moderate. The central and southern parts of the state are mostly desert or agricultural and do not provide quality bear habitat (Figure 1).

Population Monitoring

In 1972, research was initiated examing various population densities in 6 different areas of the state. Mark-recapture estimates were made at that time, and based on habitat quality and quantity, the density estimates were extrapolated within occupied black bear habitat. A population estimate of 20,000 black bears, estimated for Idaho in the late 1970s, is still used today.

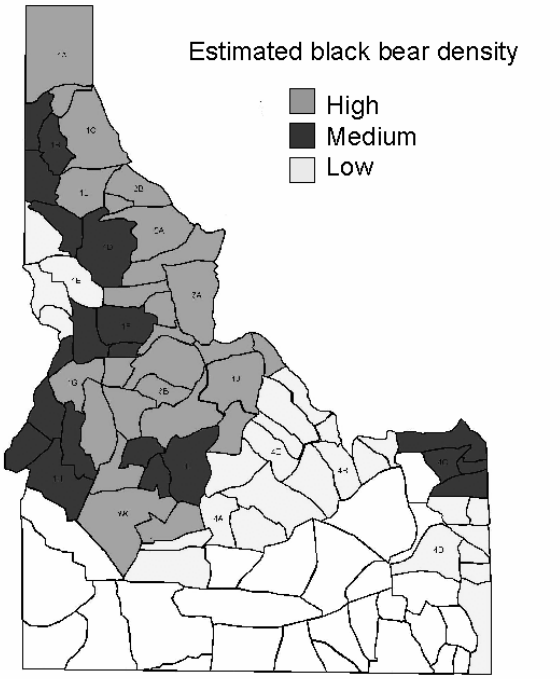

Figure 1. Black bear data analysis units and corresponding relative bear densities. Densities were estimates using harvest numbers and demographics of harvested bears.

Currently, population monitoring consists of a variety of techniques. In the panhandle of the state, density estimates have been derived through a mark-recapture trapping effort. In other parts of the state, tetracycline-laced baits are used to mark bear's teeth; recapture occurs when bears are harvested and a

premolar is removed to identify if it has been marked. In all parts of the state, harvested bears are required to be checked, when all pertinent management information is obtained, a tooth is pulled for aging, and the pelt is marked. Teeth are aged and subsequent harvest demographics are modeled. Each management area has established criteria for the percent of harvested males ≥5 years of age.

Management Plan

The current management plan was finalized and implemented in 1998. The following goals are outlined in the plan:

1. Distribute recreational opportunity throughout black bear habitat in a manner that is consistent with population objectives for each Data Analysis Unit (DAU).
2. Improve harvest information by improving compliance with the mandatory check and report program and by implementing a survey to generate information on hunter numbers, hunter success rates, and hunter effort. Improve compliance level with the mandatory check program.
3. Use an adaptive management approach in developing harvest goals and objectives in select DAUs as a means to further evaluate management criteria.
4. Monitor the black bear population response to changes in season framework using our biological criteria and take steps to increase or reduce harvest when data indicate the opportunity or need.
5. Manage black bears to reduce conflicts among competing user groups.
6. Consider initiating research to:
    a. Develop a long-term population monitoring technique.
    b. Establish the link between harvest criteria and characteristics of the standing population by determining age- and sex-specific vulnerability to different harvest techniques.
    c. Determine black bear mortality patterns and reproductive potential.
7. Work with the Outfitters and Guides Board to set outfitter quotas in DAUs where a harvest reduction is needed.

Hunting Laws and Regulations

A resident hunting license costs $11.50 and a bear tag costs $10.50. A non-resident hunting license costs $128.50; regular bear tag costs $235.00; a reduced bear tag costs $31.50; and a second tag costs $31.50. The reduced and second tags are valid only in certain GMUs. Also, a nonresident deer (*Odocoileus* spp.) tag ($235.00) can be used for a bear or mountain lion (*Puma concolor*) in those GMUs where both a deer season and a bear or mountain lion season are open. Hound hunting is allowed, but permits are required. Resident permits are unlimited and cost $11.50. Nonresident hound permits are limited and cost $128.50. In 2001, the state sold 3,173 resident and 115 nonresident hound permits. Baiting is also allowed, but requires a permit costing $11.50. In 2001, 1,865 baiting permits were sold. There is a bag limit of 1 bear/year in most of Idaho; however, in 9 GMUs a 2-bear bag limit is allowed.

Legal methods of take include hound hunting and baiting. Spring seasons typically run from 1 April–30 June, and fall seasons from 30 August–18 November. Season length and bag limit vary by GMU. In 9 GMUs, mostly in north central Idaho, a 2-bear bag limit is allowed.

Harvest Summary

Harvest data have been collected on all bears harvested since 1983 when mandatory reporting was implemented. The hide and skull must be brought to an official Idaho Department of Fish and Game (IDFG) check point, and all pertinent data are recorded, a premolar tooth is extracted for aging, and a pelt tag is placed on the hide. Telephone surveys of bear hunters has been discontinued in recent years. Bear harvest varies in intensity in different parts of the state, with the highest harvest in the north. Average harvest from 1998–2002 was 1,823 bears. An average of 30,456 black bear tags were sold each year over that same period (Table 1).

Table 1. Black bear harvest and number of tags sold, Idaho, 1993–2002.

Year	Fall	Spring	Harvest	Tags sold
1993	618	557	1,175	No data
1994	689	647	1,335	No data
1995	755	723	1,477	No data
1996	768	801	1,566	No data
1997	924	664	1,585	No data
1998	1,142	890	2,032	28,641
1999	902	973	1,875	30,961
2000	933	925	1,858	31,133
2001	894	1,006	1,900	32,358
2002	1,309	1,062	2,371	29,187

Depredation Trends, Policies, and Programs

Approximately two thirds of Idaho is federally owned land. Most of the bear population in the state lies within federal property boundaries. In these locations, problems are typically a result of poor food

years, and are related to poor sanitation and campground use. Much of the remaining private lands within bear habitat have annual sanitation problems, including orchard and bee hive depredations, sheep and livestock complaints, and occasional safety concerns. Statewide, an average of about 120–150 complaints are filed each year, and 20–30 bears are destroyed as a result of those complaints. This appears to be fairly stable with annual fluctuations apparently based on wild food availability and/or drought conditions. Annually, the state pays an average of $15,708 on bear depredation and damage claims. Although it varies, on average only 2 claims/year are paid out. The state has a $1,000 deductible payment policy, and most claims do not meet the deductible.

The state provides brochures, such as those for the "Bear Aware" program. Additionally, some regions are providing more intensified sanitation information and education. In the panhandle region, a grizzly bear (*Ursus arctos*) enforcement and education officer has been used successfully for about 10 years, informing the local public on how to live in bear country. Although feeding wildlife is discouraged, baiting of bears is allowed. Consequently, feeding bears outside of hunting season is also allowed. Baiting other big game animals for hunting is not permitted.

Although the state does not provide for rehabilitation of bears, some licensed rehabilitation facilities are functioning in the state. The IFGD has cooperated with some of these facilities to rehabilitate orphaned cubs and place them back into the wild. No ongoing monitoring program is in place to detect the success of the rehabilitation efforts. However, those involved believe it is worthwhile and successful.

Research Programs

Population density estimates have been conducted in the Panhandle in recent years using mark-recapture trapping. Efforts to determine the effectiveness of tetracycline bait, DNA sampling, and bait station trend monitoring are ongoing. Elk research in the north central part of Idaho indicated that black bears accounted for up to 60% of elk calf mortality. Consequently, intensive research and adaptive management, focused on addressing this concern, was initiated in 1997 and is ongoing.

Public Attitudes Towards Hunting and Management

A comprehensive survey of "Wildlife Values in the West" was conducted by Colorado State University (Teel et al. 2003). This survey reviewed public attitudes in the states of Alaska, Arizona, Colorado, Idaho, North Dakota, and South Dakota. The survey predominantly queried attitudes toward management of bears. Idaho residents, when asked how to manage bears that wandered into residential areas, generally responded that education of the public was most acceptable and destruction of the bear was least acceptable. All other management was acceptable to some degree (Figure 2).

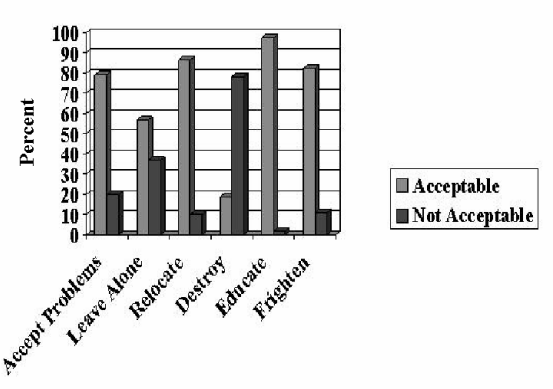

Figure 2. Public attitudes toward management options for black bears in residential areas, Idaho, 2003.

A voter initiative to ban the use of baiting, hounds, and spring bear hunting was defeated in 1996 by a 60:40 margin. Most public comments at IDFG open houses and commission meetings were concerned with bear predation effects on elk calves.

Conclusions

Research in a portion of the state identified bear predation as an important factor in elk calf survival. Consequently, bear management and season structure in Idaho became more liberal in recent years. Age structure and other population demographics were monitored in an attempt to identify changes in demographics following intensified harvest, reduced harvest, and eliminated harvest. Additionally, researchers and managers continue to try to improve other monitoring techniques to determine trends in bear populations.

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MONTANA BLACK BEAR STATUS REPORT

GARY OLSON, Montana Department of Fish, Wildlife and Parks, 1008 Sunset, Conrad, Montana 59425, USA, grolson@3rivers.net

Classification

Use of dogs for bear (*Ursus* spp.) hunting was prohibited in Montana in 1921 and black bears (*U. americanus*) were designated as big game animals in 1923. Killing of cubs or females with young was prohibited in 1947, and a ban on baiting was instituted in 1948. Non-resident bear licenses were made available in 1961. In 1971, resident hunters were required to purchase a black bear license to legally take a black bear; prior to that residents could harvest a black bear with an elk (*Cervus elaphus*) or deer (*Odocoileus* spp.) tag in their possession.

Montana Department of Fish, Wildlife, and Parks (MFWP) completed a black bear management plan and environmental impact statement in 1994 (MFWP 1994), which signaled a change in management direction and management strategies.

Distribution and Abundance

Black bears occupy forested habitats on both sides of the Continental Divide; the moist forests of the northwest corner of the state are considered the most productive black bear habitat. From the northwest to the southeastern portions of the state, habitat quality and bear densities decline coincident with the precipitation gradient. Approximately 45% of the state is considered occupied black bear habitat.

At present, no bear densities are calculated, and therefore no population estimates exist. However, on-going research may help define densities in a variety of black bear habitats across the state.

Population Monitoring

A variety of methods are used to monitor black bear populations in Montana. Regional wildlife biologists rely heavily upon age and sex information from harvested bears, as well as nuisance or depredation information. Some bear habitats accommodate aerial berry field surveys in late summer and fall. In other areas, late spring aerial surveys provide some information on litter sizes. Current research efforts are concentrating on DNA analysis in several areas of Montana (see Mace and Chilton, this volume). Comparing hair sampled from harvested bears to samples from free-ranging bears allows a calculation of harvest rates. Population estimates and density calculations are made from "recaptures" of hair samples from free-ranging bears.

Management Plan

Montana completed a black bear management plan and environmental impact statement in 1994 (MFWP 1994) with the following management assumptions and guidelines:

1. Adults are ≥5 years old; subadults are ≤4 years old;
2. A 40% maximum for females in annual harvests;
3. Median age of harvested females ≥6 years old;
4. Median age of harvested males ≥4 years old;
5. Variance will be evaluated in 3-year periods.

Hunting Laws and Regulations

Montana offers both spring and fall hunting opportunities; spring seasons generally run from 15 April–31 May and fall seasons from 15 September–1 December (end of general deer and elk hunting season). South central Montana has 2 bear management units with both female and total quotas in place.

It is illegal to harvest black bear cubs. Cubs are defined as bears <1 year old. It is illegal to harvest female black bears with young. Both baiting and use of dogs to hunt black bears are prohibited in Montana.

Resident licenses are $15.00 plus a $4.00 conservation license. Non-residents are charged $350.00 plus a $7.00 conservation license. Licenses must be purchased by 14 April to participate in the spring hunt, or by 31 August for the fall hunt. All hunters must pass a mandatory black bear identification test before purchasing a license (new in 2002). Hunters are required to report their kill within 5 days of harvest and present the complete bear hide with proof of sex naturally attached and skull for the purpose of inspection, tagging, and removal of a tooth for aging.

Harvest Summary

Black bears are the fourth most popular big game species in Montana, based on human-days of recreation. Montana spring black bear season accounts for 50% of the annual harvest. Approximately 1,100 black bears are killed each year on 45% of the state's land base. Generally, 75% of harvest occurs west of the Continental Divide (forested habitat); harvest declines as habitat diminishes east and south (MFWP Regions 1–5). Since 1985, tooth cementum analysis and harvest records indicate an average of 35% females in the harvest. Median ages are 4–5 years for females and 2–3 years for males except in Region 5, where harvest quotas are in place (and median ages are higher).

From 1996–2001, Montana black bear hunting produced a range of 9,000–11,000 hunters spending a total of 84,000–102,00 days in the field. The average black bear hunter hunts for 9 days, with 9–13% success.

Spring and fall black bear hunting result in the same hunter success (8.8%), although hunter numbers are fewer in spring (5,800) than in fall (6,900). Spring black bear hunters spend an average of 6.1 days in the field, compared to 8.4 days during the fall season.

Depredation Trends, Policies, and Programs

Montana has a black bear depredation policy and shares responsibility with U.S. Department of Agriculture (USDA) Wildlife Services. The MFWP handles nuisance black bears; depredating bears (situations involving livestock, including bees) are handled by USDA Wildlife Services. There are state guidelines dating to 1987 for controlling nuisance black bears and bear depredation of beehives. At present, each of the 5 MFWP administrative regions where black bears occur compiles nuisance bear information. However, no statewide summary is available for numbers of complaints, dollars spent, or bears relocated. On-going efforts to assemble a statewide black bear depredation database continue as time and funding permit.

Montana law prohibits feeding of wildlife, including black bears. Several brochures and short video clips have been used to help educate the public about living in bear habitat and preventing depredation problems (e.g., proper food storage and waste disposal). In addition, public information meetings are held annually around the state to inform the public of bear issues, including problem black bears.

Montana has a newly opened wildlife shelter in Helena to house orphaned and injured animals, including black bear cubs. Over the past 15 years, MFWP has placed approximately 60 black and grizzly (*U. arctos*) cubs into human-made dens in several mountainous locations along the Rocky Mountain Front. Approximately 55% of these bears survived 1 year. Successful reintroductions are based upon survival for 1 year and/or no depredation problems.

Research Programs

Prior to 2000, Montana had only 1 intensive black bear research effort in northwestern Montana (Jonkel and Cowan 1971). Several smaller and more short-term efforts focused on specific areas of northwestern Montana and south-central portions of the state, and examined survival rates of radio-marked bears. During 1997–2001, biologists for MFWP collected hair samples from areas along the Beartooth Face in southern Montana in an effort to determine mortality rates. An intensive MFWP black bear telemetry study was initiated in 2000 in the Swan Valley of northwestern Montana. This DNA-based research focuses on harvest rate and population size. During 2001–2002, additional DNA data was collected from other bear management units in central and northwestern Montana (Mace and Chilton 2002).

Public Attitudes towards Black Bear Hunting and Management

In 1993, MFWP released the *Montana Bioeconomics Study, A Contingent Valuation Assessment of Black Bear Hunting: Hunter Attitudes and Economic Benefits* (Brooks 1993). General reasons for black bear hunting were categorized: for solitude (83% rated important or very important), test of hunting skills (65%), to bag a trophy bear (47%), to be outdoors (99%), for the meat (44%), to be in a natural setting (92%), and to learn about bears (78%).

The average hunter spent 10 days/year hunting black bears. Forty-one percent of resident hunters and 55% of non-resident hunters belong to a sports group. Average age of resident black bear hunters is 37 years, 39 years for non-residents. Montana residents spent an average of $19.60 per hunting day, while non-residents claimed $137.50 per day. Based on number of hunter-days, total net economic value associated with black bear hunting is approximately $5,000,000 annually.

Conclusions

Current DNA and telemetry research efforts will help to define mortality rates and bear densities in various habitats. This information will allow black bear managers to evaluate current management guidelines and enhance bear management practices. Nuisance and depredation information needs to be compiled on a statewide basis with existing tooth cementum analysis and hunter questionnaire harvest data to provide a better overall picture of population condition and trend.

Two of the greatest black bear management challenges in Montana are loss of habitat due to human encroachment (home building) and crafting a management program that can accurately predict and react to bear population condition and trend.

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NEVADA BLACK BEAR STATUS REPORT

CARL LACKEY, Nevada Division of Wildlife, 1100 Valley Road, Reno, NV 89512, USA, cdembears@aol.com.

Classification

Black bears are classified as a game animal in Nevada, although there has never been a structured, legal harvest system.

Distribution and Abundance

Nevada's black bear population is estimated at 200-300 animals. This population is concentrated in the far western part of the state, with the highest densities living in the Carson Range, from Reno south to Gardnerville, including the Lake Tahoe Basin. Marginal to good habitat exists in several smaller mountain ranges, all in close proximity to the Carson Range. These include the Pine Nuts (east of Carson City), the Virginia Range (east of Reno), and the Wassuks, Pinegroves, and Sweetwaters (all south of Gardnerville). There has been some indication in recent years of a population expansion, evidenced primarily by sightings and captures of younger bears in areas significantly east of their current range.

Many historical references indicate both black bears and grizzly bears occupied several mountain ranges throughout the state. References to the hunting of bears in the central part of Nevada near Austin, as well as Elko in northeast Nevada are common. However, these populations were probably reduced to the current demographic profile by the late 1800s.

Population Monitoring • Research Programs

The first research to take place in Nevada was conducted in the late 1980s as a cooperative project between the Nevada Division of Wildlife (NDOW) and the University of Nevada, Reno (UNR). In this study, researchers determined basic population size, distribution, denning ecology, home range size, and reproductive capabilities (Goodrich and Stiver 1989, Goodrich 1991, Goodrich 1993, Goodrich and Berger 1994). At that time the bear population was estimated at about 125 animals.

More recent research resulted in the current population estimate of 200-300. This research, also involving NDOW and UNR, looked at the specific differences between wildland populations and urban, or nuisance bear populations (Beckmann 2002, Beckmann and Berger 2003a, Beckmann and Berger 2003b, Beckmann and Lackey 2004, Beckmann et al 2004). Initial objectives were to investigate the ecological health of Nevada's black bears, including population demographics, mortality rates, and changes in behavior in contact zones with humans. Another objective was to evaluate the effectiveness of aversion conditioning, as well as relocation success of a large carnivore in the basin and range landscape. There are currently 26 bears from the research that are still fitted with radio-collars, but due to budget constraints, continued monitoring has been suspended. The NDOW must now rely on recapture efforts and use of volunteers to monitor these bears.

Mortalities have increased significantly over the last 10 years, and even more so in the last 5 years. A total of 78 documented bear mortalities have been recorded since 1997. Of these, 40 were road kill, 19 were public safety kills, U. S. Department of Agriculture (USDA) Wildlife Services took 7, and 12 were attributed to various other causes. Only 2 of the 77 were considered natural, or non-anthropogenic. This is despite not having a legal hunt in the state.

Depredation Trends, Policies, and Programs

Following a severe drought in the late 1980s, bear complaints in Nevada rose from 1–2/year to over 150/year at present time. Complaints vary, but they all involve bear access to garbage, denning in urban areas, and public safety. Based on the most recent study, it appears Nevada's bear population has experienced a demographic shift in the last 15 years from a largely wildland population to a more urban one, but not necessarily a population increase.

With the adoption of a formal black bear policy and procedure in 1997, NDOW began collecting data on all captured bears. Prior to this, other than the first study (Goodrich 1991, Goodrich 1993), bears were simply trapped and translocated. NDOW now routinely marks each bear captured, and will very rarely use translocation, opting instead to use on-site releases and aversive conditioning. One biologist with a Karelian bear dog, and several wardens are the primary responders.

In addition to these changes, NDOW initiated its "Bear Aware" program in 1999. The aversive conditioning of bears has contributed immensely to the "Bear Aware" program. Budget constraints are the biggest obstacle to the program, which is currently operating on $1,500 annually. The education consists of a limited number of slide presentations, as well as brochures, bookmarks, and assorted handouts to the general public.

The NDOW is currently in the process of writing a black bear management plan, with the first draft to be completed by summer 2003. Nuisance bear call response and a legal hunt will be evaluated in the plan.

Complaints of depredation by black bears, although very rare, have historically been related to bears and domestic sheep. In the last 4–5 years, however, complaints of damage to homes, cars, and garbage enclosures have contributed to the overall rise in the number of calls. In most cases, the NDOW biologist will capture and kill offending animals that meet the policy's criteria for lethal control. In cases involving depredation of domestic livestock, however, NDOW contracts with USDA Wildlife Services. These cases are few, with an average of <1/year.

There are currently no laws in the state prohibiting the feeding of wildlife. Douglas County in the Lake Tahoe basin passed an ordinance in October of 2001 addressing the garbage problem, but the law was written in such a way that enforcement is very difficult. A person must receive 2 complaints against them (from neighbors or other citizens) within a 2-year period before they are required to obtain a bear-proof garbage container. The ordinance does not address the feeding of bears, nor does it attend to the problem of tourist's versus resident's garbage. The NDOW is a member of a new multi-agency group called the Tahoe Council for Wild Bears. The group's focus is on public education and one of the results from the first year is a model ordinance for counties and cities to adopt. Success of this group will be determined in the future.

The NDOW uses only 1 licensed rehabilitation facility for orphaned bear cubs. Animal Ark, north of Reno, has cared for approximately 10 cubs in as many years. This facility is run by a very dedicated and professional couple, who has modified their operation over the years to accommodate 3–4 bears at a time.

Conclusions

Black bear management in Nevada, although on a smaller scale than most states, is progressing at a steady pace. With the completion of a management plan, more options will become available to the field personnel responding to bear complaints. Continued research is needed, but will remain a low priority until funding resources are found. Dr. Jon Beckmann, of the Wildlife Conservation Society, is currently seeking funding to complete a DNA study with the use of hair samples from Nevada bears, along with samples from another state. The NDOW hopes to use this information to determine kinship among garbage-feeding bears, and relationships between garbage-feeding bears and wildland bears.

Bear complaints are not expected to decrease anytime soon, mainly because of the garbage situation, but also due to the forecast for a fourth year of drought. Habitat conditions are far from optimal and in some areas fire has degraded the conditions even more. The use of the Karelian bear dog has contributed to the success of the aversive conditioning, but even more so to the success of the public education campaign. Because NDOW is attempting to deal with nuisance bears using non-lethal tactics, the agency receives little, if any, negative press when a bear is captured and killed. Bear populations are expected to remain stable throughout the region, at least in the short term. Continued development in bear habitat is already having significant impacts on distribution of bears and mortality rates. This only appears to be getting worse.

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NEW MEXICO BLACK BEAR STATUS REPORT

RICK WINSLOW, New Mexico Department of Game and Fish, P.O. Box 25112, Santa Fe, NM 87504, USA, rwinslow@state.nm.us

Abstract: Historically, New Mexico was home to both black bears (*Ursus americanus*) and grizzly bears (*U. arctos*). Grizzlies were extirpated by the mid 1930s. Black bears were reduced to <1000 individuals. Based on results of an 8-year study, 5,200–6,000 black bears were estimated to occupy nearly 59,000 km^2 of habitat in 2001. Hunter harvest averaged 372 bears during the past 13 years, but >700 bears were killed because of hunter harvest and depredation through during the past 2 seasons. Thus, the current population number is likely less than in 2001. A population model developed during the study will be used to enhance harvest management. A study of bears in a wildland/urban interface near Albuquerque was initiated in 2002.

Classification • Distribution and Abundance

In the mid 1920s, Ligon (1927) estimated 750 bears inhabited New Mexico and suggested they were declining due to uncontrolled hunting and poisoning to protect livestock. The Sandia and Manzano Mountains, in the central part of the state, were completely devoid of bears at that time. Black bears and grizzlies were persecuted for their perceived threat to the livestock industry until 1927, when both species were protected as game animals. The last grizzly was killed in the mid 1930s. The black bear population was estimated to be 3,000 in 1967 (Lee 1967), 4,800 in the late 1980s (Donald Jones, New Mexico Department of Game and Fish [NMDGF], personal communication) and 5,200–6,000 in 2001 (Costello et. al. 2001). The population has likely decreased since 2001, due to high human-caused mortality and low recruitment.

Historically, black bears inhabited most woodland and forested areas of the state, and current predicted suitable habitat can be divided into 10 distinct regions (Figure 1). Primary habitat is considered to be closed-canopy forest and woodland types, including ponderosa pine (*Pinus ponderosa*), mixed conifer (*Pseudotsuga menziesii-Abies concolor*), spruce-fir (*Picea engelmannii-Abies lasiocarpa*), and pinyon-juniper (*Pinus edulis-Juniperus* spp.). Secondary habitat is more open-canopy woodland and shrubland types, including pinyon-juniper stringers, oak (*Quercus* spp.) and desert scrub, and wetland shrub types. Edge type habitats are generally grassland types used by bears, but usually in close proximity to more suitable habitats (Costello et al. 2001).

In 2001, Costello et al. (2001) derived a statewide population estimates using 2 methods: the first was extrapolation of field-based density estimates to statewide primary habitat, and the second was harvest-based population modeling. Resulting estimates were similar, indicating 5,200–6,000 black bears ≥1 year old occupied nearly 59,000 km^2 of habitat (Table 1). The overall trend for the bear population in New Mexico is stable or decreasing slightly due to high human-caused (both harvest and depredation) over the last few years.

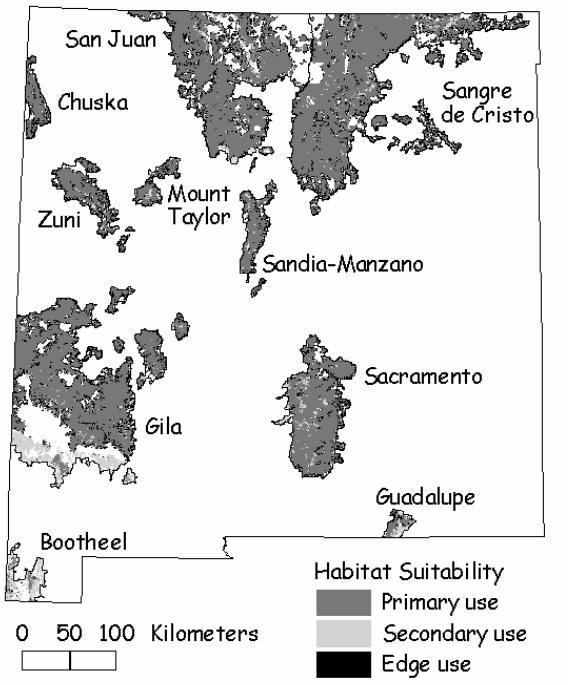

Figure 1. Predicted range of occupied suitable habitat for black bears, New Mexico, 2001.

Population Monitoring

Black bear harvest is monitored through mandatory pelt tagging of harvested animals. Successful hunters are required to present pelts of their harvested bears within 5 days to a NMDGF representative for tagging. We determine sex and age (through tooth cementum analysis), and obtain information on location of the harvest, effort expended, weapon used, use of guides, and use of dogs. We also conduct mail-out surveys of license purchasers.

We developed a population model derived from field data (Costello et al. 2001). Model inputs include annual harvest, weather variables, and indices of mast production (from field surveys). Estimates are derived using long-term harvest records.

Table 1. Regional and statewide density estimates of black bears ≥1 year old, New Mexico, 2001.

Region	Estimate
San Juan	1,700
Sangre de Cristo	1,500–2,300
Gila	1,000
Sacramento	500–1,000
Zuni	150
Mount Taylor	50
Sandia-Manzano	120
Bootheel	20
Chuska	80
Guadalupe	30
Statewide	5,200–6,000

Management Plan

The NMDGF is currently in the process of developing a 5-year management plan for black bears. Current management is based on the recent study (Costello et al. 2001). A Black Bear Task force has been formed to utilize attitudes and opinions of a variety of different interest groups to assist with the formulation of bear harvest management strategies. Public input will be heavily influential to this process so that the needs of a diverse public may be addressed.

Hunting Laws and Regulations

Current license fees are for $33.00 for resident hunters and $160.00 for non-residents. Annual bear license sales were about 2,400–6,200 from 1992–2002. Bag and possession limits are 1 bear/year. During 2002, the bag limit was increased to 2 bears/year in Game Management Units (GMUs) with high numbers of depredation complaints. Hunters are not permitted to take females with cubs or cubs <1 year of age. Legal methods include use of dogs and fair chase tactics. Use of dogs is not allowed on state Wildlife Management Areas or areas managed for specific resource uses. Hunters may use archery or center fire weapons. We do not require removal of meat from the field.

Season dates vary by year. In 2003, the season for all sporting arms will be 1–29 August and 25 September–15 November. In addition, an archery only, no dog season will run 30 August–22 September statewide. The Sandia/Manzano Mountains have special restrictions requiring the use of dogs and harvest of adult males only, during a shortened regular season from 15 October–15 November. New Mexico requires hunters to have their bears hides tagged by the NMDGF within 5 days of harvest.

Significant changes during the last 5 years include special draw permits for state wildlife areas, archery only seasons that coincide with archery seasons for deer (*Odocoileus* spp.) and elk (*Cervus elaphus*), and an August season that occurs prior to the archery season. The special restrictions for the Sandia/Manzano Mountains units were also initiated during the 2001–2002 bear season. Quotas by season and/or GMU are currently not in effect in New Mexico, but will be considered for the 2004 hunting season.

New Mexico has special requirements for guides and outfitters. The guide requirements are as follows:

1. Must be18 years or older;
2. No felony convictions;
3. No game or fish violations that add to or exceed 20 points or more in the last 3 years.
4. Pass an outfitter and guide exam with 70% or better;
5. $50 registration fee for residents;
6. $100 registration fee for non-residents;
7. Complete and sign a guide application;
8. Complete, sign, and notarize the Authorization of Release of Information form that has been added to the application.

The Outfitter requirements are as follows:

1. Must be 21 years or older;
2. No felony convictions;
3. No game or fish violations that add to or exceed 20 points or more in the last 3 years;
4. Pass an outfitter and guide exam with 70% or better;
5. Provide proof of 3 years outfitting experience;
6. Provide a copy of a minimum of $500,000 commercial liability insurance policy;
7. Provide a copy of registration with New Mexico Tax and Revenue Department;
8. Provide a copy of a Hunter Education Card;
9. $500 outfitter registration;
10. Complete and sign an outfitter application;
11. Complete, sign, and notarize the Authorization of Release of Information form that has been added to the application.

Harvest Summary

Hunter harvest averaged 372 bears during the past 13 years, but >700 bears were killed because of hunter harvest or depredation during the past 2 seasons (Table 2). Hunter success averages about 10%, with those hunters using dogs having a significantly higher success rate. The harvest is usually approximately 60% male and 40% female.

Depredation Trends, Policies, and Programs

Nuisance bear activities have been on the rise for the last 10 years. The level of activity correlates with rainfall and natural food resource availability (Zack et al. 2003). Generally, depredation complaints range from bears eating domestic fruit, bird or animal feed, compost, and pet food to predation of livestock. The

NMDGF is required to respond to nuisance complaints within 24 hours of receiving them, at which time an appropriate solution must be determined. Bears that are solely a "nuisance" are usually either deterred or trapped and translocated. We have a "3 strikes" rule that is often left up the responding officer's discretion, meaning that the level of the offence generally determines how the incident is treated. Bears involved in livestock depredation are destroyed. New Mexico has a law against attracting nuisance animals. Officers can enforce it when responding to repeated problems associated with feeding of animals (e. g. birdfeeders and deer feed). The 2003 legislative session created a state law requiring bear-proof garbage cans in areas that have a high number of nuisance problems. Feeding bears is illegal.

Table 2. Numbers of black bears killed from hunter harvest and depredation, and number of depredation or nuisance complaints, complied by the New Mexico Department of Game and Fish, New Mexico, 1990–2002.

Year	Hunter harvest	Depredation kill	Complaints
1990	384	8	14
1991	275	5	14
1992	229	8	16
1993	348	9	20
1994	625	No records	No records
1995	526	No records	No records
1996	400	No records	No records
1997	295	3	34
1998	148	1	42
1999	213	15	82
2000	325	181	228
2001	525	103	345
2002	649	52	239

New Mexico has one private rehabilitation facility for injured and orphaned bears. During the early winter of 2001, 25 orphaned cubs were reintroduced to the wild by placing them in artificial dens in remote areas. Twenty-two of these bears apparently went back into the wild population, 2 were destroyed during depredation activities, and 1 was apparently smothered in the den by a den mate. The NMDGF is responsible for returning rehabilitated bears to the wild.

Research Programs

An 8-year cooperative study, involving NMDGF, Hornocker Wildlife Institute (Wildlife Conservation Society), the New Mexico Cooperative Fish and Wildlife Research Unit (New Mexico State University), and Ecosystem Modeling, was completed in 2001 and current management is based on results of this study (Costello et al. 2001).

In 2002, a study of bears in the Sandia and Manzano Mountains was initiated to determine: (1) habitat use by translocated bears, (2) movement, (3) den site selection, (4) effectiveness of translocation, (5) frequency of recidivism for translocated bears, (6) travel corridors used, and (7) crossing of major human-created obstacles such as highways and cities. The Sandia Mountains are adjacent to Albuquerque, New Mexico and are surrounded by housing developments. This is a highly visible bear population and management of it receives much media attention.

Public Attitudes Towards Hunting and Management

No recent surveys have been taken concerning public opinion towards bear hunting. There has been a lot of attention paid to bear management and hunting issues at recent State Game Commission meetings. Recent nuisance bear incursions into the wildlife-urban interface of major cities, such as Albuquerque and Santa Fe, have caught the attention of the media and the public of New Mexico.

Conclusions

The development and implementation of a 5-year management plan for black bears in New Mexico within the next years will direct progressive management. Our process emphasizes public participation and we anticipate the plan will have widespread support. One important need is to determine a suitable population goal to meet the ecological and recreational expectations of the public. Current options seem to be maintaining the status quo, managing for smaller bear populations in hopes of reducing nuisance and depredation problems, or managing for larger bear populations with efforts to improve the public's ability to live with bears.

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NORTHWEST TERRITORIES BLACK BEAR STATUS REPORT

ROBERT J. GAU, Wildlife and Fisheries Division, Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories, #600 5102-50th Avenue, Yellowknife, NT, X1A 3S8, Canada, rob_gau@gov.nt.ca

Abstract: The Northwest Territories (NWT) is divided into settlement areas (Inuvialuit, Gwich'in, Sahtu) and regions (Deh Cho, North Slave, South Slave) that cover a vast area. We believe our black bear (*Ursus americanus*) population is stable at approximately 10,000 individuals. Other black bear information for the Northwest Territories regions and areas is neither centrally located nor tabulated in any single place. Additionally, general hunting license holders have no limits or restrictions on what they hunt and do not have to report what they hunt, therefore we will never fully appreciate the level of harvest for black bears in the NWT. Thus, our understanding and knowledge of black bears across the whole of the NWT is incomplete.

Classification

Little is know about the black bear in the Northwest Territories (NWT). The reliability of our population estimates are, at best, "guesstimates." Black bears are considered a big game species and only occasionally harvested.

Distribution and Abundance

The distribution of black bears in the NWT remains unchanged from historical times (Figure 1).

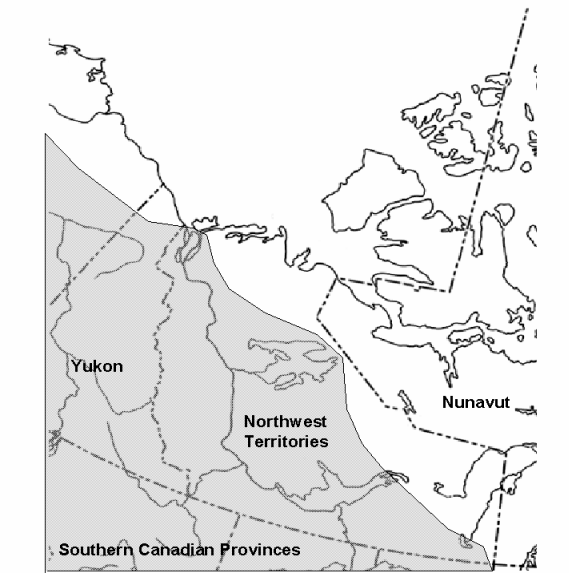

Figure 1. Range of black bears (shaded area) in the Northwest Territories.

Population Monitoring

Our crude estimate is that there are approximately 10,000 black bears inhabiting the NWT. We consider the population stable, however no scientific studies have been conducted to either support or refute our estimate.

Management Plan

Great diligence has been placed on handling and moving problem black bears from certain communities in the NWT, however, there is no standard management program for black bears.

Hunting Laws and Regulations

The hunting season for black bears is from mid-August to the end of June of the next year. There are several classifications of hunters: non-resident alien (those from outside Canada); non-resident (a Canadian or landed immigrant, who lives outside the NWT or has not resided in the NWT for a full 2 years); and resident (a Canadian citizen who has been living in the NWT for at least 2 years). A fourth category, the general hunting license, is described under Section 15 of the NWT Wildlife Act (Northwest Territories 1988). Essentially, general hunting license holders are of Aboriginal descent.

All hunters, except those who possess a general hunting license, are required to have a separate black bear tag. Special general hunting license holders may take any number of black bears in accordance with the number of tags held. There are no limits or restrictions on general hunting license holders. No person shall set out bait or food for any big game species, other than fur-bearing animals, without a permit entitling him or her to do so.

Registration of kills by non-resident and non-resident alien hunters is a by-product of the procurement of wildlife export permits, which are a requirement for removing any wildlife, in whole or in part from the NWT. Resident hunters volunteer information in the annual hunter harvest survey (survey participation is not mandatory, typically 30–50% of resident hunters reply). General hunting license holders are not required to report their harvest.

Harvest Summary

General hunting license holders have no limits or restrictions on what they hunt, and do not have to report

what they kill. Thus, we will never fully appreciate the level of harvest for many species in the NWT.

Depredation Trends, Policies, and Programs

The Northwest Territories is divided into settlement areas (Inuvialuit, Gwich'in, Sahtu) and regions (Deh Cho, North Slave, South Slave) that cover a vast area. Information pertaining to black bears is neither centrally located nor tabulated in any single place. Thus, depredation trends, bear complaints, translocations, and kills from all jurisdictions have never been tabulated.

The Government of the NWT does not pay out compensation, keep track of the number of claims, nor estimate the total cost in regards to problem black bears.

Research Programs

There are currently no black bear research programs in the NWT.

Public Attitudes Toward Hunting and Management

There has been no public opinion surveys conducted in the NWT regarding black bear hunting or management considerations.

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TEXAS BLACK BEAR STATUS REPORT

DAVID A. HOLDERMANN, Texas Parks and Wildlife Department, Region I, District 1, Alpine, TX 79830, USA, dholdermann@overland.net

Abstract: Texas lists the black bear (*Ursus americanus*) as threatened. The Louisiana black bear (*U. a. luteous*), a subspecies formerly native to eastern Texas, is federally listed as threatened. Historically, black bears were widespread, and even abundant, in Texas. By 1900, black bears were in decline in the east, and extirpated statewide by the 1960s. In the 1990s, a small resident bear population became reestablished in Big Bend National Park through ingress from nearby Coahuila, Mexico. The Texas Parks and Wildlife Department (TPWD) documents bear sightings and responds to bear-caused depredation. During the past 5 years, bears have been reported near the New Mexico, Oklahoma, Arkansas, and Louisiana borders. In the Deadhorse Mountains area, field studies indicated cub survival was 80% and bear density was 1 bear/142 km^2. Natural recolonization in Texas likely will be slow, because of low female dispersal rates and the vast expanses of desert separating islands of suitable habitat. Beginning in 2003, TPWD will identify and characterize potential bear habitats and construct a conceptual framework to explain potential black bear metapopulation dynamics in the Trans-Pecos region. Comprehensive black bear planning is needed for the orderly reintegration of black bears in Texas.

Classification

Texas classified the black bear as endangered in 1987 and upgraded its status to threatened in 1996. The Louisiana black bear, which formerly ranged in eastern Texas, was federally listed as threatened in 1992. All free-ranging black bears, in Texas counties where the Louisiana black bear formerly occurred, are considered federally threatened by similarity of appearance [Section 4 (e) of the Endangered Species Act], regardless of their taxonomic affinity.

Distribution and Abundance

Hall (1981) indicated black bears were present in all major Texas ecoregions prior to Anglo settlement (ca. 1820); however detailed information regarding their historical status is lacking. It is presumed, based on precipitation potential, ecosystem productivity, and native vegetation types, that the Pineywoods, Gulf Coast, South Texas Plains, and Edwards Plateau regions historically supported the highest quality black bear habitats in Texas. Anecdotal accounts allude to the abundance of bears in eastern Texas during the 19th century. For example, Bailey (1905), Chief Field Naturalist with the U.S. Department of Agriculture's Biological Survey, reported that during a 2-year period (1883-1885) Mr. A. Carter of Liberty County and a neighboring rancher killed 182 bears within a 16-km radius in the Trinity River drainage. By the time of the first organized survey of Texas mammals (1890-1904), black bears in the eastern half of the state were already reduced to scattered remnant populations or eliminated altogether, largely as the result of indiscriminate killing (Bailey 1905). At the same time, Bailey (1905) reported that bears were still "fairly common" in isolated islands of suitable habitat associated with the rugged desert ranges of the Trans-Pecos region. Trans-Pecos bear populations persisted for the next 50 years before finally succumbing to the combined effects of unregulated sport hunting, predator control, habitat alteration, and small population size (Onorato and Hellgren 2001). By the 1960s, black bears were extirpated from Texas (Taylor 1998).

Viable black bear populations remained through the 20th century on large, privately owned ranches in northern Coahuila, Mexico, immediately south of western Texas (Doan-Crider and Hellgren 1996). Since the late 1980s, these populations have provided a source for natural black bear recolonization of unoccupied habitats in the southern Trans-Pecos region of Texas (Onorato and Hellgren 2001). By the mid-1990s, a small breeding black bear population was reestablished along the border with Mexico in the Chisos (Skiles 1995) and possibly in the nearby Dead Horse Mountains (McKinney and Pittman 2001). Additionally, black bear sightings are now annually reported in the Del Norte, Davis, and Guadalupe mountains (Vanzant 2002), which suggests that recolonization of the Tran-Pecos is ongoing. Natural recolonization of this region is expected to be a slow process, because female black bears are philopatric (i.e., accommodate female offspring in their home ranges), which limits female dispersal, and because suitable montane bear habitats are widely separated in this Chihuahuan desert landscape (Onorato and Hellgren 2001). Recent confirmed bear sightings also have been sporadically reported from the Edwards Plateau, high plains and rolling plains (panhandle), blackland prairies-post oak (*Quercus stellata*) savannah (northeastern Texas), pineywoods (eastern Texas), and south Texas plains regions (Table 1, Figure 1). A majority of these were single bears and are thought to represent vagrant or dispersing males from populations in neighboring states and Mexico. Currently, no data are available on the abundance of black bears in Texas.

Table 1. Number of Class I[a] black bear sightings by ecoregion, Texas, September 1998–September 2002.

	Year				
Ecoregion	1998	1999	2000	2001	2002
Trans-Pecos[b]	9	4	27	16	4
Highland and rolling plains		1		1	1
Edwards Plateau	1		8		
Blackland prairies and post oak savannah	3				
Pineywoods		1			1
South Texas plains	1				
Total	14	6	35	17	6

[a] Class I = bear in possession, seen, or tangible evidence documented by a qualified Texas Parks and Wildlife Department investigator or bear observed by two or more reliable individuals.
[b] Bear sightings from Big Bend and Guadalupe National Parks, and Black Gap Wildlife Management Area omitted from this data set.

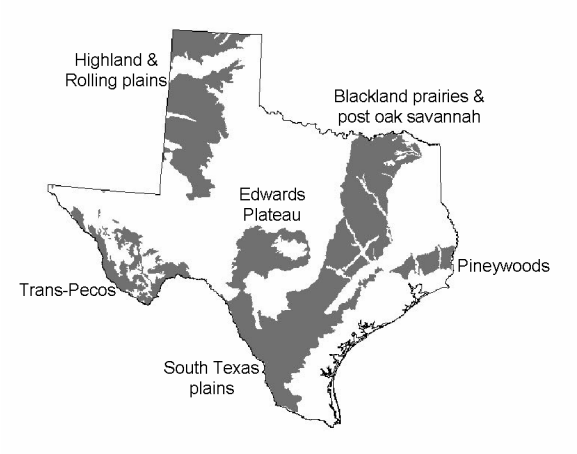

Figure 1. Texas ecoregions (U. S. Environmental Protection Agency 2004) where black bears have been sighted during September 1998–September 2002.

Population Monitoring

The TPWD uses a standardized investigation report to document statewide black bear occurrence. Opportunistic sightings of black bears or their sign are investigated by a qualified TPWD employee and designated as Class I (bear in possession, seen, or tangible evidence documented by the investigator or bear observed by two or more reliable individuals), Class II (detailed description of event provided by a reliable observer), or Class III (details of observation are vague and the account is inconsistent). These data provide limited information about the occurrence, gender, breeding status, and habitat association of black bears. The TPWD uses various forms of outreach media to encourage the public to report bear sightings. Currently, there are no intensive ongoing efforts to gather detailed information about Texas black bear populations. McKinney and Pittman (2001) studied a small population of black bears in the Dead Horse Mountains and vicinity. Although their sample of radio-collared bears was small (5 adult males, 3 yearling males, 1 yearling female, 2 adult females, and 3 cubs), it provided some insight into the population dynamics of black bears in the Trans-Pecos region. They estimated a density of 1 bear per 142/km^2 and annual cub survival of 80%.

Management Plan

In 2001, the Texas Parks and Wildlife Commission directed the TPWD to develop a black bear management plan. East and West Texas black bear working groups were established to facilitate planning and several TPWD-facilitated black bear scoping meetings were held in 2002, with participation from local landowners and landowner associations, other public and conservation groups, and state and federal agencies. The East Texas working group is currently drafting a black bear management plan.

Hunting Laws and Regulations • Harvest Summary

Because black bears are currently listed as state threatened, no hunting is allowed and there are no harvest data to report.

Depredation Trends, Policies, and Programs

The TPWD guidelines for responding to black bear complaints, outside the historic range of the Louisiana black bear, have been in effect since 2000. This policy defines "nuisance" and "depredation" in relation to black bears and establishes a protocol for initial response to complaints, trapping and translocating depredating bears, dealing with repeat-offending bears, coordination with other natural resources agencies, and reporting of significant black bear complaints and subsequent agency responses. Black bear complaints are given high priority and must be addressed by TPWD field personnel within 48 hours of being

received. Once depredation has been established, the preferred option is to trap and translocate the bear to a suitable location where further depredation is unlikely. Since 1996, TPWD has trapped and translocated 8 depredating black bears. Most black bear complaints have been associated with threats to domestic livestock operations. There is no provision in the complaint guidelines to compensate for lost or damaged property.

The TPWD publishes a black bear information brochure that covers information about basic life history and bear-human interactions and conflicts.

Research Programs

Past research in Texas was focused on the demographics, seasonal home ranges and movements, and diet of black bears in the Dead Horse Mountains (McKinney and Pittman 2001), and winter ecology and diet of black bears in Big Bend National Park (Mitchell 2001). Doan-Crider (1995) studied the population dynamics and home range characteristics of black bears in the Serranias del Burro, Coahuila, Mexico, immediately south of the Texas border.

Beginning in 2003, TPWD will support the Texas Tech University to conduct a landscape analysis of black bear population and habitat characteristics in the Trans-Pecos region. This research effort will use Geographic Information System (GIS) technologies and computer modeling to characterize and evaluate the potential of habitats to support black bears and to construct a conceptual framework for a Trans-Pecos black bear metapopulation. Information from this analysis is needed to formulate an effective black bear conservation program for western Texas.

Public Attitudes Toward Hunting and Management

Public attitudes toward overall black bear management have not been objectively assessed in Texas. Since Texas is a primarily a private-land state with <4% in public ownership (Texas Parks and Wildlife Department 2002), measurement and understanding of public attitudes towards black bears, particularly among private landowners, will be essential for the long-term management of this wildlife resource.

Conclusions

Presently, the Tran-Pecos is the only region in Texas with a breeding black bear population and where confirmed sightings of bears are consistently reported (Table 1). This region is directly linked to viable black bear populations to the south (in the Serranias del Burro Mountains of Coahuila, Mexico), and to the north (in the Sacramento-Guadalupe Mountain corridor of New Mexico). Outside the Chisos and Dead Horse mountains, single bears are regularly observed in that portion of the Trans-Pecos region between the Rio Grande and U.S. Interstate 10, which suggests that natural recolonization of historic habitats in the Del Norte, Glass, and Davis Mountains eventually will occur.

Texas appears to have suitable bear habitat in several ecological regions outside the Trans-Pecos. The southern Edwards Plateau and western South Texas Plains are also geographically linked to occupied black bear range in Mexico, which is the probable source for bears sighted in these regions. Sporadic black bear sightings in the pineywoods, blackland prairie-post oak savannah, and high and rolling plains regions appear to represent immigration from established bear populations in neighboring states. Outside the pineywoods, the habitat characteristics and potential to support resident bear populations in these regions have not been objectively assessed.

Since the 1980s, TPWD has responded to the return of black bears to Texas by listing bears as a state-threatened species, standardizing black bear reporting, increasing media coverage and public outreach, implementing a statewide depredation policy, and supporting bear research. In the near future, Texas will initiate landscape-scale research to develop a conceptual model to identify which Trans-Pecos habitats have potential to support black bears and to determine how a viable black bear metapopulation might operate in this environment.

Comprehensive black bear planning is needed for the orderly reintegration of black bears in Texas. Planning should address such important issues as public attitudes and willingness to tolerate bears; the compatibility of black bears with other natural resource values and land uses; black bear status in neighboring states and Mexico as it relates to their immigration into Texas; further delineation of potential black bear habitats by region; and finally, the establishment of black bear management and conservation goals for Texas. An immediate planning need in the Trans-Pecos is objective measurement of public attitudes relating to black bears. The attitudes and concerns of the land-owning public are of special interest in Texas, because Texas is a private-land state. This fact dictates that an effective, long-term black bear conservation strategy must address and be compatible with the interests and land uses of this public. Planning is also needed to accommodate natural immigration and management of bears in other regions of the state.

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UTAH BLACK BEAR STATUS REPORT

CRAIG R. MCLAUGHLIN, Utah Division of Wildlife Resources, 1594 West North Temple, Salt Lake City, UT 84114, USA, craig.mclaughlin@utah.gov

Abstract: American black bears (*Ursus americanus*) are protected game animals in Utah, and are managed through restrictive hunting controlled by limiting numbers of hunters within geographic regions, and through prevention and control of bear-human conflicts. About 3,500 bears are distributed throughout the forested regions of the state, occupying about 79,422 km^2 of habitat. Harvest-derived estimates of bear survival and age-sex composition of harvests are the primary sources of data for management decisions. A bear management plan was developed in 2000 using a discussion group representing a range of public interests; this plan will guide bear management efforts through 2010. Bear harvests have increased in recent years, but harvest sex ratios, age composition, and survival have met performance targets designed to maintain bear numbers in concert with competing social, economic, and biological interests. A 5-year experimental spring hunt began in 2001 to address concern over perceived high levels of bear-livestock conflict and substantial losses of bears to control efforts. The experiment should determine whether spring hunting is useful in reducing the number of bear-livestock conflicts (and subsequent losses of bears), and if spring hunts will promote male-dominated harvests. Research has been limited to telemetry-based population studies on 1 site; we plan to monitor reproduction, recruitment and adult female survival on additional sites in other geographic regions. Better monitoring of annual reproduction and survival is needed for timely detection of extended periods of low cub production and management action.

Classification

Black bears were considered predators in Utah from the time of European settlement until 1967. The Utah Territorial Legislature authorized a bounty on bears in 1888, and bounties were recorded sporadically through the 1960s. In 1967, at the request of houndsmen, the Utah State Legislature changed the status of bears to protected wildlife, and the Utah Fish and Game Commission declared black bears to be game animals with established hunting seasons. Spring and fall hunting seasons of varying length were observed through 1992, when the spring season was terminated. By 1990, hunter numbers were restricted through a limited entry system that used area-specific permits to control harvest numbers and distribution.

Distribution and Abundance

Black bears are distributed throughout most of the forested sections of Utah, which contains about 79,422 km^2 of bear habitat (Utah Division of Wildlife Resources [UDWR] 2000). Highest bear densities are found in the Wasatch Mountains of central Utah, on the Tavaputs Plateau of eastern Utah, and in the LaSal Mountains of southeastern Utah, where densities are estimated at 0.04–0.1 bears/km^2 (Figure 1). Bear densities are substantially lower in northern and northeastern Utah. Regional bear abundance and distribution have been derived primarily from harvest records.

Population Monitoring

Each year, adult survival and the sex and age composition of harvests are compared to management criteria to assess population status relative to management objectives. Harvest-based indices of population status are available statewide, but more detailed information on bear densities, survival, and productivity has been obtained from the Book Cliffs study area, located on southeast edge of the Tavaputs Plateau. This long-term study, conducted through a contract with Dr. Hal Black of Brigham Young University, has been underway since 1991. The last statewide bear population estimates were developed in 2000, when the *Utah Black Bear Management Plan* (UDWR 2000) was completed. Two population estimates were generated using a density extrapolation method and a sustainable harvest method.

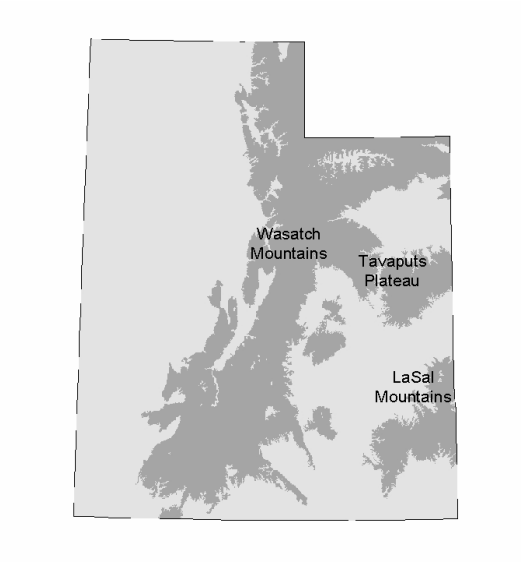

Figure 1. Distribution of black bear habitat in Utah.

Using the density extrapolation method, a statewide bear population of 3,980 bears was estimated. Total bear density on the Book Cliffs study site was estimated at 0.08 bears/km^2 by mapping female bear home ranges, then adding an estimate of the number of cubs and male

bears in the immediate population based upon capture and reproductive histories. The amount of bear habitat in Utah was considered the sum of area used by bears above 2,134 m (7,000 ft) elevation. Within each management unit, bear habitat was further classified with a medium or high value based upon vegetative types. The area in medium value habitat was assigned a density of 0.04 bears/km^2, and the area of high value habitat was assigned a density of 0.1 bears/km^2. The total estimate resulted from extrapolation of density estimates to the total area within both habitat value categories.

Using the sustainable harvest method, a statewide bear population of 3,450 bears was estimated. With this method, the bear density of each management unit containing bear habitat was estimated by assuming that annual losses were sustainable and approximated recruitment, resulting in a stable population trend. The mean harvest density was calculated for each management unit, and the unit was assigned a "reasonable" (i.e., sustainable) population density (1 of 7 densities ranging from 0.00004–0.1 bears/km^2). Each management unit's bear population was estimated by multiplying the assigned density estimate by the amount of bear habitat within the unit. The statewide population estimate resulted from the sum of all management unit population estimates. This more conservative estimate of bear numbers has been used by UDWR in most management applications.

The bear harvest is reviewed annually and compared to performance targets developed for the *Utah Black Bear Management Plan*. These targets were considered adequate to prevent population declines from over-exploitation, and are general criteria to guide harvest prescriptions. The targets propose (1) statewide bear harvest should be comprised of <40% females, (2) mean age of harvested bears should exceed 5 years, and (3) adult survival should exceed 78%.

Management Plan

The *Utah Black Bear Management Plan* was created in 2000 to guide bear management efforts through 2010. The plan was created by the combined efforts of the UDWR and the Bear Discussion Group, a body composed of diverse public interests. The *Utah Black Bear Management Plan* included an assessment of bear habitat, management history, bear management methods, and social and political issues concerning bear management in Utah, and established the following goal to provide management direction. The bear management goal is to maintain a healthy bear population in existing occupied habitat and expand distribution while considering human safety, economic concerns, and other wildlife species.

Six management objectives were developed, along with performance targets and strategies. Individual objectives, targets, and strategies include:

Objective A. Maintain current bear distribution, while working to increase bear distribution into suitable unoccupied or low-density areas through 2010:

Performance targets:

1. Number of wildlife management units that support huntable bear populations will exceed 19.
2. The number of wildlife management units that support bear populations will exceed 22.

Strategies:

1. Develop model estimating black bear numbers and potential by unit.
2. Assess feasibility of reintroducing black bears into areas of suitable habitat statewide not currently occupied.
3. Review current reintroduction efforts and develop methods and policy to establish bears in unoccupied habitat.
4. Maintain migration corridors to allow natural expansion into unoccupied habitat.

Objective B. Maintain current bear populations, with a reasonable proportion of older age animals and breeding females, balancing population numbers with other wildlife species through the year 2010.

Performance targets:

1. The percent of females in the harvest will be less than 40%.
2. The average age of harvested bears will exceed 5 years.
3. Total adult survival will exceed 78%.
4. Where feasible, utilize non-lethal methods to reduce conflicts between humans and bears, allowing higher bear population densities

Strategies:

1. Conduct research and implement techniques to determine population levels, such as tracking studies, or DNA marker population assessment.
2. Consider experimental harvest strategies to determine effects on harvest statistics and performance targets, such as spring hunts to reduce proportion of females in the harvest; spring hounding, fall baiting seasons; unlimited permits on season concurrent with big game seasons; and spot and stalk only hunts.
3. Make every reasonable effort to collect a tooth and record sex for every known

bear mortality, including sport harvest and take by U.S. Department of Agriculture (USDA) Wildlife Services.
4. Develop unit management plans that balance black bear numbers with available habitat.
5. Monitor bear health and disease and take actions to maintain healthy individuals.
6. If bear predation is documented to be a problem, implement Predator Management Plans in accordance with the Division's policy on *Managing Predatory Wildlife Species*.
7. Secure funding to accomplish essential elements of *Utah Black Bear Management Plan.*
8. Educate the public on black bear biology and management to foster public support.
9. Coordinate and cooperate with adjoining states and researchers.
10. Manage pursuit to eliminate detrimental effects on bears, e.g., number of hounds per pack, number of pursuit permits, hunt unit pressure, and other controls.

Objective C. Minimize the loss in quality and quantity of critical and high priority bear habitat, including migration corridors between occupied areas through 2010.

Performance targets:
1. Number of acres of critical and high priority bear habitat.
2. Number of habitat improvement projects completed, with a goal of one per region per year.
3. Suitable migration corridors between areas of occupied habitat**..**
4. Maintain average bear food value for each unit.

Strategies:
1. Protect critical and high priority bear habitat through consulting with and commenting on other land management agencies' development proposals.
2. Undertake a minimum of 5 habitat improvement projects per year to enhance critical and high value bear habitat, focusing on aspen regeneration, natural fire management, increasing density of food producing plants, and riparian areas.
3. Using Geographic Information Systems (GIS), develop a map depicting black bear habitat and identify important migration corridors. Work with other agencies to protect those corridors.
4. Conduct research to determine what constitutes, and how to restore, critical and high value bear habitat.
5. Annually monitor bear food plants to determine production.

Objective D. Reduce the risk of loss of human life and reduce chances of injury to humans by bears through the year 2010.

Performance targets:
1. Number of people injured by bears.
2. Number of incidents reported.

Strategies:
1. Implement guidelines identified in the Division's *Managing Nuisance Bears* policy (UDWR 2003).
2. Work with federal land management agencies and private landowners to enforce regulations and eliminate attractants that may bring bears and humans into close contact, e.g., using 'bear-proof' garbage cans in campgrounds.
3. Educate landowners about the dangers associated with living in bear habitat and how to reduce the likelihood of encounters.
4. Educate the public about the dangers associated with recreating in bear habitat and how to avoid problems.

Objective E. Reduce the number of livestock killed by bears.

Performance target:
1. Number of lambs, ewes, bucks, calves, and other livestock killed by bears.

Strategies:
1. Remove depredating bears by targeting offending individuals in accordance with Memorandum of Understanding (MOU) with Wildlife Services signed in 1993.
2. Implement non-lethal methods to reduce conflicts between bears and livestock.
3. Fund research to determine factors that will minimize livestock predation.
4. Work with land management agencies and livestock operators to utilize grazing techniques that will minimize depredation.
5. Implement an experimental spring bear hunt in historic problem areas to determine if it will help reduce livestock depredation while at the same time reducing female bear take.

Objective F. Maintain quality recreational opportunities, both consumptive and nonconsumptive,through the year 2010.

Performance targets:

1. Number of bear hunters.
2. Number of bear pursuit hunters.
3. Number of bait Certificates of Registration (CORs).
4. Number of days people spend looking for or observing bears or sign.
5. Number of reported conflicts between different user groups.

Strategies:

1. Maintain recreational hunting, including hounding, baiting, and pursuit as management tools.
2. Increase watchable wildlife opportunities for black bears, through using the public to conduct bear food surveys, track counts, and other needed efforts.
3. Implement harvest strategies that will tend to reduce conflicts between resource users, such as spot and stalk hunting during big game seasons, or limiting the number of hounds, and other approaches.
4. Work with the public to draft legislation to affect guide regulation.

Hunting Laws and Regulations

Black bears are hunted through a limited entry system that controls harvest on individual management units by limiting numbers of hunters. Most management units are hunted during fall seasons that are open from late August through late September, and again during the month of November. Season dates for 2003 are 23 August–28 September and 1–27 November. An experimental spring season is in place on 4 management units for 2001–2005. This season runs from mid-April through late May. In 2003, the spring season dates are 12 April–26 May.

Hunters are permitted to use hounds, bait, or spot and stalk bears, and may hunt over natural food sources. Baiting is restricted to hunters who use archery tackle, and is undertaken by relatively few hunters. A COR is required to document the location of each bait site, and must be obtained at the regional UDWR office within the region where the bait station will be located. Written landowner permission is required before a COR for a bait station is issued. The COR will permit a properly licensed hunter to establish 1 bait station, and will specify the bait items used, the names of all hunters that are permitted to hunt over the station, and the names of all individuals that will tend it.

There are no limits on the number of hounds used to take or pursue a bear, but the owner or handler of the hounds must hold a valid limited entry bear permit or a bear pursuit permit while engaged in the activity. Only properly licensed hunters that have been present for the entire hunt, from the time the dogs are released until the bear is treed or brought to bay, may take bears.

Each hunter may take 1 bear/year. Successful permit holders must wait 2 years before applying for another bear hunting permit. Adult females accompanied by cubs are not legal game. Hunters must present bears for permanent tagging to a conservation officer or Division office within 48 hours of the kill. The pelt and skull must be presented to the UDWR; skinned carcasses may be left in the field, but evidence of sex must remain attached to the pelt or carcass to meet reporting requirements. Legally obtained tanned bear hides are the only parts of bears that may be purchased or sold. Gall bladders, teeth, claws, paws or skulls may not be bartered or sold.

A pursuit-only season exists on most management units, including some that are closed to the taking of bears. The bear pursuit season is separated into spring and fall periods. In 2003, dates of the bear pursuit season are 12 April–4 June, 23 August–28 September, and 1–27 November.

Utah does not regulate commercial guiding, and there is no licensing requirement for guides. Limited entry bear permits cost $88.00 for residents and $313.00 for nonresidents (the same fees apply for limited entry bear archery permits). The handling fee for a bait station COR is $5.00. Bear pursuit permits cost $30.00 for both residents and nonresidents, and the number of pursuit permits is not limited.

Harvest Summary

Black bear harvests in Utah climbed above 50 animals for the first time in 1986, and interest in bear hunting surged in the late 1980s (Table 1). By 1989, concern that hunting pressure and harvests had become excessive resulted in a change to limited entry management of hunting effort. In 1990, the UDWR began issuing a limited number of management unit-specific bear hunting permits to control the size and distribution of harvests. Harvests increased over the following 12 years from a low of 22 bears in 1990 to a high of 84 bears harvested in 2002 (Table 1). Hunting pressure also increased by 50%, from 142 permits issued in 1990 to 217 permits in 2002. Hunter success has remained high, ranging from 21–39% (Table 1).

Table 1. Effort and success of black bear hunters, and documented black bear mortality, Utah, 1967-2002.

	Number of permits sold					Mortality		
Year	Hunting	Pursuit	Number of hunters	Percent success by hunters	Percent females in harvest	Harvest	Other causes	Total
1967						15	12	27
1968						12	9	21
1969	43		31	58		25	27	52
1970	155		119	6		9	18	27
1971	59		48	29		17	16	33
1972	96		77	20		19	7	26
1973	125		114	20		25	0	25
1974	134		117	22		29	9	38
1975	161	161	144	14	41	22	2	24
1976	107	48	96	9	42	10	7	17
1977	149	77	127	17	33	26	6	32
1978	222	114	185	18	33	40	10	50
1979	240	91	196	11	19	26	5	31
1980	217	95	177	12	28	26	6	32
1981	263	95	227	15	30	39	4	43
1982	229	93	188	17	39	38	6	44
1983	219	98	176	8	44	18	9	27
1984	217	33	184	12	31	26	6	32
1985	269	86	230	11	27	29	10	39
1986	332	90	302	22	45	72	6	78
1987	326	156	262	14	35	44	25	69
1988	491	173	394	14	35	69	28	97
1989	687	187	556	14	30	97	10	107
1990	142	355	119	16	18	22	16	38
1991	142	364	119	25	23	35	15	50
1992	142	524	124	23	19	32	25	57
1993	162	570	136	22	51	35	12	47
1994	168	552	153	25	40	42	20	62
1995	175	627	156	30	34	53	34	87
1996	181	630	174	38	43	68	35	103
1997	192	638	176	26	44	50	31	81
1998	202	635	181	23	42	46	42	88
1999	220	264	199	26	30	57	35	92
2000	214	285	194	35	35	75	70	145
2001	212	318		33	38	70	47	117
2002	217			39	31	84	75	159
Total	7110	7041	5681			1402	695	2097
Average	209.1	270.8	177.5	21.2	34.5	38.9	19.3	58.3

Depredation Trends, Policies, and Programs

Other losses to the bear population have also increased over the past 12 years. In recent years, the number of bears killed for depredation, from vehicle strikes, in accidents, and in defense of property rivals the legal kill (Table 1). This trend supports harvest-based indices of population status that suggest Utah's bear population has increased in the past decade, but all indices used to track the bear population are subject to bias associated with weather. The past 4 years of drought have probably influenced bears and their interactions with livestock, but the effects are difficult to quantify.

The number of bears killed for livestock depredation increased since 1995. Although number of sheep grazed in Utah declined about 20% from 445,000 in 1995 to 365,000 head in 2002 (USDA 2003), numbers of bears killed for livestock depredation

increased steadily over the 8-year period from 29 bears in 1995 to 55 bears in 2002. The number of livestock depredation incidents fluctuated from 41 to 85 between 1995 and 2002, but the number of livestock lost has increased in recent years, ranging from 400–650 head annually (Figure 2). The UDWR pays ranchers for losses by bears and mountain lions (*Puma concolor*) from a $100,000 annual appropriation. Loss claims commonly exceed this amount; in 2002, ranchers were compensated at 76 cents/dollar claimed on livestock lost (Figure 2).

The number of bears killed in defense of property or for nuisance problems has fluctuated from 2–16 bears/year since 1995, but remains relatively low. Losses by auto or train collisions ranged from 0–7 bears/year since 1995. Other mortalities documented during the period include 2 bears killed illegally and 1 mortality of unknown cause.

The UDWR policy for handling problem bears was revised in 2003 to clarify the way personnel classify and respond to incidents (UDWR 2003). In addition, UDWR has a MOU with USDA Wildlife Services to address bear depredation problems. Each bear incident is classified into 1 of 3 categories for response. Bears involved in minor incidents and first-time nuisance bears are considered Category I and are handled using non-lethal techniques. Repeat offenders and injured bears are classified as Category II and are handled with non-lethal or lethal techniques as required. Aggressive bears (including bears that prey on livestock or pets) and bears that pose public safety threats are considered Category III and are handled with lethal methods. Wildlife Services personnel generally respond to livestock depredation incidents, and UDWR personnel handle most public safety and nuisance incidents. Except in extremely unusual circumstances, all orphaned cubs and malnourished yearlings are rehabilitated for release into the wild. Most of these bears are cared for by Idaho Black Bear Rehabilitation, Incorporated in Boise, Idaho.

Research Programs

In 1991, UDWR contracted with Brigham Young University to conduct research into bear population dynamics to improve management efforts. This contract will end in June 2003, with a final report to be issued within the year. The 12-year, radio-telemetry study has concentrated on investigating survival, productivity, and food habits of bears in the Book Cliffs region of eastern Utah. UDWR plans to continue monitoring the 20-odd bears that are presently radio-collared as a means to document annual reproduction and survival of bears in the region. During 2002, UDWR regional staff radio-collared 4 female bears to monitor reproduction in the La Sal Mountains of southeastern Utah. This sample will be augmented with additional collared bears in 2003.

The UDWR is also undertaking a 5-year experiment to evaluate the potential for using spring bear harvests to reduce bear-livestock conflicts and promote male-dominated harvests. Spring bear hunts will be held in 3 management units from 2001–2005. Each of the 3 units was paired with a nearby unit of similar characteristics, which will continue to be hunted only during fall. The composition of harvests, numbers of bear-livestock complaints, and numbers of bears killed for depredating livestock will be compared between corresponding spring-hunt and fall-hunt units to determine whether spring hunts can reduce numbers of bear-livestock conflicts and subsequent losses of bears to damage control efforts. In addition, the sex-age composition of spring harvests will be compared with fall harvests to determine if spring harvests will be differentially composed of male bears.

Early results, following 2 years of study, suggest that spring hunting has not reduced the numbers of bears taken to control livestock depredation, but spring harvests are composed primarily of male bears. During 2001 and 2002, 104 bear mortalities were recorded on the spring-only hunt units, and 103 mortalities were recorded on the fall-only comparison units. Both hunting harvests (57 spring:59 fall) and other losses (47 spring:44 fall) were comparable, with similar numbers of bears killed for depredation (35 spring:37 fall). Only 16% of hunting harvests on the spring-hunt units were female bears, but females comprised 46% of fall harvests on comparison units.

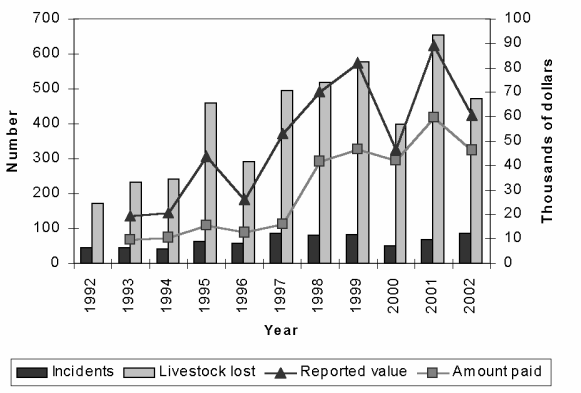

Figure 2. Number of livestock damage incidents, and associated monetary values, attributed to black bears in Utah, 1992-2002.

Public Attitudes Towards Hunting and Management

Management of black bears in Utah is challenging due to considerable public interest in the welfare of bears, and widely divergent attitudes and values of

bears held by the state's citizens. Utah has a small and well-organized community of bear hunters (mostly houndsmen) that have a vested interest in assuring that black bears are managed for sustainable harvest and pursuit opportunities. The ranching industry is concerned about bear depredation on livestock (primarily sheep) and the economic costs of sharing open range with black bears. Environmental organizations have expressed opposition to bear hunting, and question the UDWR's ability and willingness to maintain bear numbers in the face of agricultural conflicts and annual hunting harvests. All vocal interest groups, including ranchers, are concerned about the relatively high number of bears killed in livestock depredation control. This concern translated into support for the 5-year spring hunt experiment, designed to evaluate whether spring bear harvests will reduce the number of bear-livestock depredation incidents and result in harvests that are composed primarily of male bears. Approval of the spring hunt experiment, following the 1992 termination of spring hunting in Utah over concern that spring hunting resulted in orphaning of young cubs, underscores the widespread public interest in reducing bear-livestock conflicts.

Environmental organizations have recently attempted to outlaw baiting as a hunting method in the state, with little success. Baiting is practiced by about 10% of Utah's bear hunters, resulting in an average of 22 baits placed across the state each year and translating into the harvest of about a dozen bears.

The popularity of bear pursuit seasons continues to generate discussions about conflicts between houndsmen and other hunting activities in early fall, and about perceptions of excessive pursuit pressure placed on bears by nonresident houndsmen in a few management units near Utah's eastern border. In 2001-2002, nonresidents purchased 78 of the 318 (24%) bear pursuit permits sold in Utah. However, relatively little pursuit effort is expended in the early fall season. Thirty-five percent of pursuit permit holders indicated they chased bears during the early fall season, when most conflict is perceived to occur. Most pursuit days reported on the UDWR bear hunter questionnaire(2,913 of 5,153 or 57%) were expended in the 3 most accessible management units close to eastern border. These units, where conflict was alleged, were closed to pursuit during early fall season, therefore nearly all pursuit on these high-use units occurred during the spring.

Conclusions

Utah's black bear population appears to have increased since 1990, as indicated by (1) a trend of increasing hunting harvests, coupled with sustained hunter success, (2) a preponderance of young age classes in recent bear harvests, (3) evidence of reproduction by research bears in the Book Cliffs during most of the period (Table 2), and (4) 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). However, continued drought and subsequent impacts on reproduction and recruitment may curtail population growth and the bear population's ability to sustain harvests in the future. Consequently, UDWR needs to implement an index or measure of annual reproduction to anticipate multi-year suppression of cub production and adjust harvest regulations proactively.

Table 2. Percent of radio-collared, adult female black bears with cubs, in years of perceived high and low natural food availability, Book Cliffs study area, Utah, 1992-2002.

Year	Food availability	No. females monitored	Percent with cubs
1992	High	4	75
1993	High	8	88
1994	High	7	100
1995	High	9	78
1996	Low	10	10
1997	High	15	80
1998	High	6	83
1999	High	4	100
2000	High	5	60
2001	Low	3	0
2002	Low	10	10
All Years		81	62
High years		58	83
Low years		23	9

The UDWR also needs to expand its monitoring of bear reproduction, recruitment, and survival into additional geographic areas to evaluate and manage regional bear populations. In addition, public concern over livestock depredation by bears warrants research and management efforts to reduce bear-livestock conflicts.

Finally, UDWR will be reviewing the harvest-based criteria used in management recommendations and developing a written management system for implementation in the near future. This system will provide rules of thumb for management action needed to achieve objectives; that is, identify specific actions in response to particular criteria evaluations. A management system will also provide for annual evaluation of UDWR's existing decision-making process to address knowledge gaps and identify data needs that translate into future research objectives. The

management system should improve agency decision-making, strengthen public support for programs, provide clear justification for funding initiatives and focus for future research needs, and promote achievement of management goals.

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WASHINGTON BLACK BEAR STATUS REPORT

DONALD A. MARTORELLO, Washington Department of Fish and Wildlife, 600 Capitol Way North, Olympia, Washington, 98501, USA
RICHARD A. BEAUSOLEIL, Washington Department of Fish and Wildlife, 3515 Chelan Highway, Wenatchee, Washington, 98801, USA, beausrab@dfw.wa.gov

Distribution and Abundance

There are an estimated 25,000–30,000 black bears inhabiting Washington, and regional populations are likely stable to slightly increasing (Washington Department of Fish and Game 2003).

Population Monitoring • Management Plan

The goals for black bear management in Washington are to: (1) maintain sustainable, healthy populations of black bears through all bear habitats, (2) maximize recreational hunting opportunities consistent with the status of bear populations, and (3) minimize black bear nuisance and damage activity.

As outlined in the *Game Management Plan*, sex ratio and median ages of harvested bears are used as indicators of overall bear population health and vigor, and reflect the impact of harvest levels on black bear populations (Table 1).

Table 1. Black bear harvest guidelines in Washington.

	Harvest		
Parameter	Liberalize	Acceptable	Restrict
% Females in harvest	<35%	35–39%	>39%
Median age of harvested females	>6 years	5–6 years	<5 years
Median age of harvested males	>4 years	2–4 years	<2 years

Based on a model using population reconstruction methods and harvest age data, the statewide black bear population in Washington likely ranges between 25,000–30,000 animals. At the Black Bear Management Unit (BBMU) level, bear populations are generally healthy. To maintain these stable populations, modifications to harvest levels are made (on a 3-year basis) as indicated by recent trends in female harvest and median ages (Figure 1).

No formal surveys are conducted in Washington for black bears. In the past, Washington Department of Fish and Wildlife conducted bait station surveys as a measure of bear abundance. However, an analysis of statistical power indicated that at the level of survey intensity (limited by funding), we would not be able to detect a change in bear abundance using bait stations. As such, the survey technique was discontinued. Starting in 2003, adult female and cub survival will be monitored in selected areas to better assess bear population status and impacts of hunting.

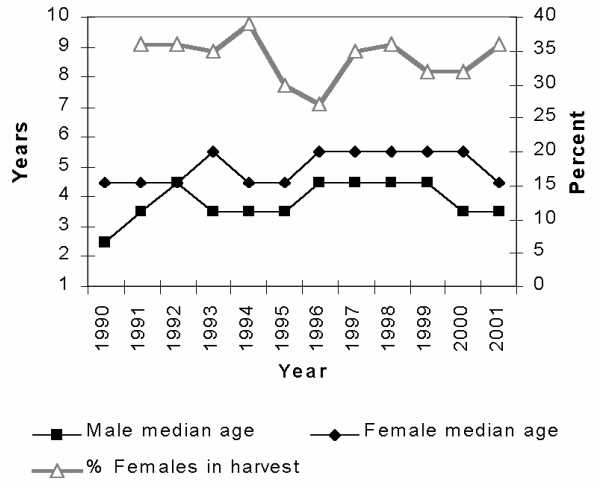

Figure 1. Median age of harvested black bears, by sex, and percent females in harvest, Washington, 1990-2001.

Hunting Laws and Regulations • Harvest Summary

Black bear seasons have changed significantly over the last 7 years. In the November 1996 general election, Washington voters passed Initiative 655, which banned the use of bait and hounds for hunting black bear and the use of hounds for hunting cougar and bobcat. Therefore, the use of bait and hounds for hunting black bear became illegal for the 1997 season. In an effort to mitigate the anticipated decrease in bear harvest, 1997 bear seasons were lengthened, and bear bag limits were increased in some areas. Legislation also was passed that provided authority to the Fish and Wildlife Commission to establish reduced costs for black bear and cougar transport tags; an effort to increase the number of bear hunters and, therefore, bear harvest. As a result of these efforts, the 1998-2001 black bear harvest increased above previous levels (Table 2, Figure 2).

Table 2. Statewide black bear harvest, hunter effort, and median age information, Washington, 1990–2001.

	Harvest			No.	Percent	No. hunter-	No.	Median age		Percent
Year	Male	Female	Total	hunters	success	days	days/kill	Male	Female	female
1990								2.5	4.5	
1991	876	503	1,379	10,839	13	84,771	61	3.5	4.5	36
1992	921	521	1,442	13,642	11	98,434	68	4.5	4.5	36
1993	986	521	1,507	12,179	12	102,558	68	3.5	5.5	35
1994	654	419	1,073	11,530	9	110,872	103	3.5	4.5	39
1995	850	368	1,218	11,985	10	102,859	84	3.5	4.5	30
1996	951	359	1,310	12,868	10	104,431	80	4.5	5.5	27
1997	546	298	844	11,060	8	97,426	115	4.5	5.5	35
1998	1,157	645	1,802	20,891	9	216,456	120	4.5	5.5	36
1999	757	349	1,106	37,033	3	481,319	435	4.5	5.5	32
2000	777	371	1,148	37,401	3	296,849	259	3.5	5.5	32
2001	919	512	1,431	25,141	6	230,431	161	3.5	4.5	36

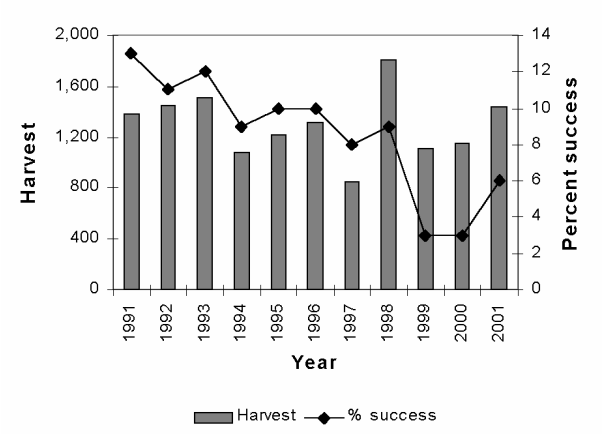

Figure 2. Black bear harvest and hunter success, Washington, 1991-2001.

Depredation Trends, Policies, and Programs

The total number of black bear-human interactions decreased slightly between 2000 and 2001, from 500 to 382, respectively (Figure 3). Black bear nuisance and damage activity may not be a good indicator of the status of the population, but more likely it reflects environmental conditions. For example, in 1996 we had a late spring with poor forage conditions for black bear, followed by a poor fall huckleberry crop.

Conclusions

Washington has a unique and challenging situation when it comes to management of our black bear population. Washington is the smallest of the eleven western states, yet we have the second highest human population; a population that continues to grow at record levels. We also have one of the largest black bear populations in all of the lower 48 states. Given that approximately 75% of our black bear habitat is in federal or private industrial ownership, a large portion of core black bear habitat is relatively secure. This means that the long-term outlook for black bear is generally good.

As local bear populations respond to current reduced levels of harvest a greater emphasis on monitoring populations within individual bear management units will be necessary. Continued changes to bear seasons, bag limits, and depredation processes are likely as we seek to minimize levels of human-black bear conflicts by using general season hunting, public education, and depredation control.

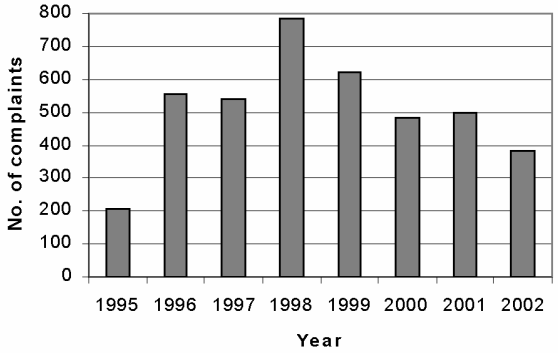

Figure 3. Confirmed human-black bear interactions, Washington, 1995-2001 (1995 based on 10 months of data).

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WYOMING BLACK BEAR STATUS REPORT

SCOTT BECKER, Wyoming Game and Fish Department, 260 Buena Vista, Lander, WY 82520, USA
RON GROGAN, Wyoming Game and Fish Department 260 Buena Vista, Lander, WY 82520, USA
DAVE MOODY, Wyoming Game and Fish Department, 260 Buena Vista, Lander, WY 82520, USA
DAN BJORNLIE, Wyoming Game and Fish Department, 260 Buena Vista, Lander, WY 82520, USA,
dan.bjornlie@wgf.state.wy.us

Classification

Prior to 1911, black bears (*Ursus americanus*) and grizzly bears (*U. arctos*) were classified as predators throughout Wyoming, meaning they could be taken at any time, anywhere, and by any means. From 1911 to 1938, both species were classified as game animals on most of the national forests within the state, including the Black Hills, and were classified as predators throughout the remainder of the state. During this time, the majority of bear hunting seasons statewide coincided with those of big game species. In 1938, the first spring seasons were set for most of the state and, the following year, bears were classified as game animals statewide. Game animal classification allowed for the protection of cubs and females with cubs at side, additionally, bears could not be trapped or hunted with dogs without the approval of the local game warden. This lasted until 1957, when bears were once again given predator status in some parts of the state and game animal status in the remainder of the state. In 1967, bears were reclassified as big game animals statewide. In 1968, black bears and grizzly bears were separated and managed as distinct species in order to protect the declining grizzly bear population. Then, in 1976, black bears were given their current status of trophy game animals, which committed the Wyoming Game and Fish Department (WGFD) to reimburse landowners for livestock losses.

Distribution and Abundance

Black bears occupy most of the major mountain ranges within Wyoming, including the Absaroka, Teton, Wyoming, Wind River, Bighorn, Laramie, Sierra Madre, Snowy, and Uinta ranges. They do not inhabit the Black Hills of northeast Wyoming, although their historic range included this area. The 9 occupied mountain ranges comprise approximately 112,000 km^2 of suitable black bear habitat and are composed of 4 distinct black bear populations that are geographically isolated from each other by high-elevation grasslands and sagebrush (*Artemesia* spp.)-dominated deserts. The largest population occurs in the northwest corner of the state, including Yellowstone National Park, and is contiguous with bear populations in Idaho and Montana. The second largest population occurs in the Bighorn Mountains of north central Wyoming. This population primarily resides within the state and only extends into Montana for a short distance. The third population, extending northeast from the south central region of the state, is contiguous to large tracts of black bear habitat in Colorado. Nonetheless, studies conducted in the Snowy Range Mountains indicate that this area exhibits relatively low bear densities compared to densities observed in other portions of the western United States (Grogan 1997). The fourth population exists in the southwest corner of the state and has the smallest distribution and lowest densities of bears found in Wyoming. This region is a small extension of the Uinta Mountains that originates in Utah. Currently, there are few reliable estimates of bear abundance in Wyoming, but all populations are believed to be stable.

Population Monitoring

In 1979, Wyoming was divided into 31 black bear hunt areas that closely corresponded with elk (*Cervus elaphus*) hunt areas. In 1993, this system was reorganized into 29 hunt areas that more closely resembled known bear distribution. With the completion of Wyoming's *Black Bear Management Plan* (WGFD 1994), the 29 hunt areas were grouped into 9 Bear Management Units (BMU). Each BMU contains hunt areas with distinct bear populations that are specific to the 9 mountain ranges in the state (Figure 1). Management of black bears is now based on harvest within each BMU, not individual hunt areas.

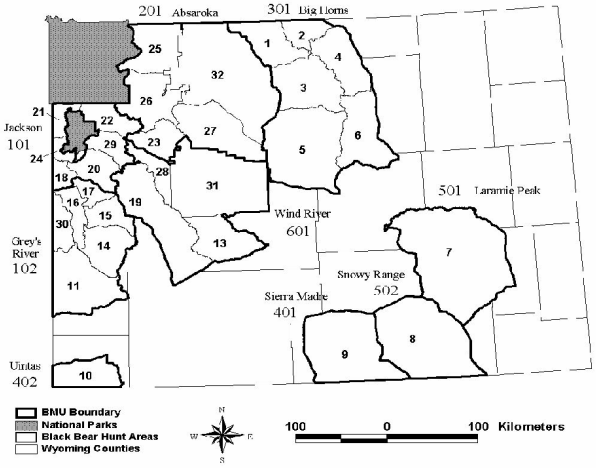

Figure 1. Wyoming black bear hunt areas and bear management units, 2003.

Relatively few changes have occurred with the BMU system of management since 1994, other than a few minor hunt area boundary changes, the addition of 2 new hunt areas, and the opening of 1 BMU that had previously been closed. In the Uintas, BMU 402 was opened to hunting of black bears beginning in 2001, however, only a spring season exists, the fall season remains closed at this time. In 2002, hunt area 31 was added to the Wind River BMU, which includes all non-Indian owned fee title lands within the exterior boundaries of the Wind River Indian Reservation. Hunt area 32 was created in 2003. This unit includes primarily privately owned lands in the basin between the Bighorn and the Absaroka Mountains. It allows for limited public take in an attempt to reduce the number of damage situations and human-bear conflicts.

Information collected from harvested bears is the only source of data presently used to monitor black bear populations in Wyoming. A mandatory reporting system was instituted in 1979 that requires all successful hunters to present the skull and pelt of harvested bears to a WGFD employee, who collects 2 teeth for aging and records location of kill, sex, number of days hunted, method of take, and a general description of overall body condition. Skulls and pelts must be presented in an unfrozen condition and proof of sex must remain naturally attached to the pelt for accurate identification.

Desired harvest criteria and indicators of overharvest were established in 1994 to better monitor trends in black bear populations statewide and within each BMU (Table 1). Currently, the desired harvest of female bears is ≤35% of the total harvest, whereas overharvest is indicated by a female harvest of ≥40% of the total harvest or a sub-adult (≤4 years old) female harvest of ≥35% of the total female harvest. Desired harvest of male black bears is ≥60% of the total harvest. Median ages of ≥4, ≥6, and ≥5 are recommended for males, females, and total harvest, respectively.

Annual female quotas are evaluated each winter by comparing the sex and age structure of the harvest for the last 5 years with the indicators of potential overharvest. If the 5-year trend suggests that overharvest may be occurring, reduced quotas may be recommended for the following year, and conversely, increased quotas may be recommended if the 5-year trend is below the desired level.

Management Plan

In 1993, the WGFD formed a committee to develop a statewide management plan for black bears. This plan was finalized in 1994 and, soon after, new regulations for the management of black bears were in place. Three main objectives were set forth to guide bear management in the state of Wyoming: 1) strive to keep harvest within the desired criteria; 2) provide a harvest of 200–275 bears annually; and 3) provide maximum hunting opportunity while maintaining stable bear populations. These objectives have not changed since 1994; however, it is becoming increasingly difficult to maintain our third objective due to early season closures as female quotas fill. It is difficult to determine if these early season closures are the result of an increase in bear populations statewide, if current environmental conditions (i.e., drought) are affecting the bears' susceptibility to hunting, or if hunter selectivity has been altered due to the female mortality quota system (hunters taking the first bear they see). Currently, the WGFD is attempting to limit quota increases to better evaluate this situation.

Table 1. Black bear harvest criteria and observed harvest characteristics, Wyoming, 1993–2002.

Criteria	Desired	Over-harvest	1993–2002
Females in harvest	≤35%	≥40%	33%
Males in harvest	≥60%		67%
Sub-adults[a] in female harvest		≥35%	52%
Median age			
Female	≥6 yrs	≤4 yrs	4 yrs
Male	≥4 yrs	≤2 yrs	4 yrs
Total	≥5 yrs	≤3 yrs	4 yrs

[a] Sub-adult bears are ≤4 years of age as determined by cementum annuli aging techniques.

Hunting Laws and Regulations

New regulations governing female black bear mortality quotas were enacted in the fall of 1994. Hunt areas with distinct bear populations were combined to form BMUs and assigned annual female mortality quotas, so that once a quota was filled the hunting season in that BMU automatically closed (Table 2). Initially, harvest from the 1994 fall and 1995 spring seasons were regulated as one annual quota, but this was changed in the spring of 1995 to include separate spring and fall quotas for each calendar year. This assured that a fall season would occur regardless of spring harvest levels. If female mortality quotas for the spring hunting season are exceeded, the excess is subtracted from the fall mortality quotas. Conversely, if female mortality quotas in the spring have not been reached, the portion of the quota remaining will be added to the fall mortality quota.

Table 2. Black bear season types, dates, and quotas by bear management unit and hunt area, Wyoming, 2003.

		Spring			Fall		
		Archery	General	Quota	Archery	General	Quota
Bighorns	1–5	1–4 May	15 May–15 Jun	10	1–14 Sep	15 Sep–31 Oct	5
	6	Closed	1 May–15 Jun	1	Closed	1 Sep–31 Oct	1
Laramie Peak	7	15–30 Apr	1 May–7 Jun	3	15–31 Aug	1 Sep–31 Oct	2
Snowy Range	8	15–30 Apr	1 May–7 Jun	4	1–30 Sep	1–31 Oct	2
Sierra Madre	9	15–30 Apr	1 May–15 Jun	3	1–30 Sep	1–31 Oct	2
Uinta	10	15–30 Apr	1 May–15 Jun	1	Closed	Closed	
Greys River	11	1–30 Apr	1 May–15 Jun	3	15–31 Aug	1 Sep–31 Oct	3
	14–17, 30	15–30 Apr	1 May–15 Jun	14	15–31 Aug	1 Sep–15 Nov	10
Wind River	13	15–30 Apr	1 May–15 Jun	5	15–31 Aug	1–31 Aug[a] 1 Sep–31 Oct	4
	19	15–30 Apr	1 May–15 Jun	6	15–31 Aug	1 Sep–15 Nov	4
	28	15–30 Apr	1 May–15 Jun	3	1–14 Aug	15 Aug–31 Oct	3
	31	15–30 Apr	1 May–15 Jun	2	1–14 Aug	15 Aug–31 Oct	2
Jackson	18,20–22, 24, 29	15–30 Apr	1 May–15 Jun	11	15–31 Aug	1 Sep–15 Nov	9
Absaroka	23	15–30 Apr	1 May–15 Jun	8[b]	1–14 Aug	15 Aug–31 Oct	10[b]
	25–27	15–30 Apr	1 May–15 Jun		15–31 Aug	1 Sep–31 Oct	
	32	15–30 Apr	1 May–15 Jun	2	Closed	1 Aug–31 Oct	3

[a] Valid only in that portion of Area 13 within the Popo Agie Wilderness.
[b] Inclusive to areas 23, 25, 26, and 27.

Presently, only legal and illegal female black bear mortalities are counted against the quotas. Female bears that died as a result of vehicle collisions were counted toward the quota through the 2000 hunting season, but this was changed prior to the 2001 hunting season. Bears removed because of nuisance activity do not count towards annual female quotas and there are no limits on the number of damage bears that can be removed annually. The separation of damage mortality from bear harvest management is intended to prevent a high nuisance year from influencing annual harvest quotas. That is, a high nuisance year may necessitate increased harvest if the two were not separated, even though biological data (age and sex characteristics of the harvest) did not justify an increase.

Season dates are generally from 15 April–15 June during the spring and 1 August–15 November in the fall. Typically, the first 2 weeks of the spring and fall seasons are special archery-only seasons with opening and closing dates specific to each hunt area or BMU. However, beginning in 2003, hunt area 6 in the Bighorn BMU no longer offers archery-only seasons. A general hunting season starts the day after archery season ends and remains open until the female quota for the hunt area or BMU is filled or the season closure date is reached.

Successful black bear hunters must present the skull and pelt from each bear taken to a WGFD employee for inspection within 3 days after the harvest. Legal shooting hours are from one-half hour before sunrise to one-half hour after sunset. The annual bag and possession limit is 1 bear/calendar year. Cubs and females with cubs at side are protected from harvest and dogs may not be used to hunt, run, or harass bears. Non-resident hunters are not allowed to hunt black bears in any federal- or state-designated wilderness areas without a professional or resident guide. Hunters are responsible for inquiring about season closures by calling a toll-free telephone number prior to going into the field. For the upcoming 2003 black bear hunting season, resident and non-resident bear licenses cost $30.00 and $250.00, respectively.

During the fall of 1993, the U.S. Forest Service (USFS) prohibited bear baiting on national forest lands

within Wyoming because an environmental assessment of the activity was not yet complete. In the spring of 1994, baiting on these lands was reinstated after the final environmental assessment concluded that regulations of bear baiting in Wyoming would be the sole responsibility of the WGFD, regardless of land ownership. In addition to recommendations made in the *Black Bear Management Plan*, this temporary ban on baiting further increased public awareness of the issue. As a result, current baiting regulations include:

1. Baiting is permitted in all hunt areas except those within the federal grizzly bear recovery area.
2. Bait is defined as a nontoxic biodegradable substance, not to exceed 91 kg (200 lbs), enclosed in a rigid container no larger than 0.23 m^3 (8 cubic feet).
3. The use of game animals, birds, fish, or protected species is prohibited.
4. Baits cannot be placed more than 7 days prior to the season opening and it must be removed no later than 7 days after the season closes.
5. Baits cannot be placed within 183 m (200 yards) of a water source, road, or pack trail; or within 0.5 mile of a developed campground, picnic ground, or building.
6. Bait density cannot exceed more than 1/1.6 km^2 (1/mi^2), and 1 hunter cannot maintain more than 2 baits at once.
7. Prior to placing a bait on public land, a written description of the proposed location must be submitted to the USFS district ranger, Bureau of Land Management area manager, or WGFD regional wildlife supervisor.
8. The hunter's name, address, and phone number must be permanently affixed to the outside of the bait container.
9. If a grizzly bear shows up at a bait site, the hunter shall report it immediately to the WGFD. The bait site will be closed and the bait removed as soon as possible by WGFD personnel. No person will be allowed to use that bait site for the remainder of the calendar year.

Harvest Summary

Since 1979, total black bear harvest has increased 261% in Wyoming. From 1979 to 1982, harvest averaged 175 bears/year, then increased to 215 bears/year for the next 10 years with little variation. Black bear harvest has averaged 209 bears/year from 1993–2002 (Table 3). With the implementation of the female mortality quota system in the fall of 1994, a sharp decline in harvest was observed, dropping from 237 (in 1993) to 136 (in 1996), which was the lowest harvest recorded since 1979. Since then, harvest has steadily increased, reaching an all-time high of 323 bears in 2002.

In 1992, spring seasons were shortened to protect late-emerging females with cubs. Since then, spring female harvest has declined from an average of 43 from 1979–1992 to 38 for the last 10 years. Conversely, fall female harvest has increased slightly from an average of 29 in 1979–1992 to 30 for the previous 10 years. From 1993–2002, statewide female harvest has accounted for 33% of all harvested bears while 52% of these have been sub-adult females (Table 1). In this same time frame, median ages of female, male, and total harvest have all equaled 4 years of age.

Table 3. Black bear harvest and damage statistics, Wyoming, 1993–2002.

	No. harvested bears					No. hunter-days			No. damage bears	
	Spring		Fall							
Year	M	F	M	F	Total	Spring	Fall	Total	Translocated	Removed
1993	79	46	74	38	237	6,699	21,120	27,819	No data	13
1994	56	32	78	43	209	5,180	22,966	28,146	No data	12
1995	51	27	44	29	151	5,923	13,422	19,345	No data	4
1996	74	34	16	12	136	6,633	11,854	18,487	11	14
1997	84	40	36	17	177	4,291	9,558	13,849	1	8
1998	96	25	44	32	197	6,987	7,713	14,700	11	4
1999	83	40	45	26	194	11,944	6,635	18,579	12	4
2000	99	45	40	19	203	6,267	8,650	14,917	24	14
2001	96	50	82	32	260	6,933	9,073	16,006	18	40
2002	106	45	116	56	323	No data	No data	No data	24	28
Total	824	384	575	304	2,087	60,857	110,991	171,848	101	141
Mean	82	38	58	30	209	6,762	12,332	19,094	14	14

Almost 58% of the annual bear harvest, recorded for the period 1993–2002, occurred during the spring season even though the number of spring hunter-days accounted for only 35% of the total annual hunter-days (Table 3). Hunter-days per harvested bear is also markedly lower during the spring season (spring = 58 days/bear; fall = 157 days/bear). This is likely due to the influence of baiting, given that 79% of all bears harvested in the spring since 1993 were killed over bait, compared to 19% in the fall when most successful hunters incidentally take a bear while pursuing deer (*Odocoileus* spp.) and elk. In the northwest and north-central portion of the state, female mortality quotas have increased from 57 in 1995 to 119 in 2003, although only 39% (21 of 54) of the quotas have been filled. The female quota increase is partly due to concerns about increased nuisance bear activity, even though there is no data to support that moderate increases in harvest from sport hunting will reduce nuisance activity. In fact, the number of bears taken in nuisance actions has increased despite increased harvest from hunting in the last 2 years. The combination of increased take due to sport hunting and nuisance control has undoubtedly reduced bear populations in the western portion of the state. As a result, we have documented a decrease in female median age and an increase in percent sub-adult female harvest in this area.

Depredation Trends, Policies, and Programs

Currently, Wyoming uses a statewide protocol for managing trophy game depredations and interactions with humans. Each incident is handled on a case-by-case basis and is dealt with accordingly, based on the location of the incident, the threat to human safety, the severity of the incident, and the number of incidents the animal has been involved in. Every effort is made to prevent unnecessary escalation of incidents through an ascending order of options and responsibilities:

1. No Management Action Taken (combined with educational efforts).
    a. Educational pamphlets and discussion on how to live safely in bear country are provided.
2. Deterrent Methods (combined with educational efforts).
    a. Removal or securing of attractant by the landowner, leasee, or WGFD.
    b. Removal of depredated carcass by landowner or leasee.
    c. Use of guard dogs (landowner responsibility).
    d. Educational pamphlets and discussion on how to live safely in bear country are provided.
3. Aversive Conditioning (combined with educational efforts).
    a. Use of rubber bullets by the WGFD or designated person/agency.
    b. Use of pepper spray by the landowner or WGFD.
    c. Noise making devices (e.g., explosives) or flashing lights by the landowner, leasee, or WGFD.
    d. Educational pamphlets and discussion on how to live safely in bear country are provided.
4. Trapping and Translocation (combined with educational efforts).
    a. If the above efforts do not deter the bear from the area, if public safety is compromised, if it is a first offense, or if it has been a lengthy span of time between offenses.
    b. Educational pamphlets and discussion on how to live safely in bear country are provided.
5. Lethal Removal of the Animal by the WGFD (combined with educational efforts).
    a. If the above methods do not deter the bear, if public safety is compromised, or if the offending bear has been involved in multiple incidents in a short span of time.
    b. Wyoming statute also allows for any black bear damaging property to be killed by the owner, employee, or leasee of the property.
    c. Bears that have been removed from the population will be used for educational purposes.
    d. Educational pamphlets and discussion on how to live safely in bear country are provided.

The WGFD works closely with hunters, outfitters, recreationalists, livestock operators, and homeowners in an attempt to minimize conflicts with black bears. Every spring, the WGFD hosts bear and mountain lion (*Puma concolor*) workshops throughout the state to educate people about bear and lion biology, front- and back-country food storage techniques, what to do in the event of an encounter with a bear or lion, and the morphological characteristics that differentiate a black bear from a grizzly bear. In addition, numerous presentations are given throughout the year to civic, private, and school groups to educate them about bear biology and how to coexist safely with bears. Media outlets are also used to inform and educate members of the general public about bear safety issues.

On the national forest lands within the federally allocated grizzly bear recovery area, developed campgrounds are required to have bear-proof dumpsters and bear-proof food storage containers. If traveling or hunting in the backcountry, food must be stored in bear-proof containers or hung on game poles or trees out of

the reach of bears. However, homeowners and businesses within this area are not required by state law to store food or waste in bear-proof containers. Recently, bear management officers have begun supplying 55-gallon barrels, to use as bear-proof storage containers for attractants that must be stored outdoors, to homeowners who continually have conflicts with bears, or those who request them. These barrels were donated, free of charge, by the Wyoming Department of Transportation.

Even with all the preventive measures taken by the WGFD, conflicts with black bears do occur and have been occurring more frequently during the last 3 years. The number of black bear conflicts has ranged from a low of 35 reported incidents in 1996 to a high of 230 reported incidents in 2002. The WGFD is fiscally responsible for confirmed livestock losses and apiary damage caused by black bears, as well as mountain lions and grizzly bears. The number of black bear damage claims for the last 10 years range from 10 to 24, and annual payments made to claimants range from $5,409.39 to $31,158.23 (Figure 2). Apiaries accounted for 54% of the total damage payments made in 2002, while sheep and cattle accounted for 30% and 15%, respectively. An average of 14 nuisance bears were removed annually and 14 were translocated annually during the last 10 years, with peak removals taking place in 2001 and 2002, and peak translocations occurring in 2000 and 2002 (Table 3).

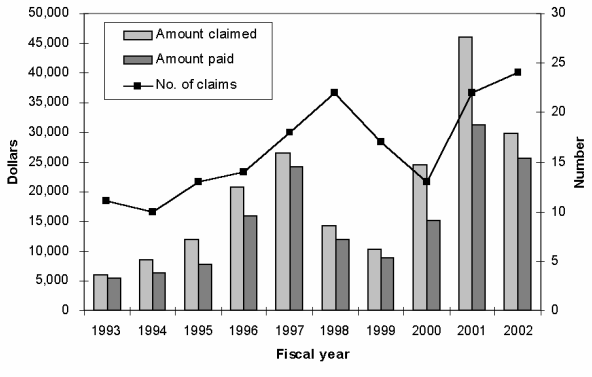

Figure 2. Black bear damage claims and payments, Wyoming, 1993–2002.

Research Programs

The WGFD is currently undertaking research in 2 areas. First, we are monitoring reproductive parameters of female black bears, including age of first reproduction, litter size, cub survival, juvenile female survival, and juvenile female dispersal. Second, we are documenting den type selection, size, and habitat use by female black bears. Recent publications include the following :

Grogan, R. 1997. Black bear ecology in southeast Wyoming: the Snowy Range. Thesis, University of Wyoming, Laramie, Wyoming, USA.

Grogan, R., and F. Lindzey. 1999. Estimating population size of a low-density black bear population using capture-resight. Ursus 11:117-122.

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Public Attitudes Towards Hunting and Management

There has been no public attitude surveys conducted in Wyoming concerning black bear hunting and

management since 1993. In that year, the USFS prohibited baiting on national forest lands during the fall hunting season. Baiting was allowed on these lands the following spring; however, the temporary restriction heightened awareness and controversy of the baiting issue, and a public attitude survey was conducted in the winter of 1993. The 3 key findings of this survey were: 1) approximately half of the respondents had little or no knowledge of black bear management in Wyoming or the controversy surrounding bear baiting and spring hunting; 2) 16% and 32% of respondents, respectively, felt that baiting and spring hunting should continue; and 3) 52% agreed that some form of bear hunting should continue. A similar survey, involving only licensed bear hunters, was also conducted in 1992, in which, unsurprisingly, only 20% favored elimination of bear baiting. However, a somewhat surprising result of the 1992 survey was that 52% of the respondents (licensed bear hunters) favored shortening spring seasons to reduce female harvest. Presently, no referendums or state legislation banning baiting or spring bear hunting have been proposed in Wyoming, although it is apparent that nationwide approval of these activities is declining.

Conclusions

The greatest bear management challenge that the state of Wyoming will face in the future is maximizing hunter opportunity while maintaining stable bear populations. Already, based on the harvest criteria set forth in the *Black Bear Management Plan*, it appears as if bear populations are beginning to show the effects of increased harvest. It is very difficult to determine, strictly from harvest data, if this increased harvest is the direct result of an increase in black bear populations since 1999, if environmental factors have played a larger role in the susceptibility of bears to hunting, or if hunter selectivity has changed since the implementation of the female mortality quota system. If funding and manpower were not issues, research projects that would better estimate black bear densities and population demographics statewide would be initiated. This information could be used to better formulate harvest criteria based on data from bear populations in Wyoming. It could also be used to assist in setting appropriate female mortality quotas within each BMU in the state.

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ALLIANCE BETWEEN AGENCY AND PRIVATE FACILITY REHABILITATES BLACK BEARS IN DROUGHT-STRICKEN SOUTHERN COLORADO

SUSAN B. DIETERICH, Frisco Creek Wildlife Hospital and Rehabilitation Center, P.O. Box 488, Del Norte, CO 81132, USA
HERMAN F. DIETERICH,[1] Frisco Creek Wildlife Hospital and Rehabilitation Center, P.O. Box 488, Del Norte, CO 81132, USA
STAN F. ABEL,[2] Colorado Division of Wildlife, 600 Reservoir Rd. Pueblo, CO 81005, USA
CHARLES H. WAGNER, Colorado Division of Wildlife, 0722 S. Road 1E, Monte Vista, CO 81144, USA
SCOTT A. WAIT, Colorado Division of Wildlife, 151 E. 16th St., Durango, CO 81301, USA

Abstract: During 2001–2002, black bears (*Ursus americanus*) in southern Colorado experienced hardship due to a drought and failure of natural foods that created an increase in bear-human conflict. The Colorado Division of Wildlife (CDOW) needed a non-lethal option for dealing with an unusual number of orphaned and injured bears. The private, non-profit Frisco Creek Wildlife Hospital and Rehabilitation Center (FCWRC) admitted 81 bears for care and treatment with the goal of eventual release. We used medical and surgical protocols to treat individual bear maladies, including malnutrition, critical starvation, ectoparasites, neurological deficit, superficial wounds, internal injuries, and cachexia. All 63 malnourished bears fully recovered and 20 of 22 bears (91%) treated for other medical conditions returned to clinically normal status. During 2001–2002, we released 75 bears near their points of origin using several release methods. Post-release observations were documented for 17 bears by the end of 2002, including 7 mortalities from human-related and natural causes. With mutual goals and collective resources, our alliance of public and private entities was able to deal with an unusual set of circumstances. Our experiences may be helpful to other rehabilitation programs and managers dealing with black bears.

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Key words: bear-human conflict, black bear, Colorado, drought, mast failure, medical, nuisance, orphaning, rehabilitation, release, *Ursus americanus.*

Failures of natural foods, often brought on by drought, have been correlated with mortality of black bears due to increased bear-human conflict (Rogers 1976, Rogers 1987, T. D. I. Beck , CDOW, unpublished data) and higher vulnerability of bears to hunting (McDonald et al. 1994, Noyce and Garshelis 1997). Loss of adult females inevitably results in orphaning of cubs, and higher numbers of orphans have been associated with drought and food shortage (Henderson 2003). Colorado has been relatively drought free since the late 1970s. The 1980s were exceptionally wet and by September 1999 reservoirs were 130% of average. However, from October 2000–September 2002 southern counties in Colorado received 33%–78% average precipitation (N. Doesken, Colorado Climate Center, Colorado State University, unpublished data). Crops of soft and hard mast appeared to fail sporadically throughout the state. Lack of natural foods evidently compelled bears to seek food in towns, subdivisions, apiaries, and domestic sheep flocks. Consequently, numbers of bear-human conflicts and bear mortalities increased. Formal complaints, or those serious enough to be reported to CDOW headquarters, increased from 503 in 1999 to 1,000 in 2002. During 1 June–3 August 2001, the CDOW management unit surrounding Ft. Garland, Trinidad, and Walsenburg formally reported 59 bear-human conflicts, but had over 1,200 additional calls. Non-hunting bear mortality essentially quadrupled from 111 bears in 1999 (238 bears in 2000, 273 in 2001) to 404 bears in 2002. Vehicle collisions killed 63 bears in 2000, 101 bears in 2001, and 156 bears in 2002, an increase of >50% each year. Annual hunter kills, during September–November, rose from 550 bears in 1998 to 857 in 2002 (M. Lloyd, CDOW, unpublished data).

Area wildlife managers, district wildlife managers, and wildlife technicians were primarily responsible for handling black bear complaints (J. Mumma, CDOW, unpublished data). With media coverage of bear-human conflict, the public was aware of injured and orphaned bears and most people wanted them to be treated and returned to the wild. The CDOW evaluated the existing FCWRC bear program, including post-release data of 27 radio-collared or ear-tagged bears rehabilitated and released during 1993-2000. Based on this data and the availability of our on-site hospital, we were asked to deal with the tremendous influx of orphaned and ailing bears during 2001–2002.

Various techniques have been used to rehabilitate, release, and evaluate survival of orphaned bears in the wild (Maughan 1994, Clark et al. 2002, Convey 2002), however references to the medical and surgical

[1] In memory of Herman F. Deiterich, DVM, 11 November 1929–28 April 2003
[2] Present address: P. O. Box 462, Rye, CO 81069, USA

treatment of wild bears and the success of such intervention are uncommon. Our objectives in this paper were to (1) describe methods of capture, care, and release of bears admitted for rehabilitation during 2001–2002, (2) evaluate the success of medical intervention, and (3) provide preliminary data on post-release survival and behavior of rehabilitated bears.

METHODS

Bears were captured in southern Colorado, rehabilitated at the FCWRC, and released in remote locations in or near their points of origin. Age-class of bears was estimated from presence of mother, dentition, and size (Beck 1991) as follows: cub (<1 year old), yearling (1 year old), subadult (2–4 years old), and adult (>4 years old). Bears captured for rehabilitation included: (1) cubs observed without their mother for ≥3 days, (2) cubs of adult females that died from human-related causes, (3) severely malnourished yearlings, and (4) ill or injured bears of any age with a reasonable chance of recovery and release. In the field, bears <10 kg were captured with noose poles without sedation. Bears >25 kg were sedated with tilatamine hydrochloride-zolazepam hydrochloride (Telazol®, A. H. Robins Company, Richmond, Virginia, USA), at a dosage rate of 7 mg/kg, delivered intramuscularly (IM) by jab pole or capture dart (Kreeger 1997). Method of capturing bears 10–25 kg was left to the judgment of the officer in the field. Captured bears were transported to FCWRC in airline kennels, culvert traps, or box traps. A formal report of each bear's encounter and capture history, issued by the CDOW Terrestrial Section, accompanied each bear.

Facility

The FCWRC is a 97-ha property located in the San Luis Valley, Rio Grande County, Colorado. It is a remote location at 3,482 m elevation that abuts the Rio Grande National Forest. The staff included only a veterinary surgeon and a veterinary technician. Clinical care was provided on-site in fully equipped treatment, medical, and surgical units. Standard 1.4-m^2 Formica hospital cages were used for critical and postoperative care of bears <10 kg. The grounds contained 20 small (11 m^2) and 4 large (27 m^2) pens for housing bears. The small 5-sided, roofed pens were constructed of 2.5-cm, 9-guage chain-link fencing set on a concrete slab. Small pens were equipped with 0.6-m^2 aluminum dens with wood floor inserts. The large 6-sided, partially roofed pens were constructed of 5-cm, 9-guage chain-link fencing with pea gravel floors. Large pens had attached 1-m^2 dens with wood floor inserts. All pens and dens had guillotine doors that were operated by steel cables from hallways.

Treatment and Care

Admitting procedures included (1) an examination, (2) an outline of treatment regimen, and (3) appropriate housing and care. Clinically normal bears were not sedated for medical examination and were moved to appropriate housing. Ill, injured, or malnourished bears were sedated with a 2:1 mixture of ketamine hydrochloride (Ketaset, Fort Dodge Animal Health, Overland Park, Kansas, USA) and xylazine hydrochloride (Rompun, A. H. Robins Company, Richmond, Virginia, USA) at a combined dosage rate of 3–6 mg/kg IM. They were examined, and diagnosed with x-ray and lab procedures. Emergency cases were stabilized and scheduled for treatment. Pharmacology and therapeutics (Adams 1995), medical regimens, and surgical protocol were extrapolated from accepted treatment of domestic species and in consultation with wildlife veterinarians, zoo veterinarians, and other specialists.

We made clinical rounds daily to monitor the growth, behavior, and health of each bear. We mixed anthalminics or other oral medications into "medicine balls" of peanut butter, honey, and graham crackers that bears ate without hesitation. We gave antibiotics and pain medications parenterally if a bear was sedated for a medical procedure and orally if a bear was not sedated or required multiple doses of medication. Surgical intervention for wound debridement, drain placement, and fracture repair was accomplished in the surgical suite with the bear under isoflurane (Aerrane, Baxter Healthcare Limited, Deerfield, Illinois, USA) and oxygen general anesthesia delivered by mask. For simple procedures (e.g. skin scrapings, wound treatment, and bandage or splint changes), we administered ketamine-xylazine sedation and treated the bear in its pen rather than move it to the hospital.

Diagnostic tests included skin scrapings to identify ectoparasites, particularly demodectic mange (*Demodex* sp.), sarcoptic mange (*Sarcoptes* spp.), or ringworm (*Microsporum* spp.) (Aiello 1998). Poor hair coat is a clinical sign of ascariasis (*Toxascaris* spp., *Balyisarscaris* spp.), the most common endoparasites of captive carnivores (Fowler 1993:402). Bears with ectoparasite alopecea or positive fecal examination for endoparasites were given a 0.2 mg/kg oral dose of ivermectin (Ivomec, Merial Limited, Iselin, New Jersey, USA) every 30 days until release (C. Robbins, Washington State University, personal communication). We observed head, neck, and spinal trauma cases for neurological deficits. To reduce edema, we administered dexamethasone (Dexamethasone Solution, Vedco, St. Joseph, Missouri, USA) daily at a dosage rate of 2mg/kg IM for 2 days and 1 mg/kg for 1 day. We managed pain with butorphanol tartrate (Torbugesic, Fort Dodge Animal Health, Overland Park, Kansas, USA) at 0.1–0.4 mg/kg IM as needed, or

ketoprofen (Ketofen, Fort Dodge Animal Health, Fort Dodge, Iowa, USA) at 2 mg/kg orally for up to 5 days.

We customized each diet based on overall condition and age of the bear, and feeding recommendations listed on the commercial product. Cubs <10 kg and severely emaciated older bears were fed Multi Milk milk replacement (PetAg, Hampshire, Illinois, USA; identical to Black Bear Formula Zoologic 30/50, PetAg, Hampshire, Illinois, USA), moistened puppy kibbles, and fruit 2–3 times per day. Healthy bears >10 kg were fed commercial canine kibbles as a dietary staple. Supplemental foods included fruits, berries, lettuce, fish, Carnivore Diet 90/10 (Dallas Crown, Kaufman, Texas, USA), mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*) carcasses, and native vegetation. Although Evans (1987) noted that some post-weaning diets should be fed *ad libitum* to facilitate the fat deposition necessary for winter survival, we restricted amounts to 4–10% of the bear's body weight daily, depending on seasonal metabolic cycles (hyperphagia, hibernation), to minimize waste and spoilage. When fed smorgasbord style, bears ate more supplemental foods (e.g., sweet fruits) than dietary staple. During 2002, we modified our feeding protocol to decrease total food consumption, but increase intake of protein. We provided a more nutritionally complete 9:1 ratio of dietary staple to supplemental foods (Marcum 1997) in an attempt to reduce alopecia (observed in some bears in captivity >90 days).

Access to the housing area was limited to facility staff and select agency personnel, to minimize contact between humans and bears, especially pen-reared orphans (Alt and Beecham 1984). No talking, music, smoking, or unnecessary mechanical noise was allowed near pens. We placed canvas tarpaulins on the outside of each pen as visual barriers to direct the bears' focus toward natural terrain and away from human activities and structures. Schedules for feeding bears and cleaning pens were kept consistent to elicit predictable behavior by captive bears. Imitating bear behavior, we used non-verbal, postural signals to communicate our intentions to bears. We attempted to enrich the captive environment by replicating some of the behavioral opportunities presented in the natural environment (Shepherdson 1993). We provided leaf litter, hay, conifer boughs, rotting stumps, fruit-bearing twigs, resting platforms, water-tanks, and logs containing honey. Free-ranging bears and other native wildlife frequented the area adjacent the pens, affording additional stimulation.

Typically, 2–3 cubs were housed together, and siblings were kept together. Yearlings were housed alone, with a sibling, or with another compatible bear. Adult bears were housed alone or with their cubs in the larger pens.

Release procedures

Bears that required minimal care were hard-released at their capture site or directly from holding pens. Most bears required a more prolonged stay at the facility. During October–November, we performed a thorough physical exam of each bear under ketamine-xylazine sedation. We screened for diseases, evaluated clinical condition, and recorded morphometric data. We affixed white (CDOW color designation for rehabilitated bears) numbered ear-tags. We estimated body mass from chest girth (LeCount 1986, Beck 1991) to evaluate whether individuals were of sufficient body mass to begin hibernation. Minimum weight requirements (Table 1) were based on mean fall weights recorded by Beck (1991). Because physiology often dictates behavior (Nelson and Beck 1984), we encouraged bears with sufficient body mass to enter hibernation in captivity through gradual elimination of food over a 2-week period. Drinking water, fresh bedding, and familiar dens were accessible. We subsequently released them using winter-release methods (Alt and Beecham 1984, Eastridge and Clark 2001).

Table 1. Minimum weight requirement (kg) for encouraging hibernation in captive black bears, Frisco Creek Wildlife Hospital and Rehabilitation Center, Colorado, 2001–2002.

	Sex	
Age-class[a]	Female	Male
Cub	27	32
Yearling	35	51
Subadult	60	84
Adult	84	112

[a]Age-class: cub (<1 year old), yearling (1 year old), subadult (2–4 years old), adult (>4 years old).

During November–January, hibernating bears were transported, without sedation, in the artificial dens (individually or with pen-mates) to release sights pre-determined by the CDOW biologists. Biologists selected release sites with minimal human disturbance during the winter and availability of spring forage, including new shoots of forbs, grasses and sedges, and aspen (*Populus tremuloides*) buds (T. D. I. Beck, CDOW, unpublished data). We used 3 winter-release methods. During the winter of 2001–2002, familiar artificial dens (from each holding pen) were left at the release site and covered with straw bales. Bears were given 1–3 days to acclimate and doors were opened (J. Beecham, Wildlife Conservation Society, personal communication). During 2002–2003, the familiar artificial dens were needed for housing lynx (*Lynx canadensis)*. Therefore, most bears were hard-released directly from the artificial den immediately after

transport to the release site. Some bears were transported in an unfamiliar den (airline kennel or converted barrel) that was then positioned and covered with straw bales at the release site. These bears were also given 1–3 days to acclimate, before the door was opened.

CDOW officers observed each den for 30–45 minutes when doors were opened. They also revisited sites bi-monthly until May and reported if they saw the bear, tracks, or other evidence of its activity. In early June, officers checked each den to verify den emergence, surveyed surrounding terrain for bear mortality, and returned artificial dens to FCWRC. Throughout the study period, CDOW biologists compiled reports of white ear-tagged bears that included location, circumstances, physical appearance, behavior, and ear-tag number.

RESULTS

From July 2001–December 2002, we admitted 81 bears to FCWRC, including 61 cubs (27 F, 34 M), 16 yearlings (10 F, 6 M), 1 sub-adult (M), and 3 adults (F). Most cubs (67%) were presumed orphaned when they were observed without their mother for ≥3 days. Thirty percent of cubs were known orphaned after their mothers were killed illegally (15%), killed by motor vehicles (11%), or killed by CDOW officers (3%). One cub (2%) was separated from its mother and sibling, due to harassment by private residents. Seven cubs were admitted with injuries: 1 with an abdominal puncture wound (from a capture dart); 1 with a mild concussion (from falling out of a tree under sedation, with its mother); 1 with a fractured canine alveolar socket in the lower left mandible (sustained during a prolonged chase); 1 with a 10-cm seroma on the neck (from being lifted down from a utility pole with a noose pole); 1 with fractured 2nd, 3rd, and 4th digits and torn muscle of the left hind foot, and punctures in the right maxillary sinus (from being caught by the guillotine door of a bear trap and a simultaneous attack by a dog); 1 with a 16-cm subcutaneous laceration on its right side and lower abdomen (from an automobile collision); and 1 found unconscious along a major highway (assumed to have been hit by car).

Three yearlings were admitted with injuries: 1 with a grossly infected 12-cm wound between its shoulder blades (apparently inflicted with a hatchet); 1 with an infected, necrotic 8-cm wound in the neck that had eroded 3 cm of the trachea and 5 cm of the esophagus (probably caused by scrap metal); and 1 with multiple rib fractures, sucking chest wounds, soft tissue trauma, and rubber buckshot imbedded in the chest cavity (from being shot at close range by a private resident). One other yearling was admitted with cachexia and hypothermia (from over-sedation and a prolonged chase).

The single subadult bear was admitted with deep gluteal muscle damage (from a capture dart). The 3 adults were also admitted with injuries: 1 with deep gluteal muscle damage (from a capture dart); 1 with deep muscle damage and a concussion (from falling out of a tree under sedation onto the capture dart, with its cub); and 1 with thickened foot pads and overgrown claws of its left fore and hind feet (from a mite infestation).

Fifty cubs and 13 yearlings appeared malnourished when admitted. This included 16 cubs and 5 yearlings in critical starvation requiring clinical care and specialized diets. At arrival, cubs weighed 4–16 kg, yearlings 5–30 kg, the sub-adult 72 kg, and adults 84–110 kg. All malnourished bears fully recovered, with normal bone and joint development, and exhibited no permanent impairment from their initial catabolism (i.e., destructive metabolism, tissue wasting from lack of basal energy requirements). At release, cubs weighed 32–61 kg, yearlings 45–93 kg, the sub-adult 75 kg, and adults 90–130 kg.

Twenty-two bears were treated for medical conditions other than malnutrition and 20 (91%) returned to clinically normal status. Six bears were successfully treated for demodectic mange and 1 bear was successfully treated for ringworm. Among injuries described above: 3 bears recovered from neurologic deficit subsequent to blunt force trauma; 7 bears with multiple moderate injuries healed uneventfully; and 3 bears that required major surgery fully recovered. One bear was euthanized following surgical evaluation due to avascular necrosis of a portion of its trachea and esophagus; and 1 bear died as a result of cachexia, hypothermia, and residual capture sedation.

During 2001, we observed moderate hair loss on 15 of 34 (44%) cubs after 90 days in captivity. Skin scraping and fecal tests were negative and symptoms were inconsistent with parasite infestation. We did not medically treat the condition and released the affected bears in the same time frame as unaffected bears. In 2002, when we modified our feeding protocol, only 4 of 27 (15%) cubs developed similar mild hair loss after 90 days in captivity. Again, tests were negative for parasitism, therefore affected cubs were not treated.

We released 75 of 79 surviving bears during 2001–2002 (Table 2). In 2002, we kept 4 female cubs over the winter to allow time for normal hair growth (following treatment for mites) or weight gain. Three adult females (1 with a cub) and 1 subadult male were released at their capture site, after treatment and a short period of convalescence. Five yearlings were soft-released from holding pens during June, July, and November 2002. One 15-kg female cub was unintentionally released from a pen during September 2002, when a free-ranging adult female broke loose the attached den. The female and cub were observed

Table 2. Number of captive black bears released, by method, from the Frisco Creek Wildlife Hospital and Rehabilitation Center, Colorado, 2001–2002.

		Age-class[a]			
Season	Method	Cub	Yearling	Subadult	Adult
Summer	Hard release at capture site	1		1	3
	Soft release from pen	1[b]	3		
Winter	Release in familiar den	33	2		
	Release in unfamiliar den	6			
	Hard release from den	16	7		
	Soft release from pen		2		

[a]Age-class: cub (<1 year old), yearling (1 year old), subadult (2–4 years old), adult (>4 years old).
[b]Bear was unintentionally released, when free-ranging adult female broke into pen.

foraging near the pens on 2 later occasions. Most bears (55 cubs, 9 yearlings) were kept at the facility through fall, encouraged to hibernate, and winter-released during November–January.

Of bears released in familiar dens (during 2001), 71% (25 of 33 cubs, 0 of 2 yearlings) remained in artificial dens all winter and emerged in April 2002. All 6 cubs released in unfamiliar dens (during 2002) abandoned them within 1 day. No evidence of mortality was found at any den when they were retrieved in June.

During July–October 2002, 22 post-release observations were documented for 17 bears (16 rehabilitated in 2001, 1 in 2002), 2–283 days after release (Table 3). Seven individuals were observed in wild habitat, and 10 were either found in residential areas or engaged in nuisance behavior. There were 7 mortalities among these bears, including 3 road-kills, 2 nuisance kills, 1 hunting kill, and 1 probable bear predation (fed on by bear).

DISCUSSION

Our challenge was to provide for an unusually large number of bears in a practical and affordable manner that was conducive to healing and maintenance of wild behavior. During 1993–2000, an annual average of 3–4 bears were admitted to FCWRC, but 37 bears were admitted in 2001 and 44 were admitted in 2002. To obtain a wildlife rehabilitation license in Colorado, a party must submit a letter from a veterinarian who agrees to examine and treat injured wildlife without reimbursement from the CDOW (Colorado Department of Natural Resources 1997). As a non-profit corporation, funded by foundation grants and private donations, FCWRC absorbed the cost of all diagnostic, medical, and surgical treatment. Our success was due to wise use of collaborative resources and recommendations. Agency volunteers, county law enforcement agencies, fruit distributors, and local merchants donated their time and products. Use of the 20-pen housing unit, originally built for the CDOW Canada Lynx Reintroduction Project, was also central to our achievement.

We found the captive bears to be as amenable to medical treatment as domestic animals. Bears that received clinical care were tolerant of paraphernalia and did not disturb surgically placed wound drains, valves, stitches, splints, or body bandages. There was no physiological intolerance or resistance to repeated sedatives. The safety issue of large bear's aversion to continual jab pole sedative administration was resolved by oral or dart-gun administration. Neither medically compromised bears nor healthy bears paced, weaved, or vocalized to indicate stress, as long as they were pain-free and provided with basic needs and environmental enrichment. Bears appeared to heal faster than domestic animals and continued to gain weight, even when caloric requirements increased due to the metabolic healing processes.

Critical starvation was an interesting medical issue, because severely emaciated bears of any age often refuse to eat solid food. Anorexia is often due to masseter muscle pain experienced during mastication (T. Spraker, Colorado Veterinary Diagnostic Laboratory, personal communication). The anorexic bears we treated with milk replacement formula and soft diets resumed normal feeding in 5–7 days, and we experienced full recovery of all malnourished bears.

The incidence of hair loss in black bear rehabilitation is not uncommon. Hair loss by captive cubs has been attributed to bedding material, rubbing, and mange (Charles Robbins, Washington State University, personal communication), but other factors may have significant impact. Protein deficiency is among the many causes of acquired alopecia (Aiello 1998). Based on our experience with captive bears since 1993, we believe feeding patterns were influenced by social status, boredom, food preferences, and metabolic changes. When offered mixed diets, bears typically eat favorite foods and leave less palatable foods, which may produce nutritional deficiencies (Robbins 1993). The 4–5 week period of hyperphagia, which ends about 1 October in Colorado, is when most of the fat needed for winter survival is accumulated (T. D. I. Beck 1985, CDOW, unpublished data). Possibly in response to hyperphagic behavior, there is a tendency to overfeed captive bears. Bears should be fed

Table 3. Post-release observations of black bears rehabilitated at the Frisco Creek Wildlife Hospital and Rehabilitation Center, Colorado, 2001–2002.

Bear ID[1]	Date observed	Distance[b] (km)	Bear behavior	Bear condition	Agency service provided	Outcome
SE52	07/11/02	6	Up tree in rural area	Hind leg injured	Site inspection	Free-ranging
SE53	07/22/02	5	Feeding in dumpster in NM	Good	Advice	Free-ranging
SE55	08/20/02	16	Destroying beehives	36 kg–fair	Kill permit	Mortality–permitted kill
SE58	06/15/02	7	In residential area	Fair	Hazing	Free-ranging
	08/28/02	8	Digging on golf course with unmarked bear	Fair	No action	Free-ranging
	09/06/02	25	Crossing road with unmarked bear	50 kg–good	Site inspection	Mortality–road-kill
SE61	08/01/02	<1	Foraging in oak brush	Good	No action	Free-ranging
	09/13/02	<1	Foraging in oak brush	Good	No action	Free-ranging
SE62	08/10/02	10	Killed chickens in coop	Good	Destroyed	Mortality
SE67	07/24/02	7	Broke into ski area cabin	18 kg–poor	Destroyed	Mortality
SE71	06/13/02	<1	Foraging along creek	Fair	No action	Free-ranging
	06/24/02	7	In rural fishing area, fed by humans	Good	Hazing	Free-ranging
SE72	10/19/02	23	Crossing interstate highway	57 kg–good	Site inspection	Mortality–road-kill
SE73	09/26/02	9	Eating sheep food in shed	Good	Trap	Relocated
SE76	07/08/02	2	Foraging at lakeside	Possible leg injury	No action	Free-ranging
SE77	09/07/02	<1	Foraging in oak brush	55 kg–good	Carcass sealed	Mortality–hunter harvest
SE78	08/10/02	9	Found dead, fed upon by another bear	Unknown	Site inspection	Mortality–possible predation
SE81	07/04/02	4	Feeding with unmarked bears at roadside dump	45 kg–good	Site inspection	Mortality–road-kill
SE84	06/04/02	3	Feeding in restaurant dumpster	Poor	Destroyed	Mortality
SE85	06/15/02	3	In residential area	29 kg–fair	Trap	2nd rehabilitation & release
Ear notch	09/16/02	<1	Foraging with foster mother bear	Good	No action	Free-ranging
	09/28/02	<1	Foraging with foster mother bear	Good	No action	Free-ranging

[a]All individuals were cubs (<1 year) when rehabilitated
[b]Distance from release site

according to their condition (Fowler 1986:812). Our new dietary protocol, that decreased total food volume and increased protein intake, coincided with a reduction of acquired alopecea of 44% in 2001 to 15% in 2002. This reduction of hair loss may be important for ensuring survival of winter-released bears. When residual fat reserve is depleted over winter the insulating quality of the fur is imperative for survival (C. Schwartz, U. S. Geological Survey, Interagency Grizzly Bear Study Team, personal communication). The impact of hair loss and prognosis of survival after winter release would depend on body mass and climatic conditions following release (T. D. I. Beck, CDOW, personal communication). Further studies may be of value to determine the winter survival of bears rehabilitated and released by different methods.

Winter release in familiar dens was our preferred method of release, because we had consistently observed >75% den fidelity by bears released in familiar dens (during 1993–2000) and we speculated that den fidelity might decrease bear-human encounters during spring. In 2002, release protocol had to be modified, because dens with which bears had been familiarized were needed for housing lynx. CDOW biologists were advised that providing an unfamiliar artificial den, in a situation where there is little or no snow, is mainly for the benefit of people. Under these conditions, many cubs abandon artificial dens and make their own den within 1.6 km of the release site (J. Beecham, Wildlife Conservation Society, personal communication). In Colorado, most bears enter dens in late October or early November and <10% of bears enter dens after November 15th (T. D. I. Beck, CDOW, personal communication). During November 2002, we elected to hard release most bears. We provided 3 unfamiliar dens for 6 cubs, because the CDOW biologists responsible for those release areas wanted to compare den use of unfamiliar dens to our past experience with familiar dens. All of these individuals abandoned dens immediately, supporting the proposition that use of unfamiliar dens is ineffective. By the end of 2002, there were no reports of post-release activities of bears winter-released in 2002, therefore we were unable to determine the advantage of one method of release over another. Better monitoring, preferably with radio-telemetry, is needed to assess the relative merits of the various release methods.

The release and apparent adoption of a captive cub by a free-ranging adult female was notable. Prior to the adoption event, we observed this bear near the pens on several occasions. She appeared to be an older adult female with worn teeth, weighing approximately 90 kg. She was recognizable due to hairless patches of scar tissue on her left shoulder. She repeatedly pulled on a particular den tarp and 1 of 2 cubs in the pen exchanged vocalizations with her. Three days after her first appearance, we found the den had been pulled away from the pen and both cubs had escaped. We recaptured 1 cub from atop the pen, but saw the other cub 8–9 m up an aspen with the older female at the base of the tree. Both bears left the area before we returned with a capture rifle. We searched the area for signs of predation, but found none. Two days later, the "foster" pair was observed feeding together near the pens. The physical attributes of each bear facilitated positive identification on that date and 12 days later when the pair was observed again (Table 3). The cub was recognizable due to a 3-cm cauliflower-shaped notch in the top margin of its right ear, similar to those found on the ears of cougar cubs (*Puma concolor*) after frostbite. This cub had been orphaned when its mother was killed 145 km from FCWRC, indicating this event was indeed an adoption. Natural adoption of bear cubs has been observed very infrequently among brown bears (*Ursus arctos*), polar bears (*Ursus maritimus*), and black bears (Erickson and Miller 1963, Jonkel et al. 1980, Lunn et al. 2000). Nursing black bears have been found to readily accept orphaned cubs introduced into their dens by humans (Clarke et al. 1980, Alt 1984, Alt and Beecham 1984, Carney and Vaughan 1987), however most females reject or kill cubs presented to them after den emergence (Alt 1984). Lunn et al. (2000) speculated that females who recently lost offspring may adopt cubs, because they are still physiologically primed to provide maternal care. We did not specifically look for evidence of lactation at the time of this incident. However, the female we observed was not accompanied by other offspring, allowing for the possibility that she may have recently lost her cubs.

MANAGEMENT IMPLICATIONS

Witmer and Whittaker (2001) reasoned that costs, liability, and inability to process very many bears may prevent greater use of rehabilitation in the resolution of problem bears. There is the potential threat of litigation in the event of human injury by a rehabilitated or relocated bear (Perry and Rusing 2000). Aggressive behavior in bears has been described as a defensive response to fear (Herrero and Fleck 1990), however fearless bears are inherently dangerous because they are naturally aggressive (McCullough 1982, Herrero 1985). Our results suggest a program of medical intervention, rehabilitation, and release of wild bears is a viable management option. The emphasis of our alliance was to successfully reestablish bears in the wild by providing optimum health care, while preserving wild behavior. Varying degrees of human interaction in bear rehabilitation is necessary. Bears are motivated by food, new stimuli, and social structure while in rehabilitation. Bears are distinctly individual and may react to captive situations defensively (frightened bear) or non-defensively (curious bear, dominance-testing

bear). We believe it is the caretaker's responsibility to understand bear behavior. For example, we have been successful at discreetly interacting with captive bears by allowing them to respond to our presence by moving to the security of a den or hollow log. The human who respects the bear's personal space, while feeding and cleaning the enclosure, unassumingly supports its natural tendency to avoid humans. According to McNay (2002), habituation has allowed safe interactions between bears and humans at very close range in the wild. We suggest that bears are capable of differentiating between a caretaker in a captive setting and humans encountered in natural environments. Therefore, if rehabilitation incorporates appropriate behavioral concepts, such as understanding, respect, and tolerance, it should have a negligible impact on post-release behavior.

Black bears have been documented as self-sufficient at 5.5 months (Erickson 1959) and successfully rehabilitated and released at >5 months old (Alt and Beecham 1984). We released 75 bears ≥9 months old, in good physical condition, and exhibiting normal behavior. Our post-release data suggests only 9% of 43 bears released by July 2002 were destroyed because of nuisance behavior and only 5% were captured for translocation or more rehabilitation. We believe post-release behavior is more affected by individual characteristics of the bear, the bear's age, and how long it received positive reinforcement for its nuisance behavior leading to capture than by the rehabilitation process at our facility. Our methods and approaches can be applied and further refined throughout North America for the benefit of black bears and those who value this resource.

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IMPROVING THE STANDARDS OF CARE IN WILD-CAUGHT BEARS

JOHN B. MURNANE, D. V. M., Interagency Grizzly Bear Study Team, Forestry Science Lab, Montana State University, P.O. Box 172780, Bozeman, MT 59717, USA, john_murnane@merck.com

Wildlife anesthesia is under increasing scrutiny by the public. Continued discussions among wildlife professionals and wildlife veterinarians have led to a better understanding of the physiological demands and risks of field anesthesia, as well as opportunities for improvement in techniques. In this presentation, I focused on the concept of understanding homeostasis with regard to temperature, cardiovascular, respiratory, and hydration status. I described the fail-forward cascade of events in each of these categories. I made recommendations for a baseline physical exam, frequent monitoring, and early to preemptive intervention. I discussed use of pulse oximetry and continuous temperature monitoring, as well as expansion of core parameter monitoring to include capillary refill, mucous membrane status, and level of anesthesia, along with temperature, pulse, and respiration (TPR). I discussed the benefits of supplemental oxygen to mitigate physical demands (e.g., the generalized respiratory-depressive effects of anesthesia; increased oxygen demand by tissues under conditions of hyperthermia and tachycardia; and risk of seizures) and as supportive care for shock. I made recommendations for carrying emergency drugs, for seizures, shock, bradycardia, and cardiac arrest, as part of a complete anesthesia kit. However, I emphasized the importance of early, ordinary interventions over the complex interventions required in a late-stage crisis. Preseason and precapture planning, training and skills development, and expansion of equipment and supplies can be instrumental in minimizing the risks of complications during field anesthesia. The skill set of a competent veterinary technician can serve as a model for capture team members to use for their own development.

Key words: veterinary techniques, wildlife anesthesia

BLACK BEAR HARVEST IN MONTANA: AN UPDATE ON STATE-WIDE HARVEST LEVELS AND TRENDS

RICHARD D. MACE, Montana Department of Fish, Wildlife, and Parks, 490 North Meridian Road, Kalispell, MT 59901,USA, rmace@state.mt.us
TONYA L. CHILTON, Montana Department of Fish, Wildlife, and Parks, 490 North Meridian Road, Kalispell, MT 59901, USA

Montana has a long history of black bear (*Ursus americanus*) hunting. The species was declared a game animal in 1923, and pursuit of bears has gained in popularity ever since. Montana is surrounded by other states with large populations of harvested black bears, however many of these states have seen restrictions in harvest opportunities for various reasons. Such reductions in opportunies have resulted in greater numbers of non-resident hunters in Montana. This increased harvest has pointed to the need for game managers to improve their knowledge of sustainable harvest rates. Montana completed an Environmental Impact Statement (EIS) on black bear management in 1994. This EIS outlined various options for bear management, and stressed the need to improve our knowledge of bear ecology within the state. Montana initiated a mandatory check of bears in 1985. These mandatory checks allow collection of detailed information from all legally harvested bears, resulting in a large, relatively unexplored database. We detail the harvest strategies employed by Montana Department of Fish, Wildlife and Parks, and provide an analysis of harvest data for the 5 regions of Montana occupied by black bears. We look at long-term trends in harvest composition and numbers for the years 1985–2001.

Key words: black bear, harvest composition, hunting, Montana, *Ursus americanus*

TRENDS IN UTAH'S BEAR HARVEST

JOSH HEWARD, Department of Integrative Biology, Brigham Young University, Provo, UT 84602, USA, jh328@email.byu.edu
HAL L. BLACK, Department of Integrative Biology, Brigham Young University, Provo, UT 84602, USA

We analyzed Utah's black bear (*Ursus americanus*) harvest over the last 20 years for trends in sex and age composition and geographical distribution. The number of adult females in the harvest has increased in recent years, possibly due to abandonment of the spring bear hunt in 1993. Several population parameters of Utah bears were compared with those of Colorado bear populations, with special reference to the effects of spring hunt cancellation. Bears taken in nuisance situations by U.S. Department of Agriculture Wildlife Services and the Utah Division of Wildlife Resources comprise a significant portion of the total harvest and have increased dramatically in recent years within some regions of the state. Survival rates were also computed from the harvest data and compared with survival estimates from radio-collared female bears.

Key words: black bear, harvest composition, hunting, survival, *Ursus americanus*, Utah

MARK-RESIGHT DENSITY ESTIMATION FOR BLACK BEARS

SEAN M. MATTHEWS, Wildlife Conservation Society, P.O. Box 83, Yosemite, CA 95389, USA, smatthews@wcs.org
RICHARD T. GOLIGHTLY, Department of Wildlife, Humboldt State University, Arcata, CA 95521, USA
J. MARK HIGLEY, Hoopa Valley Tribal Forestry, P.O. Box 368, Hoopa, CA 95546, USA

Absolute density is difficult to calculate using mark-recapture techniques, for animals with large home ranges that typically traverse study area boundaries. Density estimates and associated 95% confidence intervals for black bear (*Ursus americanus*) were generated for the Hoopa Valley Indian Reservation, California, in 1998, using a mark-resight technique involving radio-telemetry and baited camera stations. The density estimator was generated using an unbiased, generalized Peterson related estimator (Bowden 1993) and converted to a density estimate using a weighting technique (Garshelis 1992). The estimator weights each bear by the proportion of time it spent within the study area during the sighting period to account for movement in and out of the study area. Confidence interval estimates were based on the variance of the sighting frequencies of marked bears and were generated using the cube root transformation of the estimators (Arnason et al. 1991). The technique was used to generate a density estimate for 2 study sites on the Reservation.

Key words: black bear, California, density estimation, Hoopa Valley Indian Reservation, mark-resight technique, *Ursus americanus*

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SCIENCE DESIGN FOR PROPOSED NORTHERN DIVIDE GRIZZLY BEAR POPULATION ESTIMATE

KATE KENDALL, USGS – Northern Rocky Mountain Science Center, Glacier Field Station, Glacier National Park, West Glacier, MT 59936, USA
MARCI JOHNSON, USGS – Northern Rocky Mountain Science Center, Glacier Field Station, Glacier National Park, West Glacier, MT 59936, USA
JEFF STETZ, USGS – Northern Rocky Mountain Science Center, Glacier Field Station, Glacier National Park, West Glacier, MT 59936, USA, jstetz@usgs.gov

Baseline information on the status of the grizzly bear (*Ursus arctos*) population in northwestern Montana is needed to assess management measures designed to recover this threatened population. Planning has begun for a proposed study to estimate population size in the Northern Continental Divide Ecosystem using hair snag stations and DNA identification of individuals. Here we will report on the results of a September 2002 workshop in which a group of experts met to discuss science design issues related to this proposed project. The study area boundary will include most, but not all of the 32,000 km^2 of occupied habitat. Hair snags will be distributed on a 5x5 km grid for a total of almost 1,174 snag sites. Sampling will be conducted during each of 5 14-day snag sessions. Concurrent with sampling at baited hair snag sites, we will collect hair from unbaited bear rub trees along trails and other unbaited sites where bear hair accumulates. Results from the two types of sampling will be used in a mark-recapture estimate of population size.

Key words: DNA, grizzly bear, hair snagging, mark-recapture technique, Montana, Northern Continental Divide Ecosystem, population estimation, *Ursus arctos*

ESTIMATION OF BLACK BEAR HARVEST RATES IN MONTANA USING DNA RECAPTURE METHODS

RICHARD D. MACE, Montana Department of Fish, Wildlife, and Parks, 490 North Meridian Road, Kalispell, MT 59901, USA
TONYA L. CHILTON, Montana Department of Fish, Wildlife, and Parks, 490 North Meridian Road, Kalispell, MT 59901, USA, tonchilton@aol.com

Montana Department of Fish, Wildlife and Parks (FWP) initiated a long-term research project on black bear (*Ursus americanus*) demography in 2000. A major goal of this research is to document the vital rates of a representative black bear population in a single area of the state and throughout Montana to determine whether bears are being harvested at sustainable levels. Traditionally, such rates are determined through telemetry. However, it would be inefficient and expensive to radio-instrument a representative sample over such a large geographic area as the state of Montana. To overcome this problem, FWP is investigating the use of DNA technology to obtain estimates of harvest rates and population size throughout Montana. The basic technique involves DNA-marking a large number of individual bears through hair-snagging methods, and then searching for return marks in the harvested sample. To date, we have conducted these DNA assessments in 3 areas of Montana: the Swan Valley, the Yaak River area, and the Big and Little Snowy-Judith Mountain ranges. We report on our success to date in both the initial marking of bears and the derivation of harvest rates and population sizes. Further, we provide recommendations to others that may be contemplating the use of DNA techniques for black bear population studies.

Key words: black bear, DNA, hair snagging, mark-recapture technique, Montana, population estimation, *Ursus americanus*

THE REPRODUCTIVE BIOLOGY OF BLACK BEARS IN MONTANA

KEITH AUNE, Montana Fish, Wildlife and Parks, Bozeman, MT 59717, USA, Kaune@montana.edu
NEIL ANDERSON, Montana Fish, Wildlife and Parks, Bozeman, MT 59717, USA

We extracted reproductive tracts from 98 female black bear (*Ursus americanus*) carcasses from 5 Montana Fish, Wildlife and Parks (FWP) administrative regions in Montana from 1990-1999. We measured length of the placenta and weighed each ovary. Ovaries were serially sectioned and scanned with a microscope to count corpora lutea. Estimated ages of these bears ranged from cub of the year to 32 years, based on tooth cementum analysis. In addition, we examined 292 premolar tooth sections, from female black bears killed during 1980–1999 from non-hunting or hunting causes, to construct reproductive histories for each individual. We also analyzed published and unpublished FWP file information on cub litter size from various habitats across Montana. From these sets of data we examined the temporal and spatial variations in reproductive parameters such as the age of first reproduction, reproductive interval, pregnancy rates, and corpora lutea counts. In addition, we describe the changes in reproductive tract morphology and relative productivity associated with maturation. Reproductive tracts of cub (<1 year old) and yearling (1 year old) bears appeared immature and did not demonstrate any evidence of pregnancy as expected. Corpora lutea were found in 2 of 12 bears (16.7%) aged 2.5 years indicating that at least some of these bears became pregnant and might produce cubs at age 3. Corpora lutea were found in 38 (48.7%) of 78 ovaries from adult bears (>4.5 yrs). The mean number of corpora lutea found in pregnant females was 2.05 (SD = 0.8) and ranged from 1 to 5. There was no difference in mean number of corpora lutea in black bears from western Montana (FWP regions 1 and 2) as compared to eastern Montana (FWP regions 3, 4 and 5). Five hundred and seventy reproductive intervals were established for 224 adult female bears. These intervals ranged from 1 to 9 years and averaged 2.57 years (SD = 1.6). The mean age of first reproduction demonstrated in tooth sections was 6.2 years (SD = 1.3) and ranged from 2 to 10. The oldest bear demonstrating corpora lutea was 22.5 and the oldest age of a bear presenting evidence of reproduction by tooth sections was 25.5. Cub litter size data were available for 4 FWP regions in Montana and ranged from 1.75 to 2.18. There was weak evidence for geographic disparity in reproductive interval and pregnancy rates between various regions of Montana but no clear difference in mean number of corpora lutea or reported cub litter sizes. The implications of these reproductive parameters to population dynamics and harvest management are discussed.

Key words: age of first reproduction, black bear, reproductive interval, litter size, Montana, pregnancy rate, reproduction, *Ursus americanus*

MOVEMENTS OF UTAH BLACK BEARS: IMPLICATIONS FOR MANAGEMENT AND CONSERVATION

JANENE AUGER, Department of Integrative Biology, Brigham Young University, Provo, Utah 84602, USA
JOSHUA D. HEWARD, Department of Integrative Biology, Brigham Young University, Provo, Utah 84602, USA
HAL L. BLACK, Department of Integrative Biology, Brigham Young University, Provo, Utah 84602, USA, hal_black@byu.edu
GUY WALLACE, Utah Division of Wildlife, P.O. Box 91, Monticello, Utah 84435, USA

Abstract: In Utah, black bears (*Ursus americanus*) occur in large and small patches of suitable montane habitat separated by expanses of lower elevation salt desert shrubland. During 1985–2004, we documented long-range movements within and between suitable habitat patches using ear-tag recovery and radio-telemetry. Fourteen bears made natural movements of 37–274 km, apparently related to dispersal or foraging. Three ear-tagged bears and 8 radio-collared bears made homing movements of 36–126 km following translocation. Nine bears traversed unsuitable habitat and 10 bears crossed large rivers in their movements. We also documented 5 unmarked bears seen or killed in lowland desert habitat 16–40 km from suitable habitat. These various movements suggest that bears occasionally cross large expanses of habitat unfit for residency. We propose that rates of movements are relatively rapid and direct in unsuitable habitat and less so in contiguous suitable habitat where escape cover, water, and food resources are present. Dispersing males likely provide gene flow between habitat patches. Low-density bear populations in Utah may be enhanced by augmenting female numbers.

WESTERN BLACK BEAR WORKSHOP 8:72-80

Key Words: black bear, dispersal, drought, food shortage, homing, translocation, *Ursus americanus*, Utah

In western North America, large expanses of black bear habitat occur in the northern Rocky Mountains, but in the southern Rocky Mountains bear populations exist in isolated habitat patches as seen in Arizona, New Mexico and Utah (Pelton and Van Manen 1994). These populations are physiographically disjunct and are not separated as a result of habitat fragmentation as seen in the southeastern United States, for example. In Utah, black bears occur in contiguous habitat along the Wasatch Range, on the East and West Tavaputs Plateaus, and the Uinta Mountains (Figure 1). They are also found on several smaller, isolated and semi-isolated montane islands including the LaSal, Abajo/Elk Ridge, Boulder, and Henry Mountains. Other montane regions of the state appear to have adequate habitat, but lack bear populations (Raft River, Deep Creek, and Navajo Mountain) or support populations at low densities (Bear River, Pavant, Tusher, Pine Valley, Paunsaugunt) (Utah Division of Wildlife Resources [UDWR] 2000, Heward 2004). This distribution lends itself to questions regarding genetic exchange, availability of travel corridors between patches, mortality associated with movements between and within patches, and effectiveness of translocations of nuisance bears. These questions are relevant to biologists charged with the responsibility of regulating harvest of bears and to those managing population augmentation or restoration of populations to their former range.

During 1985–2004, location data from ear-tagged bears that were killed, resighted, or recaptured provided our first insights into movements of Utah bears within and between habitat patches. Here we report long-distance movements apparently motivated by food shortage, fall foraging, dispersal, or homing. Additionally, we explore the implications of these movements for population management and conservation.

STUDY AREAS AND METHODS

Marked black bears in the sample were initially captured within or translocated to 1 of 4 study areas (Figure 1). The East Tavaputs Plateau study area (ETP) was located in east-central Utah near the Colorado border (Tolman 1998). The Wasatch Front study area (WF) was located on the eastern edge of the Great Basin adjacent to the city of Provo in north-central Utah (Bates 1991). The La Sal Mountains study area (LS) and the Abajo Mountains study area (AM) were located in 2 isolated mountain ranges in southeastern Utah (Frost 1990, Richardson 1991). Elevations within the study areas ranged from 2190–3900 m. Study areas contained continuously flowing streams, and consisted of vegetative communities representative of suitable black bear habitat in the southwestern United States. Habitats included pinyon–juniper woodlands (*Pinus* spp.–*Juniperus* spp.), oak–mountain shrublands (*Quercus gambelii*, *Prunus virginiana*, *Peraphyllum ramosissimum*, *Amelanchier* spp., *Symphoricarpos* spp., *Arctostaphylos* spp., and *Cercocarpus* spp.), and forests of aspen (*Populus tremuloides*), ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*), mountain fir (*Abies concolor–Pseudotsuga menziesii*), and spruce–fir (*Picea* spp.–*Abies lasiocarpa*). Areas at

lower elevations consisted of desert shrubland, (*Sarcobatus vermiculatus*), sagebrush (*Artemisia* spp.), and rabbitbrush (*Chrysothamnus* spp.), and were considered unsuitable habitat for residency by bears. The La Sal Mountains and the Abajo Mountains were surrounded by unsuitable habitat, but the ETP and the WF were contiguous with other large expanses of suitable bear habitat. The East and West Tavaputs Plateaus were separated by the Green River in Desolation Canyon.

Research trapping was conducted during summer months from 1991–2002 on the ETP, 1985–1992 on the WF, and 1987–1991 on the LS. Bears were handled using methods of LeCount (1986). All bears were marked with numbered All-Flex ear-tags (Allflex USA, Dallas, TX) and adult females were radio-collared. Yearlings, handled in dens with radio-collared females, were also ear-tagged, as were bears translocated to the ETP by the UDWR during the years of the study.

Long-range movements of marked bears were documented when ear-tags were recovered from hunters or wildlife biologists outside of study area boundaries. To determine distance moved by each bear, we measured a straight line between the release site and the recovery site from digital topographic maps.

During 2001–2003, bears captured in nuisance situations on the eastern slope of the Abajo Mountains were radio-collared and translocated to the western slopes, 41–65 km in a straight-line distance from capture sites. They were monitored irregularly from small aircraft by UDWR pilots, therefore time elapsed between translocation and return may have been slightly overestimated.

Additionally, we compiled records of unmarked bears killed or seen in unsuitable habitat from our own observations and from UDWR records. These data were collected opportunistically, but were nevertheless instructive.

Bears were aged (when possible) using cementum annuli (Matson's Laboratory, Milltown, Montana, USA) and bears ≥4 years old were considered adults.

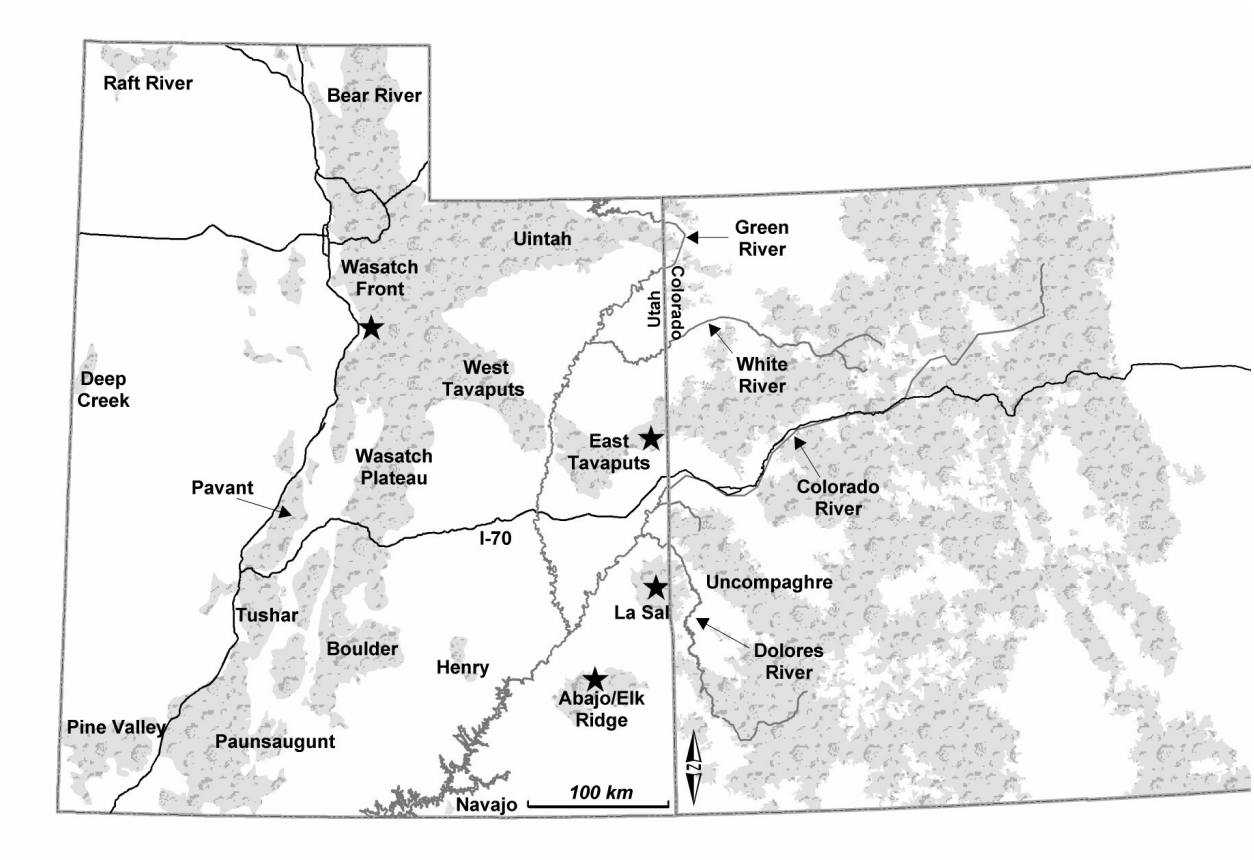

Figure 1. Black bear habitat and geographic features of Utah and western Colorado. Shaded areas in Utah represent real (currently occupied) and potential (unoccupied area at elevations above 1700 m) bear habitat (Utah Division of Wildlife Resources 2000). Shaded areas in Colorado represent forested bear habitat (U.S. Geological Survey 1999). Stars indicate study areas where bears were captured and ear-tagged during 1985-2003.

RESULTS

We documented natural movements of 14 bears (11 males, 3 females) away from study areas where they were originally captured (Table 1). Ear-tags were recovered from 9 bears killed by hunters, 3 bears killed in nuisance situations, 1 bear captured in a nuisance situation, and 1 bear killed by a motor vehicle. Males moved distances of 37–274 km and females 48–86 km. The 3 females were all killed in areas where they were depredating corn crops. Bears moved in various directions from the ETP, primarily west to the West Tavaputs Plateau or southeast to lowland agricultural areas in Colorado (Figure 2). Bears from the LS moved northeast to the Uncompahgre Plateau in Colorado or south to the Abajo Mountains. The bear from the WF moved northeast within contiguous habitat (Figure 3).

Table 1. Sex, age, and movement characteristics of ear-tagged black bears that made natural long-distance movements from study sites on the East Tavaputs Plateau, La Sal Mountains, and Wasatch Mountains, Utah, 1985-2004.

			Capture[1]		Eartag recovery					
Bear No.	Study Area	Sex	Date	Age (yrs)	Date	Age (yrs)	Type	Time elapsed	Distance (km)	Comments
1	ETP	M	Jul 2001	3	May 2003	5	Hunter	2 yrs	116	Killed in Range Creek, West Tavaputs Plateau
2	ETP	M	Aug 1992	Cub	Aug 1992	Cub	Depredation	21 days	60	Orphaned. Captured by CDOW in peach orchard 6.4 km west of Fruita, CO.
3	ETP	M	Aug 1993	6	Sep 2000	13	Vehicle	7 yrs	274	Moved from ETP as an adult. Killed on I-70 near Frisco, CO.
4	ETP	M	Feb 1995	1	Jul 2001	7	Depredation	6 yrs	96	Killed near Meeker, CO. Sibling to Bear 5.
5	ETP	M	Feb 1995	1	Sep 1997	3	Hunter	2 yrs	112	Killed in Range Creek, West Tavaputs Plateau. Sibling to Bear 4.
6	ETP	M	Jan 1995	1	Sep 1998	4	Hunter	3 yrs	113	Killed on Anthro Mountain, West Tavaputs Plateau. ETP was natal area.
7	ETP	F	Jul 1996	3	Sep 2000	7	Depredation	4 yrs	86	Killed near Palisade, CO.
8	ETP	M	Jan 1999 Jun 2001	1 3	Sep 2002	4	Hunter	1 yr	155	Killed near Scofield Reservoir, Wasatch Plateau.
9	ETP	F	Jul 2001 Mar 2004	4 6	Sep 2004	6	Hunter	6 months	48	Killed near Fruita, CO. Had been feeding in cornfield.
10	ETP	F	Jun 2002	2	Sep 2002	2	Depredation	3 months	48	Killed running from cornfield near Fruita, CO. Was emaciated and weighed 32 kg in June.
11	LS	M	Apr 1989 Dec 1990	1 2	Spring 1991	3	Hunter	1 yr	37	Killed on Uncompahgre Plateau, CO.
12	LS	M	May 1989	1	May 1991	3	Hunter	2 yrs	60	Killed on Uncompahgre Plateau, CO.
13	LS	M	1996	1	Sep 2001	6	Hunter	5 yrs	87	Translocated from the southern to northern La Sal Mountains in 1996. Killed on Abajo Mountains.
14	WF	M	1987	1	May 1989	3	Hunter	2 yrs	68	Dispersed as a yearling (known from telemetry data). Killed on Tabby Mountain, Uintah Mountains.

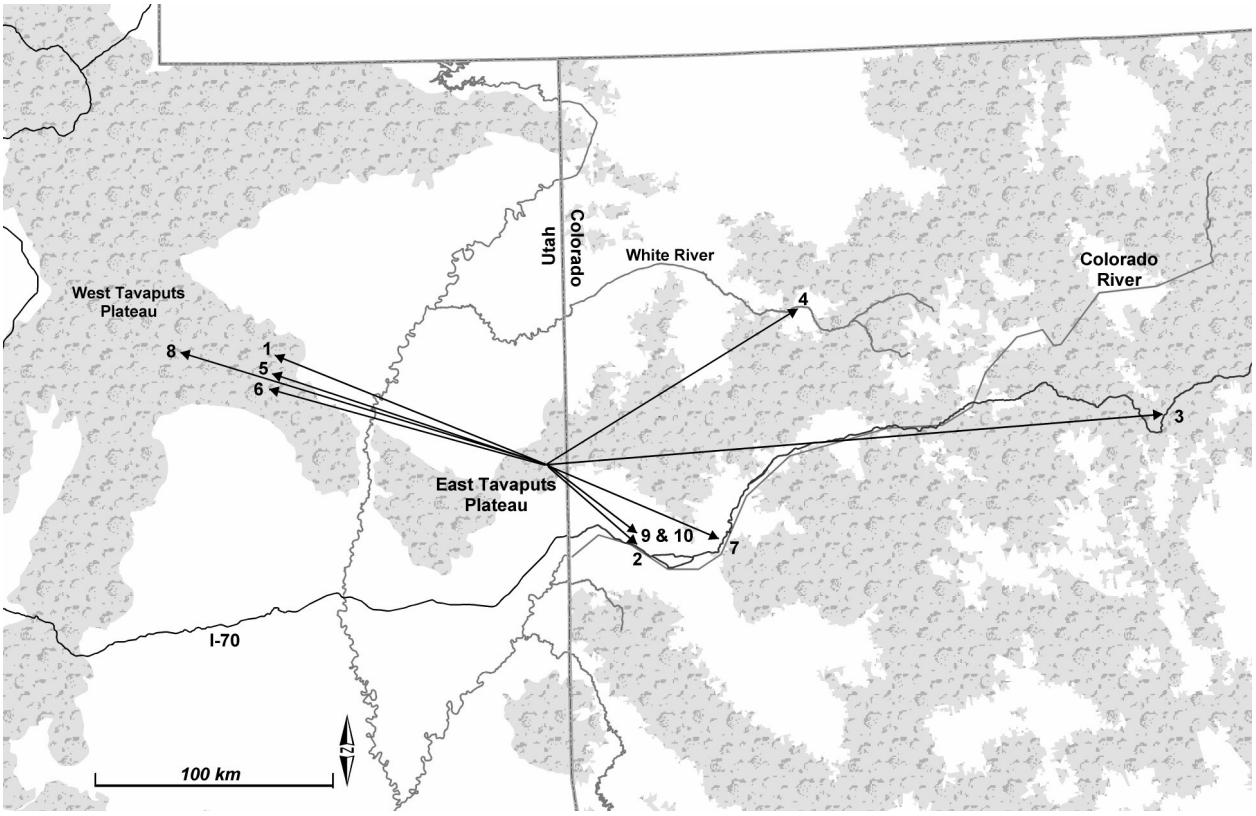

Figure 2. Lines depicting natural movements of ear-tagged black bears from the East Tavaputs Plateau study area, Utah, 1991-2004. Movements are represented as straight lines between starting and ending points, because precise routes of travel are not known.

We observed movements of 3 ear-tagged bears captured in nuisance situations and translocated to the ETP (Figure 3). Bear 15, an adult female, was trapped in September 1995 in the rural community of Myton. Cub tracks were observed at the trapsite, but no cubs were captured. She was released on the ETP in Railroad Canyon. Within 21 days she returned to her original capture site, a distance of 113 km. She crossed the Green River, and perhaps the White River, and traversed 40–48 km of unsuitable habitat. Bear 16, a male cub, was placed in an artificial den on the ETP with his female sibling and subsequently released in March 1994. In July, he was shot by a cabin owner in Nine-Mile Canyon on the West Tavaputs Plateau across the Green River and 126 km from his artificial den site. Bear 17, a subadult male, was translocated to the ETP from a location undisclosed by the UDWR on 6 June 1994. About 4 weeks after release, he was struck by a car on U. S. Route 191, 48 km SE of Price. Habitat at the kill site was juniper woodland and low-growing desert shrub at an elevation of 1402 m. Closest suitable habitat was approximately 16 km to the east. When killed, he had traveled 103 km from his release site and crossed the Green River.

Nine of these 17 (53%) ear-tagged bears traversed non-suitable habitat and 10 (59%) crossed large rivers in their movements (Figures 2 and 3). Bears 2, 7, 9, and 10 crossed a minimum of 24 km of arid habitat southeast of the ETP to reach agricultural lands. Bears 11 and 12 crossed from the La Sal Mountains to the Uncompahgre Plateau, descending between 600 and 900 m in elevation to the valley floor, and crossing at least 11 km of arid desert shrubland bordering the Dolores River. Bears 13, 15 and 17 traveled in unsuitable habitat for 45 km, 40–48 km, and 16 km, respectively.

Homing movements were observed for all 8 radio-collared bears translocated to the western slopes of the Abajo Mountains (Table 2). All of these returns could have been made through contiguous suitable bear habitat. Mean distance of return was 52.4 km ± 9.6 (SD). Mean elapsed time between translocation and return was 24.3 days ± 12.0 (SD, excluding one outlier who returned in 333 days).

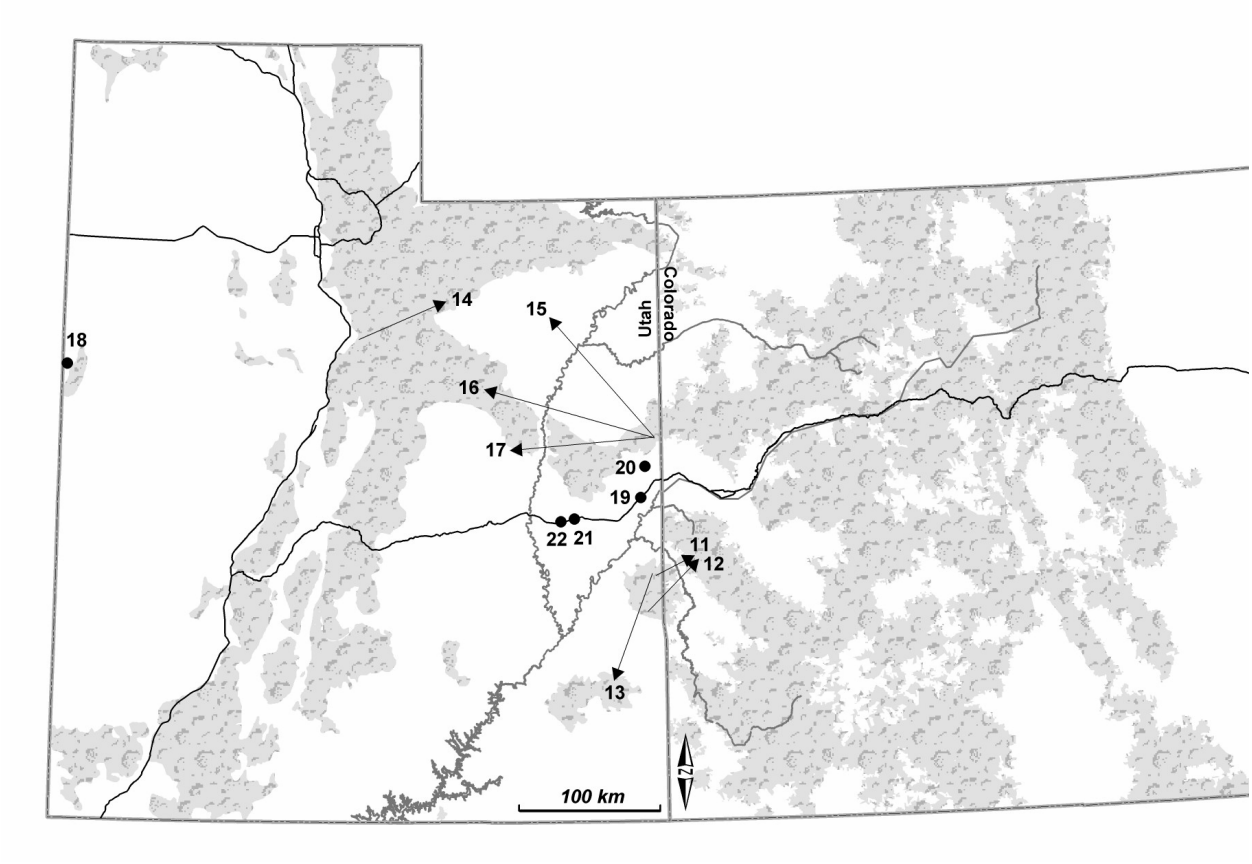

Figure 3. Lines depicting natural movements of ear-tagged black bears from the La Sal Mountains (Bears 11-13) and Wasatch Front (Bear 14) study areas, homing movements of nuisance bears translocated to the East Tavaputs Plateau study area (Bears 15–17), and point locations of bears seen or killed in unsuitable habitat (Bears 18–22), Utah, 1985-2004. Movements are represented as straight lines between starting and ending points, because precise routes of travel are not known.

We documented 5 unmarked bears seen or killed in desert shrublands 16–40 km from suitable habitat (Figure 3). Bear 18 was observed in 1996 running west of Callao about 16–19 km from the foothills of the Deep Creek Mountains on the Utah–Nevada border. To our knowledge this is the first report of a black bear on this isolated mountain range. The closest bear population in any direction is on the Wasatch Front, a minimum distance 193 km. There is no record this was a translocated nuisance bear or an unsanctioned introduction. Bear 19, a bear of unknown sex or age, was struck on Interstate 70 at milepost 220 in Grand County on 8 October 1999. Direction of movement was not reported. We observed Bear 20, a medium-sized bear of unknown sex, in early August 2000 while traveling a secondary road south of the East Tavaputs Plateau at 0900 hr. The bear was heading in a southeasterly direction in the open, arid saltbush valley floor between the ETP and the Uncompahgre Plateau 81 km away. Elevation was 1615 m. Interstate 70 runs between the two areas. This bear was not following a creek bed and there was nothing resembling bear habitat for many kilometers in any direction. Bear 21, a large bear of unknown sex, was seen crossing Interstate 70 about 1.6 km west of Crescent Junction on 27 October 2000 at 1320 hr. It was heading north towards the ETP. Bear 22, a bear of unknown sex or age, was struck on Interstate 70 at milepost 170, on 29 August 2002. Direction of movement was not reported.

DISCUSSION

Collectively, these movements suggest bears are motivated to move over the heterogeneous landscapes found in Utah, in some cases traveling through many kilometers of habitat unsuitable for permanent residence. Because animals were not monitored to obtain a history of movements, designating motivation as food-, homing- or dispersal-related was problematic, yet these movements with associated circumstances lent themselves to some discussion of these topics and their management implications.

Table 2. Sex, age, and homing characteristics of radio-collared nuisance bears translocated from the Abajo Mountains study area, Utah, 2001-2002.

Bear	Sex	Age	Date translocated	Date returned	Time elapsed (days)	Distance traveled (km)
23	F	SA	10 Oct 2001	24 Oct 2001	14	47
24	F	A	1 Sep 2001	25 Sep 2001	25	57
25	M	SA	15 Aug 2001	20 Sep 2001	37	59
26	F	A	27 Aug 2001	1 Nov 2001	36	65
27	F	SA	25 Jul 2002	2 Aug 2002	9	57
28	M	A	25 Jul 2002	7 Aug 2002	14	57
29	M	A	30 Sep 2002	24 Oct 2002	35	36
30	M	SA	13 Sep 2002	15 Aug 2003	333	41

In much of the western United States, 1999–2002 were years of severe drought, and the East Tavaputs Plateau was particularly dry (U.S. Geological Survey 2003). A resident rancher there said that range conditions were poorer than any he had seen in over 20 years (B. DeLambert, personal communication). Bear scats collected in late summer and early fall of 2000 contained little of the mast remains typically seen, e.g., acorns (*Quercus gambelii*), chokecherry (*Prunus virginiana*) or serviceberry (*Amelanchier alnifolia*), but did contain juniper seeds in the highest frequency and volume that we had observed (Heward et al. 2004). Furthermore, a closely monitored radio-collared lactating female apparently died of starvation in August 2000 (Heward and Black 2004). She had been accompanied by twins throughout the summer and was the only adult female known to have died of natural causes during the ETP study.

Several of the observed movements, including those of bears 3, 4, 7, 9, 10, 13, and 19–22, may have been associated with food shortage. Bears 4, 7, 9, and 10 were killed due to depredation complaints and all other bears were killed in late summer or fall when food acquisition is typically the primary activity. Food shortages have been associated with increased movement distances of bears (Costello et al. 2001) and associated higher mortality (McDonald et al. 1994).

Three different females (Bears 7, 9, and 10) were killed while depredating crops in lowland agricultural areas near Fruita, Colorado. Bear 7, killed in 2000, was the first eartagged bear >1 year old to be found in these areas from a pool of 76 males and 45 females captured on the ETP from 1991–2000. Van Graham, long-time employee of the Colorado Division of Wildlife, reported increased sightings and killings of unmarked nuisance bears in these same areas during the drought years. Bears presumably came from both Colorado and Utah portions of the Plateau. Perhaps the drought conditions will prompt some individuals to establish a traditional migration to these dependable food sources in lowland agricultural areas. Regular fall excursions to food resources have been documented in Colorado (Beck 1991) and in other studies (Garshelis and Pelton 1981, Rogers 1987*a*, Hellgren and Vaughan 1990, Maehr 1997, Samson and Huot 1998).

Our sample of homing bears (Bears 15–17 and Bears 23–30) showed that motivation to return to presumably familiar landscapes was high. All bears on the AM, regardless of sex or age, returned to the vicinity of capture. Seven of 8 did so within 37 days and 1 returned in half that time despite impairment by a compound fracture of the foreleg. Relatively short translocation distances, overlapping contiguous suitable habitat with no asphalt highways, likely contributed to the rapid travel and survival of these bears (Comly-Gericke and Vaughan 1997). Short translocations do not seem to be effective in permanently removing bears from nuisance situations in Utah. Similar conclusions have been reached in the western states of Nevada (Beckmann and Lackey 2004), California (Ingram 1995), and Montana (McArthur 1981), and elsewhere (McLaughlin et al. 1981, Rogers 1986, Fies et al. 1987). Bears translocated longer distances were clearly vulnerable to risk as 2 of 3 bears homing >100 km were killed en route and the other necessarily traveled through desert shrubland. Benefits of returning home may outweigh apparent risks associated with travel through habitat containing few food resources, water, or escape cover. Massopust and Anderson (1984) showed that the adaptive advantage of homing was reflected in greater longevity of homing black bears relative to non-homing individuals.

Some bear movements may have been cases of dispersal, including Bears 1, 3, 4, 5, 6, 8, 11, 12, 13, and 14. These bears moved a mean straight-line distance of 112 km (SD = 66) away from study sites to suitable bear habitat elsewhere. Using the ear-tag recovery method, we could not ascertain precisely when movements occurred, or whether individuals had established residency in their new locations. However, all were males and 9 of 10 were sub-adults (<4 years old) when first captured, making the likelihood of dispersal high (Rogers 1987*b*). These bears moved distances similar to those in Massachusetts—where 8

yearlings each moved more than 60 km with a mean dispersal distance of 112.5 km (Elowe 1987), Minnesota—where 18 subadult males dispersed 13–219 km with a mean distance of 61 km (Rogers 1987*b*), and New Mexico—where male bears < 3 years old dispersed 25–60 km (Costello et al. 2001).

Young male bears dispersing through unsuitable habitat, such as that separating disjunct populations in Utah and the southwestern United States, may effectively link populations and effect gene exchange. We observed apparent dispersal between the La Sal and Abajo Mountains, and between the La Sal Mountains and Uncompaghre Plateau, Colorado. Relative distance and observations of other movements suggest reciprocal dispersal might also occur between the East Tavaputs Plateau and the Uncompaghre Plateau, and between the East Tavaputs Plateau and La Sal Mountains. The 3 bears that apparently dispersed from the La Sal Mountains represented about 7% of the marked male bears aged 1–4 years, suggesting dispersal across unsuitable habitat is not uncommon. Thus, we would not predict the montane island populations of Utah to be genetically distinct, nor would we expect bears in contiguous habitat to show significant genetic diversification. In fact, Sinclair et al. (2003) showed, based on microsatellite DNA evidence, that the ETP population was part of a larger population extending east into Colorado and west to the Wasatch Range.

Our data did not permit us to calculate rates or specific routes of bear travel. Movements within bear habitat might be a "fits and starts" program where individuals move directionally or not, having their movements dictated by both endogenous and exogenous stimuli, prior to their establishing a home range (Rogers 1987*a*). Considerable wandering and backtracking before settling on a home range has been observed (Rogers 1987*a*, 1987*b*). However, bears crossing through 50–60 km or more of unsuitable habitat (a typical minimum distance between island mountain ranges in Utah) largely devoid of water, food, and escape cover may be motivated to move rapidly and non-randomly. Perhaps all that is required for bears to make these movements is the capacity to see distant ranges and to navigate to them. We were impressed as we watched Bear 20 lope away from us with a smooth gait reminiscent of a wolverine (*Gulo gulo*), a gait that could carry it over many kilometers of desert floor in hours rather than days. Stratman et al. (2001) documented an 11-year-old male bear that traveled a record 123 km in 10 hours.

Observations of bears 13, 17, 18, 19, 20, 21, and 22 showed extensive travel in the absence of anything resembling a connective corridor (sensu Beier and Noss 1998). Bears 19, 20, and 22 were road-kills spread out on a stretch of highway 50 miles long, suggesting that non-corridor movement does not concentrate bears in a predictable manner. Under these circumstances, use of underpasses, green bridges, or warning signs for drivers would probably not be effective in reducing mortalities.

Some montane regions of Utah appear to have adequate habitat, but either lack bear populations or support populations at low densities (UDWR 2000, Heward 2004). These ranges, especially Raft River, Deep Creek, Navajo, and Pine Valley, are somewhat isolated from larger contiguous patches of suitable habitat (Figure 1). Our observations showed that males crossed agricultural and open rangelands between mountain ranges; however, we saw no movements that could be interpreted as dispersal among 132 female bears ear-tagged in Utah from 1985–2002. Female dispersal has been shown to be rare and our likelihood of observing it was low (Onorato and Hellgren 2001). Augmentation of low-density populations, as called for in the *Utah Black Bear Management Plan* (UDWR 2000), would appear to require reintroduction or supplementation of females using methods that increase site fidelity of translocated bears (e.g. Clark et al. 2002).

In conclusion, simple recovery of ear-tagged individuals yielded several important insights. Managers and researchers should take confidence in the value of ear-tagging all handled bears knowing that ear-tags can persist for years and are a safe and inexpensive device for identifying individuals.

ACKNOWLEDGMENTS

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UNCONTROLLED FIELD PERFORMANCE OF TELEVILT GPS-SIMPLEX COLLARS ON GRIZZLY BEARS IN WESTERN AND NORTHERN CANADA

ROBERT J. GAU, Wildlife and Fisheries Division, Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories, #600 5102-50th Avenue, Yellowknife, NT X1A 3S8, Canada, rob_gau@gov.nt.ca
ROBERT MULDERS, Wildlife & Fisheries Division, Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories, #600-5102 50th Avenue, Yellowknife, NT X1A 3S8, Canada
LANA M. CIARNIELLO, Parsnip Grizzly Bear Project, 13210 Bergman Road, Prince George, BC V2M 7C2, Canada
DOUGLAS C. HEARD, British Columbia Ministry of Environment, Lands and Parks, 1011 4th Ave., Prince George, BC V2L 3H9, Canada
CHERYL-LESLEY B. CHETKIEWICZ, CW-315, Department of Biological Sciences, University of Alberta, Edmonton, AB T6G 2E9, Canada
MARK BOYCE, Department of Biological Sciences, University of Alberta, Edmonton, AB, T6G 2E9, Canada
ROBIN MUNRO, P.O. Box 6330, Foothills Model Forest, Hinton, AB, T7V 1X6, Canada
GORDON STENHOUSE, Alberta Sustainable Resource Development, Fish and Wildlife Division, Box 6330, Hinton, AB T7V 1X6, Canada
BRYAN CHRUSZCZ, Parks Canada, Box 900, Banff, AB T1L 1K2, Canada
MICHAEL L. GIBEAU, Parks Canada, Box 900, Banff, AB T1L 1K2, Canada
BRIAN MILAKOVIC, Natural Resources and Environmental Studies, University of Northern British Columbia, 3333 University Way, Prince George, BC V2N 4Z9, Canada
KATHERINE L. PARKER, Natural Resources and Environmental Studies, University of Northern British Columbia, 3333 University Way, Prince George, BC V2N 4Z9, Canada

Global positioning system (GPS) collars have the ability to gather a large volume of precise locations relative to other telemetry techniques (i.e., aerial radio-telemetry and Argos satellite-based methods). We appraised the performance of 12-channel Televilt GPS-Simplex™ collars (Televilt/TVP Positioning AB, Lindesberg, Sweden) on grizzly bears (*Ursus arctos*) from 7 areas across British Columbia, Alberta, and the Northwest Territories in Canada. Of 58 collar deployments retrieved between 2000 and 2002, 38 acted according to their programmed schedule and 20 had some degree of failure. In addition to these deployments, 10 collars failed pre-deployment and 13 likely experienced catastrophic failures and were not retrieved. Retrieved collars attempted 95,244 location fixes. Fix success significantly differed between the retrieved collars from the Northwest Territories ($\bar{x}$ = 87.4%, SE = 2.4, n = 10) and the British Columbia-Alberta study areas ($F_{5,50}$ = 10.8, P < 0.01). Success rates for British Columbia and Alberta study areas differed between the retrieved collars that functioned normally ($\bar{x}$ = 64.9, SE = 2.3, n = 28) and collars retrieved with failure events ($\bar{x}$ = 55.6, SE = 4.3, n = 17; t_{43} = 2.1, P = 0.04). Also the longer collars were in the field, the more diminished success rates became (r_s = -0.35, n = 45, P = 0.02). For locations we were able to recover from the retrieved collars, the mean dilution of precision (DOP) values were <4 for 2D and 3D locations and thus had a good degree of precision. To offset the risk of losing all data in a collar, some units were programmed to send data through periodic pre-set VHF downloads, however, we only had a mean recovery rate of 57.0% (SE = 5.1, n = 25) of the total data available to us stored in the collars. We are satisfied with the volume and quality of the location data, however we advise other researchers that significant time, money, and data may be lost coping with collar failures. Other recommendations include: retrieving collars after each field season and prior to bears hibernating, using a perchloroethylene putty to block the gap between the electronic housing and battery pack enhancing the rubber "O-ring" seal, and prompt recovery of collars once an emergency mode is enabled. Given the rapid pace of technological advancement since the first GPS collars were tested, there likely will be little time for a purchased GPS collar to be put through rigorous field testing before either a newer, faster, better, smaller, or longer-lasting model is available.

Key words: grizzly bear, GPS collars, location data, movements, telemetry, Televilt, *Ursus arctos*.

QUANTIFYING BEAR POPULATIONS AND BEAR-HUMAN CONFLICTS IN THE KENNICOTT VALLEY OF WRANGELL-ST. ELIAS NATIONAL PARK, ALASKA

JAMES M. WILDER, University of Idaho, College of Natural Resources, Department of Fish and Wildlife Resources, Moscow, ID 83844, USA, jimwilder72@hotmail.com
R. G. WRIGHT, University of Idaho, Cooperative Fish & Wildlife Research Unit, Department of Fish and Wildlife Resources, Moscow, ID 83844-1136, USA
LISETTE P. WAITS, University of Idaho, College of Natural Resources, Department of Fish and Wildlife Resources, Moscow, ID 83844, USA
CARL D. MITCHELL, U. S. Fish & Wildlife Service, Gray Lake National Wildlife Refuge, Wayan, ID 83285, USA

We examined brown (*Ursus arctos*) and black (*U. americanus*) bear populations and bear-human conflicts in the Kennicott Valley of Wrangell-St. Elias National Park, Alaska, using non-invasive genetic sampling techniques. We determined the minimum population of both species within the valley and described the factors influencing occurrence of conflict. We quantified bear-human conflicts, mapped them into a Geographic Information System (GIS), and created a bear-management database for the park. To date, 84 individual black bears and 8 individual brown bears have been identified. At least 26 bears were killed in the valley during 1999–2001. Brown bears were involved in a disproportionate number of the conflicts reported, accounting for at least 37% of conflicts attributable to a specific species, while representing only 9% of the individuals identified. The Kennicott Valley may serve as a population sink for surrounding bear populations due to human-caused mortality and its rich natural food resources.

Key words: Alaska, bear-human conflict, black bear, grizzly bear, non-invasive DNA sampling, population estimation, *Ursus americanus*, *Ursus arctos*, Wrangell-St. Elias National Park

HUMAN-BLACK BEAR INTERACTIONS IN YOSEMITE NATIONAL PARK

SEAN M. MATTHEWS, Wildlife Conservation Society – Hornocker Wildlife Institute, P.O. Box 83, Yosemite, CA 95389, USA, smatthews@wcs.org
BRENDA LACKEY, Department of Resource Recreation and Tourism, University of Idaho, Moscow, ID 83844, USA
JOHN BEECHAM, Wildlife Conservation Society – Hornocker Wildlife Institute, 2023 Stadium Drive, Suite 1A, Bozeman, MT 59715, USA
SAM HAM, Department of Resource Recreation and Tourism, University of Idaho, Moscow, ID 83844, USA

Black bears (*Ursus americanus*) in Yosemite National Park have obtained food provided intentionally and unintentionally by humans since the 1920s. This feeding of black bears has led to conflicts between humans and bears. In 1975, the National Park Service (NPS) initiated the Human-Bear Management Program in Yosemite National Park in an effort to eliminate human-provided food and garbage accessible to bears. Despite the initiation of these efforts, the annual number of bear incidents and property damage estimates have been documented as high as 1,590 and $659,000, respectively. Increases in the number of human-bear incidents has focused the need to examine and evaluate the system of human-bear interactions in the Park, with the goal of recommending ways to improve bear management and reduce the number of problem bear incidents.

The Wildlife Conservation Society is using a systems approach to characterize and investigate components of both the bear and human elements of the bear management program. Human-bear incidents of the recent past are being categorized based on the cause of the incident, age class and sex of the bear involved, backcountry or front country location, season, and time of day. Radio-telemetry is being used to quantify seasonal and daily activity patterns and movements of black bears in Yosemite Valley. The effectiveness of content and methods of dissemination of bear-related information provided to the public are being assessed. Visitor's salient beliefs about bears and food storage behavior are being evaluated using over 4,000 surveys administered to park visitors.

The documented pattern of human-bear incidents demonstrates incidents have kept one step ahead of management responses. Increases in incidents began in front country campgrounds, moving to parking lots (following installation of food storage boxes in front country campgrounds), and recently into backcountry campgrounds (following regulations prohibiting the storage of food in vehicles). Eighteen bears have been captured and radio-collared in order to assess movement and activity patterns relative to anthropogenic activity in Yosemite Valley. Subadult (<4 years old) male bears have been found more commonly near anthropogenic activity, followed by adult (≥4 years old) males, adult females, and subadult females. Collared bears do not exhibit a tendency toward being diurnal or nocturnal and generally travel greater distances during the day than at night. We have identified over 100 unique bear-related messages distributed to the public in various forms within Yosemite Valley and have determined they tend to have a high level of reading ease and a low level of human interest. Overall, 98% of visitors reported seeing or hearing some type of bear-related information during their visit to Yosemite and 75% retained what they should do relative bears and their own safety. Over 90% of visitors to Yosemite have a positive belief about the presence of bears and their ecological role within the park. About 60% of bears involved in a human-bear incident did not report the problem to park staff, most indicating "because it was so minor."

Key words: bear-human conflict, black bear, food, public attitudes, *Ursus americanus*, Yosemite National Park

BEAR-HUMAN MANAGEMENT ON PHILMONT SCOUT RANCH

BOB RICKLEFS, Philmont Scout Ranch, Rural Route, Box 35, Cimarron, NM 87714, USA,
bricklefs@philmontscoutranch.org

Abstract: Natural resource agencies and private landowners are often challenged to minimize conflicts when humans use landscapes inhabited by black bears (*Ursus americanus*). Philmont Scout Ranch, in northern New Mexico, is a large, remote property primarily used for recreation by ≥30,000 visitors each year. The Ranch is divided into a headquarters area for permanent staff and a backcountry network of permanent camps and designated campsites connected by roads and trails. We have developed a comprehensive bear-human management system, consisting of education, camping techniques, reporting, enforcement and response. Education includes guidebooks and instructions mailed to visitors prior to arrival at the Ranch, and further instruction by a staff ranger upon arrival. Instruction includes information on bear biology, but primarily emphasizes that bears must be denied any human-related food or garbage (i.e., "a fed bear is a dead bear"). Camping procedures are designed to limit bear investigation of backcountry camps and eliminate opportunities for bears to obtain human foods. They include: designation of the "bearmuda triangle" – an area where foods and odors are to be confined; use of suspended cables for hanging food and "smellables"; proper disposal, storage, and removal of waste; and specific requirements for placement of tents. A comprehensive system of recording all bear sightings allows staff to monitor compliance with procedures, and respond to nuisance bears. These procedures allow us to minimize bear-human conflict in an area where resident bears encounter humans regularly. Although most bears appear human-habituated, few are considered food-conditioned, because of efforts to prevent bears from obtaining human-related foods.

WESTERN BLACK BEAR WORKSHOP 8:84-90

Key words: bear-human conflict, black bear, camping, education, food, garbage, New Mexico, *Ursus americanus*

Philmont Scout Ranch is the largest camping operation, in terms of land area and numbers served, of any facility run by the Boy Scouts of America. It is arguably the largest camp in the world run by any youth organization. Because the entire ranch is within black bear habitat, there are probably more bear-human encounters than anywhere else in North America. All groups that visit the facility have a high likelihood of encountering or seeing a black bear. And because of the high number of camps and campsites on the facility, it is likely that all resident bears have at least 1 camp within their home range, at which camping activities occur on a daily basis during the June-August camping season.

The sheer volume of human foods introduced into wilderness-like bear habitat and the tons of trash and garbage necessarily removed, provide a unique challenge for bear-human management. The opportunistic nature of bears and human nature itself, especially youthful human nature, ensures that any management scheme will be constantly tested and mistakes will occasionally be made. But, the ultimate goal is to deny human introduced foods to bears and to provide a safe environment for youth and adults who visit.

My objective for this paper is to describe the bear-human management system employed on Philmont Scout Ranch and to provide ideas and devices that might be used in other management programs.

DESCRIPTION OF RANCH

Philmont Scout Ranch (the Ranch) is a 556.4 km^2 property in northeastern New Mexico, owned and operated by the National Council of the Boy Scouts of America (BSA). The Ranch is primarily used for recreational high-adventure camping, backpacking, and training, which serves the aims and ideals of the BSA. Annually, ≥30,000 youth and adults visit the Ranch, primarily in the summer camping season (7 June–22 August). The Ranch also sustains the multiple uses of a working western ranch, including beef cattle and livestock operations, irrigated farming, timber harvest and fee hunting.

The Ranch is located in the Sangre de Cristo Range of the southern Rocky Mountains near the town of Cimarron. Elevations range from 1,950-3,792 m. Topography is gently sloping prairie in the east and steep-sided sandstone canyons and rugged mountains in the west. Approximately 80% of the Ranch is forested and forest types include pinyon-juniper (*Pinus edulis-Juniperus* spp.), ponderosa pine-oak (*Pinus ponderosa-Quercus* spp.), mixed conifer (*Pseudotsuga menziesii-Abies concolor*) and spruce-fir (*Picea engelmannii-Abies lasiocarpa*). The highest peaks on the Ranch are above tree line. Annual precipitation ranges from 41.1 cm on the eastern plains to 63.5 cm in the mountains (Western Regional Climate Center 2003).

The Ranch is divided into a headquarters area and backcountry. Headquarters is a small rural community with housing for 20 permanent staff and the infrastructure to serve ≥1000 visitors per day. Visitor housing at headquarters is 2-person wall tents. Housing in the backcountry is primarily 2-person wall tents for staff and 2-person backpack tents for visitors. Camping is not permitted outside of established campsites. In the backcountry, there is a network of 94 camps connected

by roads and trails, each with multiple numbered campsites (872 in all). Twenty-eight camps are permanently staffed with 5-15 people who conduct programs and assist visitors. Staffed camps typically have a hard-sided staff building that serves as a kitchen, limited sleeping area, and service center for people hiking through the area. Each staffed camp has a permanent radio system plus two portable radios for business or emergency communication with management personnel at headquarters and staff at other camps.

Visitors in the backpacking program are usually in groups of 7-12 individuals, including adult leaders. Most groups come for 12-day expeditions with camping at headquarters on the first and last night and 10 nights in the backcountry. Visitors spend about equal time at staffed and non-staffed camps. At any given time, there are >4,000 visitors and 250 staff in the backcountry. During 2002, visitors and staff spent >214,000 camp-nights (1 camp-night = 1 person camping for 1 night) and prepared >700,000 meals in the backcountry. In addition to visitors in the backpacking program, 4000-5000 people are regularly housed in tents at headquarters for weeklong training sessions. In 2002, >101,000 camp-nights were spent at headquarters.

The relatively undisturbed forest communities on the Ranch provide good habitat for black bears and bear sightings are common, especially during the camping season. A density estimate of 17 bears (≥1 year old)/100 km^2 was obtained during an 8-year field study conducted partially on the Ranch (Costello et al. 2001), suggesting about 95 black bears inhabit the Ranch. Black bear hunting, using dogs, has been practiced on the Ranch for at least 50 years. Except for the northern portion of the Ranch, which was closed to bear hunting during 1992-1998 as part of the bear study, the entire Ranch has been hunted. Contiguous with the north and west boundaries of the Ranch are approximately 3,240 km^2 of good bear habitat. Until 2002, no bear hunting had been allowed for at least 10 years on these public and private lands. Average annual bear harvest on the Ranch during the 1990's was 15 bears.

Observations of bears on the Ranch suggest most are human-habituated to some degree. Resident bears are doubtless aware of thousands of humans present in their midst each year, and some bears likely encounter humans regularly. As a consequence, many bears show little fear of humans and generally ignore them when they are encountered. Although most bears appear human-habituated, few are considered food-conditioned, because of efforts to prevent bears from obtaining human-related foods.

PROCEDURES

Over the past 60 years, Ranch personnel have developed procedures for reducing conflict between visitors and bears, based on trial and error, experience, published literature, and consultation with other people involved with bear management. We currently employ a comprehensive bear-human management system, consisting of education, camping techniques, reporting, enforcement and response.

Education Program

The educational component consists of written materials and personal instruction. Education begins with guidebooks and instructions mailed to visitors prior to arrival at the Ranch. Upon arrival, visitors are given further instruction by a staff ranger. Each group is accompanied by a ranger for 3 days and trained in all camping procedures.

Visitors are informed that bears are naturally opportunistic and may investigate any unknown odor. We stress that bears must be denied any reward for that behavior in the form of human-related food or garbage. We often use the phrase "a fed bear is a dead bear." Visitors are cautioned that the summer camping season coincides with a period of low natural food availability for bears, when food is generally limited to insects and green vegetation (Costello et al. 2001). Therefore, bears may be more likely to seek human food sources during this time. By the first week of August, bears will generally begin to feed on ripening acorns (*Quercus* spp.), if there is an adequate crop.

Visitors are given information about bear coat color, size, and proportions, so that they can provide an accurate description should they encounter a bear. Bears in New Mexico range from blonde to reddish shades of brown to black (Costello et al 2001), therefore color can be important for distinguishing individuals. Occasionally markings on the chest or back can be observed. We instruct visitors to look for presence and color of ear-tags. It is difficult for inexperienced visitors to estimate weight or size at the shoulder, therefore we explain that a pointed face and large ears indicates a juvenile bear, whereas a round face and small ears indicates an adult.

A printed checklist (received prior to arrival) and on-site ranger instruction define our concept of "smellables" to visitors. Items on the list include food, garbage, soap, toothpaste, cameras and film, medicines, and many others. A ranger explains that all items with an attractive odor are to be segregated and hung out of reach of bears when not in use at camp. Our intent is to deny food rewards, as well as limit odors that may cause bears to investigate camps. Even if a bear is not rewarded with a meal by investigating "smellables", those items may cause him to damage packs or tents or get into other trouble. During the first hours of instruction in headquarters, the ranger conducts a "shake down" to ensure that only necessary and permitted items are carried on the trail. Toiletries such

as perfume or scented soap are not allowed. The ranger also introduces our concept of the campsite area where food odors are to be confined. Through time and usage this area of the campsite has come to be known as the "bearmuda triangle" (or the triangle).

Staff and visitors are instructed in how to respond to a bear encounter. Staff are instructed to use aversive conditioning to keep bears out of campsites. They are told to make it uncomfortable for a bear to be in a campsite, by forcefully yelling, throwing sticks, and chasing retreating bears. The staff also may be issued slingshots with steel balls or pepper spray. Management personnel may use rubber pellets in shotgun loads. Visitors, on the other hand, are instructed to stand up, stay together, make as much noise as possible, and maintain at least 15.2 m (50 ft) between the group and the bear. If the bear is not deterred, they are told to back away slowly and, if possible, seek assistance from staff.

Camping Techniques

Camping procedures are designed to limit investigation of camps by bears and eliminate opportunities for bears to obtain human foods. All who use the backcountry during the summer are expected and required to follow proper camping procedures.

The triangle is the campsite area where food odors are to be confined and is delineated by the locations of the campfire ring, the sump, and the suspended cable. The campfire ring is a metal ring set in the ground with cross members for pot support. Even if a campstove is substituted for a wood fire, all cooking is to be done in or immediately adjacent to the campfire ring. Visitors are encouraged to consume all prepared food at each meal so that no leftovers remain to be treated as garbage. Our meals are pre-packaged on the Ranch each spring, and consist of 2- or 4-person servings of freeze-dried, dehydrated, and stable foods.

The sump (Figure 1) is used to eliminate wastewater and serves as a leach field in a small septic system. After a meal, all pots and utensils are cleaned of food using scrapers and tissue, and the waste is stored as garbage. Beside bear safety, we are also concerned with food hygiene and safety, therefore all dishes are cleaned in wash water and rinsed in boiling water. The water used in this process is disposed of in the sump. The sump consists of a 3-m section of 10.2-cm (4-in) perforated plastic pipe joined by an elbow to a 0.6-m section. A short section of hard rubber 10.2-cm pipe is joined with clamps to the shorter section. An inverted reducer (which flares to 15.2 cm) banded with a metal screen is affixed to this rubber coupling. Use of this rubber coupling allows for easier repair when bears damage the screen end. The L-shaped sump is buried with the perforated length about 38 cm underground and the screened end about 30 cm above ground. Each group is given a "frisbee" drilled with multiple 0.3-cm holes. Wastewater is poured through the disc into the screened end of the sump. Food particles left in the disc are collected with tissue and stored as garbage.

Figure 1. Sump used in the backcountry of Philmont Scout Ranch, New Mexico. The longer perforated section is buried underground (right inset), allowing for disposal of wastewater filtered through a perforated "frisbee" held over the sump (left inset).

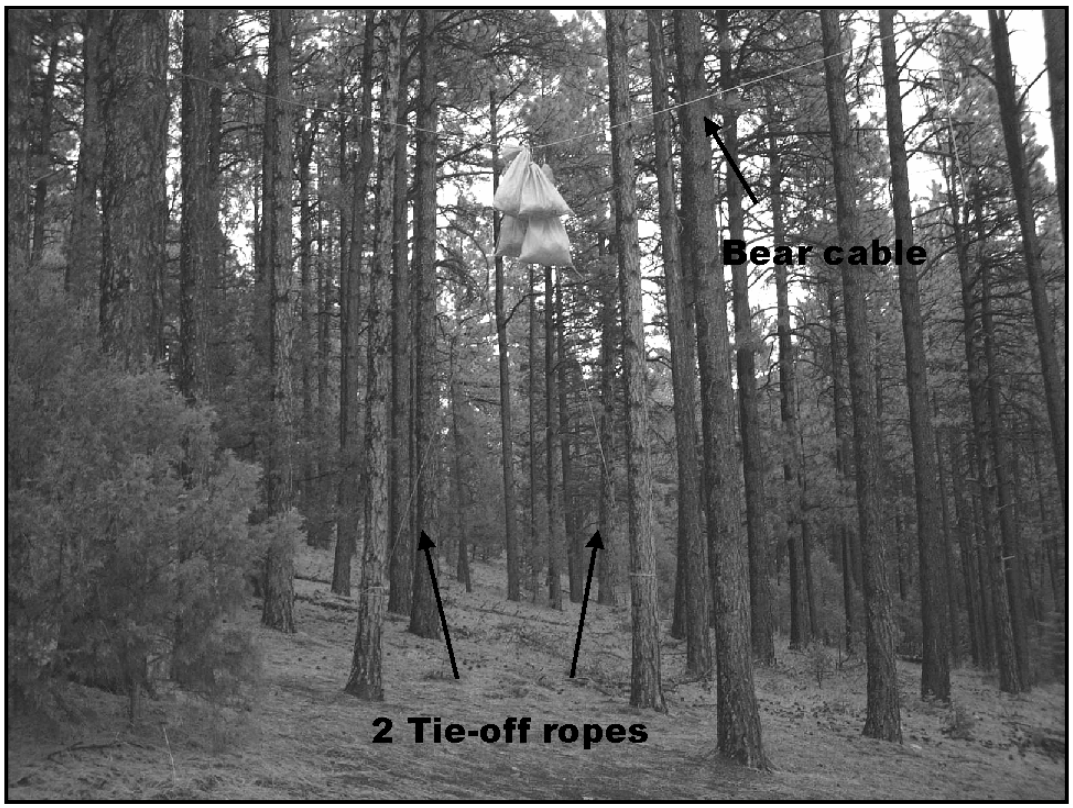

Figure 2. Storage of human-related foods and "smellables" in the backcountry, Philmont Scout Ranch, New Mexico. Bear bags are hung near the middle of a suspended cable clamped to trees with eyebolts, and secured with 2 tie-off ropes to ensure they will remain aloft, even if a bear disengages 1 rope.

The suspended cable (Figure 2) is designed to secure human-related foods from bears. The Ranch has used food hanging techniques since its beginning, however in the late 1980s we installed cables to better define the height and location in the campsite area where bear bags were to be hung. Steel cables are clamped to eyebolts screwed into a pair of trees 6-10 m apart, high enough to ensure the center of the cable is ≥4.6 m above ground. Each group is supplied with 3-4 lengths of rope and white plastic feedbags. The middle section of the rope is coiled and thrown over the bear cable while both ends are retained on the ground. The bag(s) are secured in the middle of the bear cable using a clove hitch or similar knot. Before hoisting the bags a small loop is tied into one of the ropes running from the bags. A shorter length of rope is threaded through this "oops loop" and is allowed to dangle temporarily to the ground when the bags are hoisted. The bags are hoisted to a height of 3.7 m and the 2 ends of the main rope are separated and tied to 2 different widely-spaced trees. With this system, should a bear ever chew through or disengage a rope, the other end tied to a separate tree will still hold the bag suspended. Since several bags may be hung on the same cable, there is little likelihood that a bear would destroy both ropes necessary to drop a particular bag. The dangling rope is used to hang forgotten or last-minute items (toothpaste or medicine) without lowering the entire apparatus and is also secured to a tree. When properly used, cables are a completely effective deterrent to bears. I have never seen a properly hung bear bag accessed by a bear.

Visitors are not allowed to pitch a tent within 15.2 m (50 ft) of the triangle. Of course, no food is allowed in tents. Each campsite accommodates 6-7 tents. We have observed that bears are more likely to investigate a tent that is isolated from others, therefore we encourage groups to pitch tents close together. We also try to take advantage of a black bear's natural inclination to remain in forest cover. Ideally, tents are in a tight group away from natural cover at least 15.2 m from the triangle. Tent placement relative to natural structures should provide room for a bear to readily escape if alarmed by a movement in one of the tents. A night-roaming bear may investigate the odors associated with camping. But if all procedures are followed correctly, it will only be attracted to the triangle, will not be rewarded in any way for its investigation, and will go on his way without contacting a human.

Figure 3. Bear-proof container used for storing garbage, food , or animal feed, Philmont Scout Ranch, New Mexico. The lid is secured by a spring-loaded peg that fits into a hole drilled into the edge of the lid and is released by pulling down the spring using the hook (inset).

Visitors are required to carry any garbage accumulated in the backcountry to staffed camps, where it is stored in bear-proof containers. The containers (occasionally used for fresh food or animal feed storage) are fabricated from 12-gauge sheet steel in the shape of a box (about 1-m^3) and are topped with reinforced sliding lids with handles (Figure 3). When closed, the lid is secured by a 2.5-cm diameter spring-loaded peg that fits into a hole drilled into the edge of the lid. This latch is released by pulling down the spring using a hook on the bottom and requires considerable strength. Staff are instructed to keep containers as clean as possible and to add moth balls to mask odors. All vehicles in the backcountry are required to haul bagged garbage back to headquarters, therefore containers are usually emptied every 1-2 days. At headquarters, all garbage is deposited in a bear-proof garbage compactor supplied by our refuse contractor. When properly latched, no container has ever been opened by a bear.

Reporting Procedures

In order to better manage bear-human interactions, we have developed a comprehensive system of bear reporting. All visitors are required to inform staff of any bear sighting occurring in the backcountry. If bears are seen on the trail, sightings are reported at the next staff camp. Backcountry staff complete a bear report form (Appendix A) for each bear sighting, based on their own observation or accounts of visitors. We ask visitors and staff to provide the best possible description of each bear, based on the physical characteristics described during orientation (coat color, size, and proportions). Written reports are sent to headquarters using an internal mail system. In addition, staff are required to radio headquarters immediately if a bear exhibits any nuisance behavior (below). Over six hundred bear sighting reports are collected yearly.

Wildlife census cards are another means of obtaining information on bear sighting. Upon arrival, each group is given a wildlife census card, which they carry on the trail. These census cards are by no means scientific, but rather are designed to encourage visitors to observe the environment and wildlife around them. Groups keep track of the numbers of deer (*Odocoileus* spp.), elk (*Cervus elaphus*), turkey (*Meleagris gallopavo*), bears and other animals they see. There are approximately 2000 groups on trails each summer. Over the past 10 years, 40% (range 27%-49%) of groups reported observing a bear.

Enforcement and Response

Each summer, we hire 2 people as bear researchers and they are responsible for education, enforcement and response to bear sighting incidents. Bear researchers and management personnel compile Ranch-wide bear sightings, learn of bear-caused damage, and track individual bear movements and behavior. Ultimately bear reports are used to identify nuisance bears or areas where proper procedures were not followed by staff or visitors. If a bear is beginning to develop a pattern of camp visits, management personnel will attempt to be more assertive in aversive conditioning. Likely, if these measures fail, the bear will be defined as a nuisance and further steps may be taken. Defining a bear as a nuisance is often highly subjective and relies on many factors such as age, sex, prior history, and human safety concerns. A bear will be classed as a nuisance if:

1. It repeatedly visits campsites and is difficult to run off.
2. It brazenly visits a camp during daylight or when many humans are present.
3. It contacts packs, tents, or buildings.
4. It obtains unsecured food or garbage.
5. It exhibits signs of aggression (jaw-popping or charging).
6. It physically contacts a human.

Nuisance bears are dealt with in cooperation with the New Mexico Department of Game and Fish (NMDGF). When a bear is identified as a nuisance, we attempt to capture it using a culvert trap, unless it is a female with cub(s) of the year. Occasionally, staff may tree a bear until personnel arrive to immobilize it with drugs. The NMDGF follows the "3 strikes" policy, whereby an individual nuisance bear is trapped and translocated twice, but euthanized on the third violation. If a bear contacts a human or appears highly aggressive and dangerous, it may be killed immediately. In the event of a bear-caused human injury, a thorough investigation is conducted to determine if procedures need to be further refined. In 2002, we handled 9 bears. For the last ten years we have handled from 0-26 bears/year with an average of 6.

Bear researchers and management personnel also investigate locations of nuisance activity to determine if campsites are clean. When flagrant mistakes are made the group is counseled by the Ranch personnel or a NMDGF officer. In the rare case that a group shows no intention of following proper procedures, we deny earned recognition or remove them from the trail. We also may require a wildlife conservation project in their home area before they are permitted another trip to the Ranch.

CONCLUSION

Managing bears and humans in a diverse and remote landscape presents unique challenges, but also provides opportunities for education. Especially when populations of bears are relatively high and human use is extensive. Bear behavior has been extensively studied, but every combination of environmental factors and human contact or response is unique. A bear's response to our management techniques may be anticipated but is far from predictable.

The human factor may be even more unpredictable. Our visitors are from all backgrounds, geographic areas, and levels of camping skills. After a strenuous hike at high elevation, a group may not be inclined to secure the area against bears. However, human-bear conflicts are minimized at the Ranch, because we are successful at imparting to our visitors the importance of proper food and garbage handling. Our opportunities are great to instill proper camping ethics and an awareness of bear-human interactions. Because of the possibility of injuries, we teach that our bear procedures are a serious matter and we expect compliance.

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Appendix A. Bear report form used for documenting all observation of black bears by staff and visitors , Philmont Scout Ranch, New Mexico.

BEAR REPORT

Camp:_____ Date:_____

1) Location of sighting or incident (be as specific as possible (i.e., campsite number):_____

_____

2) Sighted by (name):_____ Report taken by (name):_____

3) Time of sighting:_____

4) Date of sighting:_____

5) Color of bear:_____

6) Size of bear:_____

7) Markings:_____

8) a. Did you notice an ear-tag? Yes No If so, what color was the tag? White Orange

b. Did you notice a radio-collar? Yes No

9) Was it a sow with cubs? Yes No

10) Did the bear: (check as many as possible) Comments:

_____ A. Show signs of aggression _____

_____ B. Show no sign of fear _____

_____ C. Get something to eat – trail food or gargage _____

_____ D. Tear up packs, tents, or equipment _____

_____ E. Touch or injure someone (10-80) _____

_____ F. Attempt to get a bear bag _____

_____ G. Attempt to open a garbage container _____

_____ H. Wander through camp _____

_____ I. Cross the trail at a distance _____

_____ J. Scavenge through fire ring, cooking area, or sump _____

_____ K. Other_____

CAMP DIRECTORS: Report by radio if Yes to 8 or 9, or if A through E is checked!

CAN A BEAR-PROOF SYSTEM BE COST-EFFECTIVE? BEAR-PROOFING RESIDENTIAL WASTE COLLECTION IN CANMORE, ALBERTA

DENNIS NEUFELDT, Haul-All Equipment, 4115 18th Avenue North, Lethbridge, AB T1H 5G1, Canada, dennis@haulall.com

Located in the Rocky Mountains west of Calgary, Alberta, and east of Banff National Park, the town of Canmore has experienced steady population growth over recent years. As the town grew into the surrounding wilderness, there came a problem with managing the residential curbside waste collection program to limit wildlife, particularly bear (*Ursus* spp.), access to waste. One solution was a by-law which prohibited setting garbage out before 0500 hrs. This law did not address the fact that a portion of Canmore's population consists of non-permanent residents who may not be in the town on collection day. The town realized further problems when by-law officers began issuing residents' citations for non-compliance at 0300 hrs! In 1996, after tendering a proposal for collection, the municipality made the decision to convert to a semi-automated container system which was not only bear-proof, but was also more cost-effective than the curbside collection system the town was using. In spite of the savings to be generated, town residents had concerns about the new system:

1. It was a new and different solution to the waste collection problem;
2. Not in my back year (NIMBY) – even if they supported the concept, people did not want the containers close to their homes;
3. Space constraints – containers needed to be set up in all areas of the town, including single-family and multi-family dwellings.

Through an open and public process, the Waste Management Committee was able to alleviate concerns of the Canmore citizens. The process was made easier by the proposals that containers would be conveniently located throughout the town (allowing accessibility at all times), and a modular design would enable aesthetic placement (so as to not distract from the natural beauty of the town). The committee also promoted the benefits of semi-automated collection, which eliminated workers having to lift heavy containers. In consideration of residents' concerns, it was decided to proceed with a gradual implementation. The first containers were introduced in 1997, and the entire community had access to the new system by May 1999. The system is now used for both residential and industrial waste. In addition to achieving the primary goal of eliminating bear-waste incidents, the system has also proven to be flexible, aesthetic, accessible, and cost-effective by providing the lowest total cost of ownership.

Key words: Alberta, bear, bear-proof containers, Canmore, food, *Ursus*, waste management

"WE CAN LIVE WITH BEARS": A BEAR EDUCATION PROGRAM FOR NORTHERN UTAH

BARBARA WALKER, U.S. Department of Agriculture Forest Service, Kamas Ranger District, P.O. Box 68, Kamas, UT 84036, USA
JORDAN C. PEDERSON, U.S.Department of Agriculture Forest Service, Kamas Ranger District, P.O. Box 68, Kamas, UT 84036, USA, jcped@allwest.net

In recent years, frequent interactions between black bears (*Ursus americanus*) and campers occurred on the Kamas Ranger District (KRD) of the Wasatch-Cache National Forest. The KRD is approximately 100 km from 3 of northern Utah's largest cities (Salt Lake City, Ogden, and Provo) and receives >600,000 users per year. From 1987 to 2000, 15 incidents of bear-human conflict were documented, including 7 incidents in developed campgrounds and 6 incidents in backcountry or residential areas near campgrounds. All incidents were the result of careless handling of food or garbage. The most serious incident occurred in 1995, when a camper was hospitalized after being bitten by a subadult male bear at the Pine Valley-Lower Provo Campground. Utah Division of Wildlife Resources (UDWR) personnel responded to these incidents by translocating 7 bears and killing 4 bears. In 2000, the Shingle Creek Campground was closed for 2 weeks while UDWR personnel attempted to capture several nuisance bears. This closure resulted in revenue loss for the private campground contractor (American Land and Leisure Company [ALLC]) and those employed as campground hosts. It also impacted hundreds of potential campers, drawing public criticism of U. S. Forest Service (USFS) and UDWR.

In 2001, the "We can live with bears" education program was initiated to reduce human-bear conflicts and bear mortality. This program was a cooperative effort funded and managed by the USFS, UDWR, ALLC, and concerned volunteers. The goal of the program was to educate campground hosts, campground users, and local residents on proper storage of food and garbage, use of the bear-proof dumpsters, and other elements of eliminating human-bear conflict. The program used volunteers and USFS personnel to make one-on-one contact with as many campers as possible. Volunteers visited campgrounds 2–3 times per week during the entire season of use (May–September). Efforts were concentrated in 2 areas: the lower Mirror Lake Highway (5 campgrounds with 110 developed units) and the Upper Weber River drainage (2 campgrounds with 107 developed units and 4 group sites capable of accommodating 370 people). Contacts were made at breakfast or suppertime, when most visitors were in camp. A reminder card was also left at each campsite. Follow-up visits were made when to campsites with repeated or major problems. A slide show with visual aids was also developed and presented at local schools, youth camps, and campground amphitheaters.

During 2001-2002, volunteers made 86 visits to campgrounds and spent 360 hours educating >18,000 campers. Forty-two slide shows were presented to 2,432 people. During the 2 years of the program, only 1 bear incident was reported in campgrounds. A bear entered a dumpster when the lock was not properly engaged. Following this incident the campground host began checking and locking dumpsters each night and no further problems were reported. On lands adjacent to the bear education program area, 4 interactions occurred and 3 bears were killed by UDWR officers.

We realize the magnitude of our bear problem does not compare to that found in other recreation areas, but this is an attempt to prevent human-bear interactions that often result in negative circumstances for one or both. We feel the use of non-agency volunteers gets the message to campers by a person-to-person contact. This is a non-government employee talking to recreationalists and delivering a friendly non-threatening informative message on ways to prevent problems with black bears. Our bear education program has proved successful in curbing undesired human-bear interactions.

Key words: black bear, campgrounds, education, food storage, human-bear conflict, *Ursus americanus*, Utah

HUMAN-BLACK BEAR INTERACTIONS IN YOSEMITE NATIONAL PARK: A VISITOR STUDY

BRENDA K. LACKEY, University of Idaho, College of Natural Resources, Moscow, ID 83844, USA, bklackey@hotmail.com
SAM H. HAM, University of Idaho, College of Natural Resources, Moscow, ID 83844, USA

A 3-year study examined how Yosemite National Park addresses the continuing problem of human-black bear (*Ursus americanus*) interactions with its interpretation and communication efforts, and the extent to which these efforts are guided by contemporary communication theory. This paper summarizes the results and findings from research efforts conducted in 2002 (the final year of the study). It also provides a series of recommendations for strengthening the current interpretive communication program, with the ultimate goal of improving the human-black bear management program and reducing the number of problem bear incidents in Yosemite.

The research conducted in 2002 used 2 field experiments to test bear-related messages and to increase understanding of visitors' perception of risk associated with human-black bear interactions. Testing the effects of different messages included on-site observations to assess attention-paying behavior, and interviews that were conducted to examine visitor perceptions, preferences, and attitudes about attention paying to bear-related messages. Visitor surveys were used to describe visitor characteristics, risk perception, knowledge, and behavioral intention in order to better understand which beliefs might best be targeted in future interpretive communication messages. Five message treatments were designed to assess attention-paying behavior in 3 different types of areas in Yosemite Valley. As a complement to our evaluation of test messages, interviews were conducted to assess visitors' perceptions, preferences, and attitudes about paying attention to different types of bear-related messages. Additionally, 2 messages were designed to manipulate perceived risk and to sharpen our understanding of its relationship to visitors' familiarity with the park and the topic of bears, knowledge transfer, and the vividness of written communication devices.

A comprehensive look at our findings for the entire 3-year study would suggest the following: Yosemite Valley is aggressively delivering information to park visitors about the human-bear problem in the park. Generally, park visitors are receiving the information that Yosemite is providing about bear safety, and they are highly familiar with the problems and how to prevent incidents from occurring. Visitors have a positive attitude towards the bears in the park and want them to be protected. For the small percentage of non-compliers, modifying the current communication system probably will not produce significant change in behavior. First-time visitors tend to be seeking information about bears, while the majority of overnight visitors, who have been coming to the park for years, generally are not seeking this information. These repeat visitors admit to needing reminders, and admit that they get lazy. Personal contacts by park staff (such as campground patrol rangers, roving interpreters, and those conducting evening programs) need to be maintained to provide timely on-site reminders temporally close to visitors' opportunities to perform the desired behavior.

Key words: black bear, communication, human-bear interactions, public attitudes, safety, *Ursus americanus*, Yosemite National Park

FOOD HABITS OF BLACK BEARS IN YOSEMITE VALLEY, YOSEMITE NATIONAL PARK, 2001-2002

SCHUYLER GREENLEAF, College of Natural Resources, University of Idaho, Moscow, ID 83844, USA, schuylergreenleaf@hotmail.com
SEAN MATTHEWS, Wildlife Conservation Society – Hornocker Wildlife Institute, P.O. Box 83, Yosemite, CA 95389, USA
JOHN BEECHAM, Wildlife Conservation Society – Hornocker Wildlife Institute, 2023 Stadium Drive, Suite 1A, Bozeman, MT 59715, USA
GERALD WRIGHT, University of Idaho, Moscow, ID 83844, USA

We investigated the food habits of black bears (*Ursus americanus*) in the Yosemite Valley (YV) portion of Yosemite National Park (YNP). The diet of black bears in YV is of interest to managers because human food and garbage serve as the main factors influencing habituation of bears to park visitors. Results of this study were compared to those of Graber and White (1983) to assess the effectiveness of the YNP bear management program in reducing the amount of food and garbage available to bears in YV. A total of five hundred scat samples were collected July 2001–November 2002 from representative areas throughout YV. Samples for which age could be determined within a 2-week period were used to assess seasonality of food habits. Samples for which age could not be determined were used in an overall compositional analysis. Both percent volume and percent frequency of occurrence were determined for major forage class items by season and year. We found a sharp seasonality in black bear diets from grasses and forbs in early spring to soft mast in mid-June. Soft mast is replaced by hard mast in mid-autumn when acorns become available. Soft mast was the most predominant forage class consumed, and 2 non-native species, Himalayan blackberry (*Rubus himalaya*) and apple (*Malus* spp.), comprised a large proportion of bears' diets from June to November. Removal of these species by YNP will most certainly affect bears' foraging behavior as they search for alternative food sources, either by reducing the number of bears attracted to YV or by encouraging bears to more persistently seek out human food items. Preliminary analysis indicates that the amounts of human food and garbage in bear scat has decreased in the past 20 years. This serves as a positive metric of YNP's efforts to reduce the amount of human food and garbage available to bears since Graber's food habits analysis of bears in YNP in the 1970s.

Key words: black bear, food, garbage, scat analysis, *Ursus americanus*, Yosemite National Park

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PRESERVATION OF A HEALTHY BLACK BEAR POPULATION IN THE SIERRA NEVADA MOUNTAIN RANGE THROUGH INTERAGENCY COOPERATION

RACHEL MAZUR, Sequoia and Kings Canyon National Parks, 47050 Generals Highway, Three Rivers, CA 93271, USA, Rachel_Mazur@nps.gov
CALDER REID, Inyo National Forest, 873 North Main Street, Bishop, CA 93514, USA
TORI SEHER, Yosemite National Park, P.O. Box 577, Yosemite, CA 95389, USA

Black bears (*Ursus americanus*) and the resulting bear-human conflicts are both expanding in range and severity in California. In order to cooperate on bear management strategies, bear management, recreation, and wilderness personnel from Inyo National Forest, Sequoia and Kings Canyon National Parks, and Yosemite National Park, created the Sierra Interagency Black Bear Group (SIBBG) in 2001. The goal of the SIBBG is "to share information, techniques, and ideas; to coordinate policies and information; and to eliminate political barriers to progress – all with the ultimate goal of preserving a healthy black bear population free of human influences on a regional scale." In order to meet this goal, the SIBBG provides the framework to create rules, restrictions, and policies that make sense on a regional scale through an ongoing consultation process among all members that requires consensus before new policies are adopted or old policies are changed that will affect the others. Members are also working to improve visitor information through the creation of an interagency web page (www.sierrawildbear.gov) and coordinated handouts, and to share training opportunities. The final and most intensive coordinated activity is the adoption of uniform testing standards and protocols to approve backcountry, bear-resistant food storage containers. In the 2 years since the formation of the SIBBG, all participating agencies have had significantly reduced numbers of human-bear incidents and greater public understanding and support. Two additional forests, Stanislaus National Forest and Sierra National Forest, are expected to join SIBBG within the next year.

Key words: black bear, California, education, food storage, human-bear incidents, policy, *Ursus americanus*

LANDSCAPE ANALYSIS OF BLACK BEAR DISTRIBUTION PATTERNS IN OLYMPIC NATIONAL PARK

K. A. SAGER, University of Idaho, Department of Fish and Wildlife Resources, Moscow, ID 83844, USA, kimberlysager@yahoo.com
K. J. JENKINS, U. S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Olympic Field Station, 600 E. Park Avenue, Port Angeles, WA 98362, USA
P. J. HAPPE, Olympic National Park, 600 E. Park Avenue, Port Angeles, WA 98362, USA
J. J. BEECHAM, Wildlife Conservation Society – Hornocker Wildlife Institute, 2023 Stadium Drive, Suite 1A, Bozeman, MT 59715, USA
R. G. WRIGHT, U. S. Geological Survey, Idaho Cooperative Fish and Wildlife Research Unit, University of Idaho, Moscow, ID 83844, USA

For approximately 90 years, 2 hydroelectric dams have blocked the annual return of anadromous fish to over 70 miles of the Elwha River in Washington's Olympic National Park (ONP). The Department of Interior now proposes to remove both dams to fully restore the Elwha River ecosystem and native anadromous fisheries as authorized by the Elwha River Ecosystem and Fisheries Restoration Act of 1992. Removal of these dams, which could begin as early as 2007, presents an unprecedented opportunity to study influences of restoring anadromous fish to one of ONP's premier riverine ecosystems. We are utilizing Global Positioning System (GPS) technology to describe broad-scale patterns in seasonal distribution and movements of black bears (*Ursus americanus*) in ONP prior to dam removal. Upon completion, the study will provide baseline information, by which to assess the long-term ecological effects of salmon (*Oncorhynchus* spp.) restoration on ONP bear populations and distribution. The study will also help ONP wildlife managers reduce seasonal bear-human conflicts in the Elwha backcountry and will set the stage for establishment of a long-term black bear monitoring program. The goal of this study is to describe landscape-scale patterns of black-bear distribution in ONP, evaluate GPS fix-acquisition bias in a temperate forest environment, and lay the groundwork for development of population-monitoring strategies. In 2002, we instrumented 6 black bears with GPS radio-collars. The collars are capable of remote data downloads and, as such, have transmitted the first season of bear location data. We have also begun to evaluate GPS radio-collar fix acquisition bias by placing test collars at several field locations and measuring the topographic and vegetative characteristics surrounding those collars. We present the first season of black bear home range data, as well as preliminary results on GPS radio-collar performance in the temperate forest environment of ONP.

Key words: black bear, dams, GPS, *Oncorhynchus*, salmon, *Ursus americanus*

LIST OF PARTICIPANTS

Greg Anderson
Wyoming Game and Fish Department
260 Buena Vista
Lander, WY 82520, USA
307-332-2688

NeilAnderson
Montana Department of Fish, Wildlife, and Parks
P.O. Box 173220
Bozeman, MT 59717, USA
406-994-6358
neila@montana.edu

Jerry Apker
Colorado Division of Wildlife,
0722 South Road 1 East
Monte Vista, CO 81144, USA
719-587-6922
jerry.apker@state.co.us

Keith Aune,
Montana Department of Fish, Wildlife, and Parks,
1400 S. 19th Avenue
Bozeman,MT 59718, USA
406-994-6341
Kaune@montana.edu

Rich Beausoliel
Washington Department of Fish and Wildlife
2126 Inglewood Drive
East Wenatchee,WA 98802, USA
509-679-3858
beausrab@dfw.wa.gov

Jon Beckmann
Wildlife Conservation Society
528 Marian Street
Rigby, ID 83442, USA
208-390-5383
jbeckmann@wcs.org

Dan Bjornlie
Wyoming Game and Fish Department
260 Buena Vista
Lander, WY 82520, USA
307-332-2688
dan.bjornlie@wgf.state.wy.us

Hal Black
Brigham Young University
167 WIDB
Provo, UT 84602, USA
801-422-4553
hal_black@byu.edu

Tonya Chilton
Montana Department of Fish, Wildlife, and Parks
2504 Wylie
Missoula, MT 59802, USA
406-370-2213
tonchilton@aol.com

Bruce Christensen
McClintock Metal
455 Harter Avenue
Woodland, CA 95776, USA
530-666-6007
bc@mcclintockmetal.com

Dean Cluff
Government of Northwest Territories
P.O. Box 2668
Yellowknife, NT, Canada
867-873-7783
dean_cluff@gov.nt.ca

Tyler Coleman,
Wildlife Conservation Society
2023 Stadium Drive, Suite 1A
Bozeman, MT 59715, USA
406-522-9333

Cecily Costello
Wildlife Conservation Society
2024 Stadium Drive, Suite 1A
Bozeman, MT 59715, USA
406-522-9333
ccostello@wcs.org

Lance Craighead
CERI
201 S. Wallace Avenue
Bozeman, MT 59715, USA
406-585-8705
lance@grizzlybear.org

Brian DeBolt
Wyoming Game and Fish Department
260 Buena Vista
Lander, WY 82520, USA
307-332-7723
Brian.Debolt@wgf.state.wy.us

Chad Dickenson
Interagency Grizzly Bear Study Team
1648 S. 7th Avenue
Bozeman, MT 59718, USA
406-994-5041
chad_dickinson@usgs.gov

Susan Dieterich
Frisco Creek Wildlife Hospital and Rehabilitiation Center
P.O. Box 488
Del Norte,CO 81132, USA
719-850-1020

Bev Dixon
USFS Gallatin National Forest
3710 Fallon, Suite C
Bozeman, MT 59718, USA
406-522-2541
bdixon@fs.fed.us

Bob Facklam
Teton Welding
Box 976
Choteau, MT 59422, USA
406-466-2124
tetonwelding@montana.com

Kevin Frey
Montana Department of Fish, Wildlife, and Parks
1400 S. 19th Avenue
Bozeman, MT 59718, USA
406-994-3553
kfrey@montana.edu

Tim Fuchs
Wyoming Game and Fish Department
1213 Johnson
Thermopolis, WY 82443, USA
307-864-3834
tfuchs@trib.com

Rob Gau
Wildlife & Fisheries, Northwest Territories
600, 5102 50th Avenue
Yellowknife, NT X1A 3S8. Canada
867-920-6316
rob_gau@gov.nt.ca

Hedi Gray
Matson's Lab
PO Box 308
Milltown, MT 59851, USA
406-258-6286
gjmatson@montana.com

Schuyler Greenleaf
University of Idaho
626 S. Harrison #1
Moscow, ID 83843, USA
208-883-4717
schuylergreenleaf@hotmail.com

Kerry Gunther
Yellowstone National Park
P.O. Box 424
Yellowstone National Park, WY 82190, USA
307-344-2162
kerry_gunther@nps.gov

Billie Gutgsell
Sierra Club
340 S. 42 Street
Boulder, CO 80305, USA
303-494-6672
bgutgsell@qwest.net

Mark Haroldson
U.S.G.S. Interagency Grizzly Bear Study Team
1648 S. 7th Avenue
Bozeman, MT 59718, USA
406-994-5042
mark_haroldson@usgs.gov

Jim Hayden
Idaho Department of Fish and Game
2750 West Kathleen Avenue
Coeur d'Alene, ID 83835, USA
208-769-1414
jhayden@idfg.state.id.us

John Hechtel SIBCS
Box 4399
Palmer, AK 99645, USA
907-746-6331
john_hechtel@fishgame.state.ak.us

Josh Heward
Brigham Young University
167 WIDB
Provo, UT 84602, USA
801-422-2991
jh328@email.byu.edu

Josh Holloway
2046 Beth
Pocotello, ID 83201, USA
208-234-2566
josh_j_holloway@yahoo.com

Michael Hooker
Wyoming Game and Fish Department
260 Buena Vista
Lander, WY 82520, USA
307-332-2688

Bob Inman
Wildlife Conservation Society
4 Trail Creek
Ennis, MT 59729, USA
406-682-3437
binman@wcs.org

Kris Inman
Wildlife Conservation Society
4 Trail Creek
Ennis, MT 59729, USA
406-682-3437
kinman@wcs.org

Akiko Kameyama
Montana State University
412 W. Hayes Street, Apt. A
Bozeman, MT 59715, USA
406-587-5676
kimunkamiu@aol.com

Brenda Lackey
University of Idaho
1123 South Harrison #4
Moscow, ID 83843, USA
208-882-0948
bklackey@hotmail.com

Jerry Longobardi
Wyoming Game and Fish Department
PO Box 97
Meeteese, WY 82433, USA
307-868-2212
jlongo@tctwest.net

Rick Mace
Montana Department of Fish, Wildlife, and Parks
490 North Meridian Road
Kalispell, MT 59901, USA
406-755-8709
rmace@state.mt.us

Amy Macleod
University of Montana, Science Center
West Glacier, MT 59936, USA
406-888-7988
amacleod@usgs.gov

Michael Madel
Montana Department of Fish, Wildlife, and Parks
Route 2, Box 224
Choteau, MT 59422, USA
406-466-5100
fwpbearm@3rivers.net

Sean Matthews
Wildlife Conservation Society
PO Box 83
Yosemite, CA 95389, USA
209-372-0344
smatthews@wcs.org

Rachel Mazur
Sequoia-Kings Canyon National Parks
47050 Generals Highway
Three Rivers, CA 93271, USA
559-565-3124
Rachel_Mazur@nps.gov

Karin McCoy
University of Montana
1650 Hole in the Wall Road
Bonner, MT 59823, USA
406-244-0982
karinmccoy@hotmail.com

Kathy McFarland
Grand Teton National Park
Drawer 170
Moose, WY 83012, USA
307-739-3484
Katherine_McFarland@nps.gov

Craig McLaughlin
Utah Division of Wildlife Resources
1594 W. North Temple
Salt Lake City, UT 84114, USA
801-538-4758
craigmclaughlin@utah.gov

Sterling Miller
National Wildlife Federation
240 N. Higgins, Suite #2
Missoula, MT, 59802, USA
406-721-6705
millers@nwf.org

John Murnane
Wildlife and Equine Services
PO Box 1428
Choteau, MT 59422, USA
406-899-6068
john_murnane@merck.com

Steve Nadeau
Idaho Department of Fish and Game
600 S. Walnut, Box 25
Boise, ID 83707, USA
208-334-2920
snadeau@idfg.state.id.us

Dennis Neufeldt
Haul-All Equipment
4115 18th Avenue North
Lethbridge, AB T1H 5G1, Canada
403-328-7788
dennis@haulall.com

Gary Olson
Montana Department of Fish, Wildlife, and Parks
1008 Sunset
Conrad, MT 59425, USA
406-271-7033
grolson@3rivers.net

Jordan Pederson
U.S.F.S Wasatch-Cache National Forest
PO Box 968
Kamas, UT 84036, USA
435-783-2429
jcped@allwest.net

Howard Quigley
Beringia South
3610 Broadwater Street, #111
Bozeman, MT 59718, USA
406-556-2199
hquigley@att.net

Jon Rachael
Idaho Department of Fish and Game
3101 S. Powerline Road
Nampa, ID 83686, USA
208-465-8465
jrachael@idfg.state.id.us

Bob Ricklefs
Philmont Scout Ranch
Rural Route , Box 35
Cimarron, NM 87714, USA
505-376-2281

Kimberly Sager
University of Idaho
243 Lathen Street
Moscow, ID 83843, USA
208-882-9020
kimberlysager@yahoo.com

Paul Schullery
Yellowstone National Park
P.O. Box 168
Yellowstone National Park, WY 82190, USA
307-344-2220

Chuck Schwartz
U.S.G.S. Interagency Grizzly Bear Study Team
1648 S. 7th Avenue
Bozeman, MT 59718, USA
406-994-5043
chuck_schwartz@usgs.gov

Tori Seher
Yosemite National Park
PO Box 577
Yosemite, CA 95389, USA
209-372-0476
victoria_seher@nps.gov

Clair Simmons
Montana Department of Fish, Wildlife, and Parks
P.O. Box 303
Big Timber, MT 59011, USA
406-932-4813
csimmons@mcn.net

Rob Sinclair
IFAW
404 Sumach Street
Toronto, ON, Canada
416-964-3850

Charles Smid
Bear Trust International
PO Box 4006
Missoula, MT 59806, USA
406-523-7779
acsmid@aol.com

Jeff Stetz
University of Montana, Science Center
West Glacier, MT 59936, USA
406-888-7988
jstetz@usgs.gov

Shawn Stewart
Montana Department of Fish, Wildlife, and Parks
P.O. Box 581
Red Lodge, MT 59068, USA
406-446-4150
sstewart@twoalpha.net

Stan Tomkiewicz
Telonics, Inc.
932 E. Impala Avenue
Mesa, AZ 85204, USA
480-892-4444
stan@telonics.com

Erik Wenum
Montana Department of Fish, Wildlife, and Parks
895 Capistrano NW
Kalispell, MT 59901, USA
406-756-1776
FWP-Wenum@centurytel.net

Gary White
Colorado State University
1474 Campus Delivery
Fort Collins, CO 80535, USA
970-491-6678
gwhite@cnr.colostate.edu

Jim Wilder
National Park Service
2525 Gambell Street, Room 207
Anchorage, AK 99503, USA
jimwilder@hotmail.com

Rick Winslow
New Mexico Department of Game and Fish
P.O. Box 25112
Santa Fe, NM 87504, USA
505-846-8046
rwinslow@state.nm.us

Gary Wolfe
Bear Trust International
4722 Aspen Drive
Missoula, MT 59802-5219, USA
406-549-6320
gwolfe@micro-mania.net

Goerg Ziegltrum
Washington Forest Protection Association
724 Colubia Street NW, Suite 250
Olympia, WA 98501, USA
360-705-9290
gziegltrum@wfpa.org

ORGANIZATION AND FUNCTION OF THE WESTERN BLACK BEAR WORKSHOP

BYLAWS

Designation:

- This organization shall be known as the "Western Black Bear Workshop" hereafter referred to as the Workshop. The official publication of the Workshop shall be known as the *Proceedings of the Western Black Bear Workshop* hereafter referred to as Proceedings.

Goal:

- The goal of the Workshop is to provide information relative to and encourage the perpetuation of bear populations as an ecological, aesthetic, and recreational natural resource in western North America consistent with other proper land uses for public and private lands.

Objectives:

- To provide an opportunity for all persons interested in bears to meet and discuss current research and management of bears and their habitats.
- To provide a vehicle for disseminating research and management findings to various agencies and organizations concerned with bear management.
- To promote research for development of new information on all aspects of bear ecology, life history, and management in western North America.
- To identify particular problems associated with bear management and to formulate recommendations and resolutions to the appropriate agency or organization, including the Western Association of Fish and Wildlife agencies.
- To promote cooperation among all agencies and organizations concerned with bear management and research, particularly among the various provincial, state, and federal agencies with primary responsibilities of managing bears and their habitats.

Organiztion:

- The Workshop will be open to any person interested in bears and their management.

Voting:

- Voting members shall consist of one representative from each of the following:
  - Western states, provinces, and countries where bears are present including: Alaska, Alberta, Arizona, British Columbia, California, Colorado, Idaho, Mexico, Montana, Nevada, New Mexico, North Dakota, Northwest Territories, Oklahoma, Oregon, Texas, Utah, Washington, Wyoming, and Yukon.
  - Federal agencies: U.S. Bureau of Land Management, Canadian Wildlife Services, U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. National Park Service, U.S. Natural Resources Conservation Service, Parks Canada, and the Direccion General de Fauna Silvestre.
  - Universities, Colleges, and Research Institutions: the chair may appoint up to three people to represent colleges universities, and research institutions. Appointee shall come from any college, university, or research institution actively conducting bear research.
- Voting representatives for all states, provinces, countries, or organization shall be appointed by the agency directly responsible for wildlife management within the above names states provinces, and countries.
- The chair shall request that each of the above named federal agencies appoint one voting member. This request shall be directed to one of the regional offices or service centers in the western U.S., Canada, and Mexico.
- Voting shall be accomplished only by those authorized representatives in attendance at the business meeting of the Workshop.

The Workshop will be scheduled triennially:

- The new host state, province, country, or organization shall be selected and announced at the business meeting of the Workshop. It is the intent of the Workshop that the host state, province, country, or

organization will be volunteered on a rotating basis among the actively participating member states, provinces, countries, and organizations.

- The host state, province, country, or organization shall select the time and place of the meeting. The host shall appoint one of its representatives who will act as chair. Responsibilities of the chair shall be:
  - To serve as chair for the three-year period following his/her appointment.
  - To call for papers and prepare an agenda for the Workshop and assemble and distribute any recommendations or resolutions passed at the Workshop.
  - To prepare and distribute the Proceedings of the Workshop for which he/she has been responsible.
  - To organize and conduct meeting and business of the Workshop.
  - To appoint committees as necessary.
  - To maintain the goals and objectives of the Workshop.
  - To prepare and make a formal report to the Western Association of Fish and Wildlife Agencies (WAFWA).

The mailing list of the Workshop shall be:

- The Western Association of Fish and Wildlife Agencies.
- The Director and Game or Wildlife Chief of every member state, province, and country.
- All biologists known to be conducting bear research.
- All Bureau of Land Management State Offices and Regional Service Centers in the western U.S.
- All Regional Forest Service Offices in the western U.S.
- All Fish and Wildlife Service Regional Offices in the western U.S.
- All Cooperative Wildlife Research Units in the western U.S.
- All persons attending the last Workshop.
- Any person requesting a copy of the Proceedings.

The chair shall forward the mailing list and other pertinent material to the new Workshop chair upon completion of his/her responsibilities as chair of the current Workshop

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