11th Western Black Bear Workshop

Coeur d' Alene, Idaho
May 21-24, 2012

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Meeting Locations

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Workshops – Bay 1A and Bay 2

All Paper Presentations – Bay 2

Social – First Floor Hospitality Suite and 7th Floor, Boardroom #5

Banquet Cruise Wednesday – On the Lake

General Program: At a Glance

Coeur d' Alene, Idaho
May 21-24, 2012

Monday, May 21st
Registration, Conference Center Lobby (14:00 – 19:00)
State/Provinces Meeting Bay 1A(16:00)
Informal Social 1st Floor Hospitality Rooms (18:30)

Tuesday, May 22nd
Registration (starts at 7:00 AM)
Breakfast on Your Own
Workshop Presentations
Lunch on your own
Paper Presentations
Bear Spray Demonstration
Social/Poster Session 7th Floor Boardroom #5

Wednesday, May 23rd
Breakfast on Your Own
Workshop Presentations
Lunch on your own
Paper Presentations
Evening Banquet Cruise

Thursday, May 24th
Breakfast on Your Own
Workshop Presentation
Paper Presentations
Closing Remarks

Program
Monday, May 21st

14:00	Registration in Workshop Lobby
16:00	Western Agencies State/Provincial/Tribal Bear Status Report
18:30	Informal Social in the 1st Floor Hospitality Suite

State/Province Members

Alberta	Nathan Webb
Arizona	Ron Day
California	Marc Kenyon
Colorado	Jerry Apker
Idaho	Craig White
Montana	Jim Williams
Nevada	Carl Lackey
New Mexico	Rick Winslow
Oklahoma	Jeff Ford
Oregon	Dave Immell
Utah	John Shivik
Washington	Rich Beausoleil
Wyoming	Dan Bjornlie

Program Tuesday, May 22nd

8:00 **Opening remarks**—Craig White, *Large Carnivore and Furbearer Biologist, Idaho Department of Fish and Game*

8:15 **Welcome to Idaho**—Jim Unsworth, *Deputy Director, Idaho Department of Fish and Game*

8:25 **Keynote Presentation**: Bear management-- What do we need to know? – Rick Mace, *Montana Fish, Wildlife, and Parks*

Population Monitoring and Estimation Session

C**hair: Barb Moore,** *Idaho Department of Fish and Game*

9:05 Black bear density in Glacier National Park, Montana—Jeff Stetz, *Montana Cooperative Wildlife Research Unit*

9:25 Study design and sampling intensity for demographic analyses of bear populations — Rich Harris, *Department of Ecosystem and Conservation Sciences, University of Montana*

9:45 Introduction to Spatially Explicit Capture-Recapture – Murray Efford, *University of Otago, New Zealand*

10:05–10:35 Break

Workshop Sessions

10:35 **Integrated Models:** Fitting integrated population models to black bear data. – Paul Conn, *National Marine Fisheries Service*

10:35 **Genetics Workshop:** A genetics primer and overview of the use of genetic information in wildlife population analysis – Dan Bingham, *Rocky Mountain Research Station*

12:05–13:30 Lunch, on your own

Program Tuesday, May 22nd Cont.

13:30 **Integrated Models:** Fitting integrated population models to black bear data – Paul Conn, *National Marine Fisheries Service*

13:30 **Genetics Workshop:** A genetics primer and overview of the use of genetic information in wildlife population analysis – Dan Bingham , *Rocky Mountain Research Station*

15:00-15:30 Break

Population Monitoring and Estimation Session Cont.

C**hair: Barb Moore,** *Idaho Department of Fish and Game*

15:30 Revising black bear historic range maps and documenting the increase of a once extirpated population in Nevada – Carl Lackey, *Nevada Department of Wildlife*

15:50 Evaluating sustainable harvest and nonharvest mortalities of female black bears in Northwest Montana – Tonya Chilton-Radandt, *Montana Fish, Wildlife, and Parks*

Brown Bear Research and Management Session

Chair: Wayne Wakkinen, *Idaho Department of Fish and Game*

16:10 Grizzly bear status report – Chris Servheen, *U.S. Fish and Wildlife Service*

16:30 Grizzly bear population augmentation in the Cabinet Mountains of Northwest Montana – Wayne Kasworm, *U.S. Fish and Wildlife Service*

17:30 Bear Spray Demonstration – Chuck Bartlebaugh, *Center for Wildlife Information* (Location TBA)

18:00 Social – Poster Session – 7th Floor Boardroom #5

Wednesday, May 23rd

Workshop Sessions

8:00 **Project Design:** The design and analysis of DNA mark-recapture studies for bears: Lesson learned and new developments — John Boulanger, *Integrated Ecological Research*

9:30–10:00 Break

10:00 **Spatially Explicit Capture/Recapture** – Murray Efford , *University of Otago, New Zealand*

11:30–13:30 Lunch, on your own

13:30 **Spatially Explicit Capture/Recapture Cont.** – Murray Efford , *University of Otago, New Zealand*

15:00-15:30 Break

Ecology and Behavior Session

Chair: Mike Mitchell, *Montana Coop Wildlife Research Unit*

15:30 Black bear home range size in North America: A meta-Analysis – Andrew Tri , *Division of Forestry and Natural Resources, West Virginia University*

15:50 Conserving Andean bears in Ecuador: Status and current research– María Paulina Viteri Espinel, *College of Natural Resources, University of Idaho*

16:10 The Post-denning activities of the American black bear (*Urus americanus*) in Utah – Julie Miller, *Wildlife and Wildlands Conservation Program, Department of Plant and Wildlife Sciences BYU*

16:30 Effects of fuel reduction treatments on black bears (*Urus americanus*) spatial ecology in the White Mountains of Arizona – Michelle Crabb, *Arizona Game and Fish*

16:50 Spatial and habitat selection response of black bears (*Urus americanus*) to the Wallow Fire wildfire in the White Mountains of Arizona – Michelle Crabb, *Arizona Game and Fish*

18:00-20:00 **Dinner Banquet Cruise on Lake Coeur d' Alene**

Program Thursday, May 24th

Workshop Session

8:00 **Modeling Workshop:** Using the RISKMAN population model to inform bear management – Eric Howe, *Ontario Ministry of Natural Resources*

9:30–10:00 Break

Human Bear Interaction Session

Chair: Jeff Rohlman, *Idaho Department of Fish and Game*

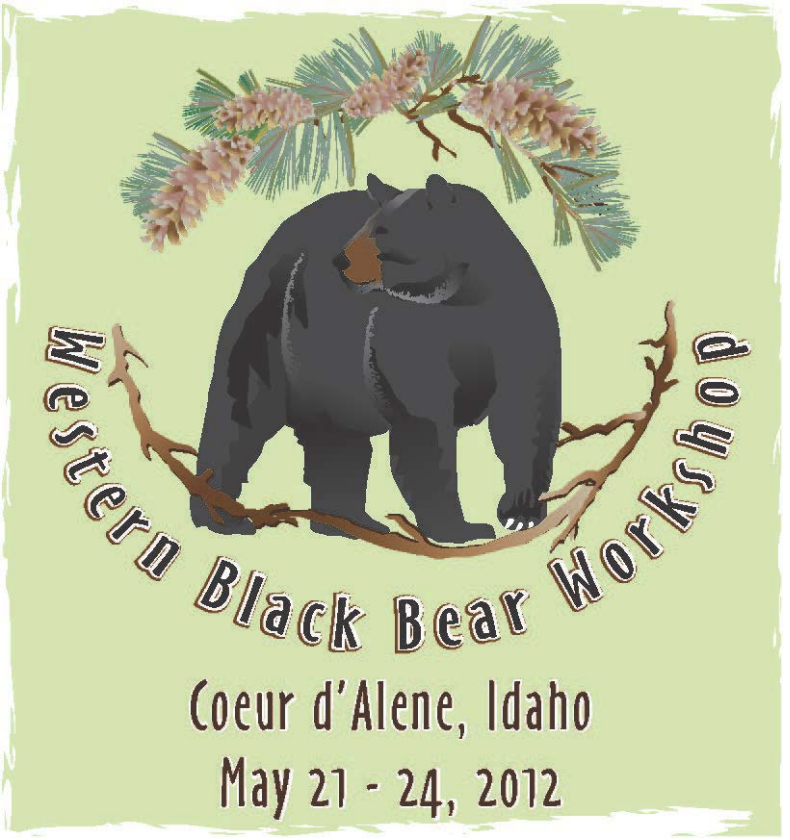
10:20 Human bear conflicts: Are they increasing? – Chris Servheen , *U.S. Fish and Wildlife Service*

10:40 A bear for the public: Visitors and their management at dens – Hal Black, *Department of Plant and Wildlife Sciences BYU*

11:00 The dark side of human dimensions in black bear management: Lessons learned in Nevada – Carl Lackey, *Nevada Department of Wildlife*

11:20 Closing Remarks

Abstracts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BLACK BEAR DENSITY IN GLACIER NATIONAL PARK, MONTANA

JEFF B. STETZ, *Montana Cooperative Wildlife Research Unit,* University of Montana, Missoula, MT 59812, USA

Katherine C. Kendall, *U. S. Geological Survey–Northern Rocky Mountain Science Center,* Glacier Field Station, Glacier National Park, West Glacier, MT 59936, USA

Amy C. Macleod, *University of Montana Cooperative Ecosystem Studies Unit,* U.S. Geological Survey–Glacier Field Station, Glacier National Park, West Glacier, MT 59936, USA

ABSTRACT: We report the first abundance and density estimates for American black bears (*Ursus americanus*) in the Glacier National Park (GNP), Montana, USA, region. We used data from 2 independent and concurrent noninvasive genetic sampling (NGS) methods, hair traps and bear rubs, to generate individual black bear encounter histories for use in closed population mark-recapture models. We improved the precision of our abundance estimate by using NGS detection events to develop individual-level sampling effort covariates to explain capture probability heterogeneity and inform our estimate of the effective sampling area. We used Akaike's Information Criterion to determine support for a suite of models with and without these sampling effort covariates. Models using the ½ MMDM covariate were overwhelmingly supported, suggesting that buffering our study area by this distance would be appropriate for estimating the effectively sampled area and thereby density. Our model-averaged super-population abundance estimate was 603 (95% CI: 526-681) black bears for GNP. Our black bear density estimate (15.8 bears per 100 km^2, 95% CI: 14.1-17.5) was consistent with published estimates for populations that are sympatric with grizzly bears (*U. arctos*) and without access to spawning salmonids. Given the density of black and grizzly bears in GNP, our study supports the concept that protected areas may act as source populations for surrounding areas, especially those subjected to harvest and increased human development as in our study area beyond GNP's borders.

STUDY DESIGN AND SAMPLING INTENSITY FOR DEMOGRAPHIC ANALYSES OF BEAR POPULATIONS

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Charles C. Schwartz, *Northern Rocky Mountain Science Center,* Interagency Grizzly Bear Study Team, 2327 University Way, Box 2, Bozeman, MT 59715, USA (Retired)

Richard D. Mace, *Montana Department of Fish, Wildlife, and Parks,* Kalispell, MT, USA

Mark A. Haroldson, *Northern Rocky Mountain Science Center, Interagency Grizzly Bear Study Team,* 2327 University Way, Box 2, Bozeman, MT 59715, USA

ABSTRACT*:* The rate of population change through time (λ) is a fundamental element of a wildlife population's conservation status, yet estimating it with acceptable precision for bears is difficult. For studies that follow known (usually marked) bears, λ can be estimated during some defined time by applying either life-table or matrix projection methods to estimates of individual vital rates. Usually however, confidence intervals surrounding the estimate are broader than one would like. Using an estimator suggested by Doak et al. (2005), we explored the precision to be expected in λ from demographic analyses of typical grizzly (*Ursus arctos*) and American black (*U. americanus*) bear data sets. We also evaluated some trade-offs among vital rates in sampling strategies. Confidence intervals around λ were more sensitive to adding to the duration of a short (e.g., 3 yrs) than a long (e.g., 10 yrs) study, and more sensitive to adding additional bears to studies with small (e.g., 10 adult females/yr) than large (e.g., 30 adult females/yr) sample sizes. Confidence intervals of λ projected using process-only variance of vital rates were only slightly smaller than those projected using total variances of vital rates. Under sampling

constraints typical of most bear studies, it may be more efficient to invest additional resources into monitoring recruitment and juvenile survival rates of females already a part of the study, than to simply increase the sample size of study females.

Key Words: American black bear, demographic analysis, grizzly bear, lambda, rate of increase, sample size, *Ursus americanus*, *Ursus arctos*, variability

INTRODUCTION TO SPATIALLY EXPLICIT CAPTURE-RECAPTURE MODELS

MURRY EFFORD, *University of Otago*, New Zealand

ABSTRACT: Animals that are mobile and often hidden by vegetation pose special problems for ecologists and population managers because they cannot be counted directly. Indirect methods using passive detectors (e.g., cameras, hair snares or traps) or searches for sign (e.g., feces or hair from rub-trees) require statistical manipulation to adjust for incomplete detection and movement of animals over the sampling period. Spatially explicit capture–recapture (SECR) is a growing suite of computing-intensive methods in which such indirectly acquired data are analyzed to estimate density or population size.

SECR has several advantages over conventional methods that separately estimate population size *N* and effective trapping area *A*. SECR does not require 'geographic closure' and estimates are free of the edge effects usually associated with trapping grids. There has never been agreement on how to calculate *A*, so this is a major advantage in itself. Freedom from edge effects also allows greater flexibility in study design, particularly allowing small clusters of detectors (e.g. hair snares) to be dispersed widely for spatially representative sampling of large areas. Other advantages of SECR are more technical (spatial heterogeneity is allowed for in the model, and density variation may be modeled across space or time).

Black bears have been in the forefront of early applications of SECR, but the methods are still new to many researchers and managers. This half-day workshop will introduce the essential concepts of SECR and demonstrate analyses using the free Windows software 'Density' and the R package 'secr'.

Note: Spatially Explicit Capture/Recapture Workshop Wednesday 10:00 am.

ESTIMATING ABUNDANCE AND DEMOGRAPHY OF BLACK BEAR POPULATIONS USING MULTIPLE DISPARATE DATA SOURCES

PAUL CONN, *National Marine Fisheries Service*

Black bear populations are notoriously difficult and expensive to monitor, particularly for low density areas where the costs of capturing and tagging animals is considerable. One possibility for monitoring in these cases is to fit integrated population models to all sources of observed data, possibly including age-at-harvest data, telemetry or mark-recapture-recovery data, reporting rate information, and indices of abundance. In addition, expert knowledge can be incorporated in the form of informative prior distributions in a Bayesian context (e.g. using meta-analysis to provide likely ranges for key parameters like survival and recruitment). Such models can be written in terms of abundance, survival, and recruitment, providing estimates of all these parameters that best fit all available data sources. However, such models can be difficult to fit, and it can be difficult to judge which parameters (if any) are reliably estimated. In this workshop, I provide a brief introduction to different approaches for fitting integrated population models to likely sources of available bear data, including chi-square, maximum likelihood, and Bayesian approaches to estimation. I also provide an overview of available software, including spreadsheet-type models, AD Model Builder, R, and WinBUGS. Throughout, I try to provide intuition on what parameters should be estimable from a given dataset. In addition to some demonstrations with simulated data, I provide two examples to illustrate concepts, including fitting a hierarchical, Bayesian model to black bear age-at-harvest and mark-recovery data in Pennsylvania (Conn et al. 2008), and fitting integrated population models to black bear age-at-harvest and tetracycline mark-recapture data from Minnesota (Fieberg et al. 2010).

Useful literature:

Conn, P. B., D. R. Diefenbach, J. L. Laake, M. A. Ternent, and G. C. White. 2008. Bayesian analysis of wildlife age-at-harvest data. Biometrics 64:1170-1177.

Fieberg J.R., Shertzer K.W., Conn P.B., Noyce K.V., and D.L. Garshelis. 2010. Integrated Population Modeling of Black Bears in Minnesota: Implications for Monitoring and Management. PLoS One 5(8): e12114.doi:10.1371/journal.pone .0012114

Gove, NE, JR Skalski, P Zager, RL Townsend. 2002. Statistical models for population reconstruction using age-at-harvest data. J. Wildl. Mgmt. 66:310-320.

White, G. C., and B. C. Lubow. 2002. Fitting population models (Quattro) (Excel) to multiple sources of observed data. Journal of Wildlife Management 66:300-309.

A GENETICS PRIMER AND OVERVIEW OF THE USE OF GENETIC INFORMATION IN WILDLIFE POPULATION ANALYSIS

DAN BINGHAM, *Rocky Mountain Research Station*

The genetics workshop is designed to provide biologists with an introduction to molecular genetic techniques that are useful for monitoring individuals and natural populations. The workshop has three objectives: (i) to provide an overview of conservation genetics; (ii) to explain what types of molecular markers, parameters, and sampling protocols are appropriate for various research/management questions; and (iii) to prepare attendees for the future (i.e., conservation genomics).

REVISING BLACK BEAR HISTORIC RANGE MAPS AND DOCUMENTING THE INCREASE OF A ONCE EXTIRPATED POPULATION IN NEVADA

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Jon P. Beckmann, *Wildlife Conservation Society*, North America Program, 301 N. Willson Ave., Bozeman, MT 59715, USA

James Sedinger, *Department of Natural Resources and Environmental Science*, University of Nevada, Reno, 1000 Valley Road, Reno, NV 89512, USA

ABSTRACT: We evaluated historical records dating back to 1840 which indicate presence of both black bears (*Ursus americanus*) and grizzly bears (U. *arctos*) in Nevada. The paucity of historical references after 1931 suggest extirpation of black bears from Nevada's interior mountain ranges did not occur until the mid-1900s. Despite these records of black bears, and the fact that the last record of grizzly bears occurred in 1930, eight years after the last grizzly bear was reportedly killed in neighboring California, the recognition of both species' historical occurrence in Nevada has been largely ignored in published distribution maps for North America. This lack of representation on distribution maps is likely due to the lack of any scientific data or research on bears in Nevada until 1987. Since that time conflicts have increased and sightings of bears in the historic range have been increasing. We report on the results of a current population estimate of black bears derived from a sample of marked bears (N = 420) captured between 1997-2008. Using Program MARK we estimated overall population size, finite rate of growth (λ=1.16), quarterly and annual survival rates for males and females, seasonal capture probabilities, and recruitment rates. Our results indicate an overall population size of 253 $\pm$ 27 adult black bears in our study area and suggest that the population of black bears in western Nevada is increasing at an annual average rate of 16% with possible expansion into historic habitat within the interior of the state. Finally, based on historical records we present suggested revised historic range distribution maps for black bears that include the Great Basin ranges in Nevada.

***Key Words*:** black bear, grizzly bear, historical records, Nevada, population estimation, *Ursus americanus*, *U. arctos*

EVALUATING SUSTAINABLE HARVEST AND NONHARVEST MORTALITIES OF FEMALE BLACK BEARS IN NORTHWEST MONTANA

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Richard D. Mace, *Montana Fish, Wildlife, & Parks*, 490 N Meridian Road, Kalispell, MT 59901, USA

ABSTRACT: Black bear hunting has a long tradition in Montana; black bears have been designated as a big game animal in Montana since 1923. In the mid-1990s, traditional black bear management was becoming increasingly controversial. In 1994, the Montana Fish, Wildlife, & Parks (MFWP) completed a Programmatic Environmental Impact Statement on black bears (MFWP 1994). The PEIS suggested that several black bear population studies be initiated to assess population structure and trend of representative populations, and to evaluate and refine the harvest criteria used to manage bear populations. At that time, many Montana Biologists were using harvest criteria originally established in Idaho to safeguard against overharvest. However, using the Idaho criteria, it appeared that Managers were at an impasse; although harvest numbers appeared sustainable, most criteria were not being met.

MFWP initiated the Montana State Black Bear Research Program in 2000. Between 2000 and 2004, MFWP researchers trapped and collared black bears in the Swan Valley. Between 2002 and 2008, MFWP also used DNA-based methods to establish both population size and density estimates and harvest rate estimates for black bears across the state.

Although this information was useful to Managers, they still desired a means of assessing total mortality levels that would be sustainable in each of their districts. We used the black bear density, population size and harvest rate information to estimate sustainable harvest and nonharvest mortality in each hunting district of MFWP's Region 1. This new information allows Managers to make more precise decisions on harvest and management, based upon more local data.

GRIZZLY BEAR RECOVERY IN IDAHO: RECOVERY OR MANAGEMENT?

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ABSTRACT: Grizzly bear recovery in Idaho covers 3 ecosystems with 3 different problems. Recovery progress over the past 30 years is reviewed and the reasons for the differences in success are compared. Grizzly recovery is more of a social challenge than a biological challenge. This presents special problems for managers in terms of how they work with local publics, local political interests, and each other. Of particular interest and importance is how the efforts of "conservation groups" on some species often result in an erosion of conservation progress on other species. A vision for the future is discussed along with some suggestions on how to get there.

GRIZZLY BEAR POPULATION AUGMENTATION IN THE CABINET MOUNTAINS OF NORTHWEST MONTANA

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ABSTRACT: The Cabinet Mountains grizzly bear population was estimated at 15 or fewer individuals in 1988 and believed to be declining toward extinction. In response to this decline, a test of population augmentation techniques was conducted during 1990-1994 when 4 subadult female grizzly bears were transplanted to the area. Two criteria were identified as measures of success: bears must remain in the target area for one year, and should ultimately breed with native male grizzly bears and reproduce. Reproductive success of any of the remaining individuals could not be established until 2005 when genetic analysis of hair snag samples indicated that one of the transplanted bears remained in the Cabinet Mountains and had reproduced. The detected bear was transplanted in 1993 as a 2-year-old and was identified by a hair snag within 5 miles of the original release site. This and subsequent genetic analysis indicated she is the source of at least 8 F1 offspring, and at least 8 F2 offspring. This reproduction indicates that the original test of augmentation was successful with at least one of the transplanted individuals. Success of the

augmentation test prompted continuation of this effort. The Northern Continental Divide Ecosystem of north central Montana has been the source of 9 additional bears transplanted to the Cabinet Mountains during 2005-2011. Seven of these individuals were females and two were males. Three bears were known to have been killed and 4 bears left the area out of 13 total transplants 1990-2011. Fates and movements of these bears are discussed.

THE DESIGN AND ANALYSIS OF DNA MARK-RECAPTURE STUDIES FOR BEARS: LESSONS LEARNED AND NEW DEVELOPMENTS

JOHN BOULANGER, *Integrated Ecological Research,* Nelson, British Columbia

Over the past 15 years DNA sampling for bears has evolved in terms of field implementation, and study design. At the same time, many more estimation methods have become available for DNA data. This workshop will highlight the main developments in the application of DNA mark-recapture methods. The use of DNA methods for population and density estimation as well as monitoring of demography and population trend will be reviewed. A primary emphasis of the workshop will be the role of optimized study design and accompanying analysis strategies to allow maximum inference from DNA sampling efforts.

BLACK BEAR HOME RANGE SIZE IN NORTH AMERICA: A META-ANALYSIS

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Michael D. Jones, *Division of Forestry and Natural Resources, West Virginia University*, 322 Percival Hall, PO Box 6125, Morgantown, WV 26506-6125, USA

John W. Edwards, *Division of Forestry and Natural Resources, West Virginia University*, 322 Percival Hall, PO Box 6125, Morgantown, WV 26506-6125, USA

ABSTRACT: Choosing a home range estimator can present a problem to researchers and managers of American black bears (*Ursus americanus*). Many home range estimators have been used over the decades, but to our knowledge, there has been no meta-analysis of how black bear home range size varies with geography region and estimation method. Our objective was to assess factors that best explain variation in home range size. We hypothesized that black bear home range size would best be explained by gender and ecoregion. We compiled 314 estimates of annual black bear home range size (km^2) across all of North America from published studies, dissertations, theses, and conference proceedings. From each manuscript, we extracted estimates, estimation method, and geographic location. We used the US Environmental Protection Agency Ecoregion maps (Level I) to determine an ecoregion for each home range estimate. We ran a multiple, generalized linear regression with 8 *a priori* models and used AICc model selection to rank these models. The 2 "best" models include both gender and ecoregion. The top model included sex, ecoregion, and estimation method. There were significant differences in home range size between ecoregion and estimation method. Sex and ecoregion seemed to be the most important factors predicting home range in black bears.

Key Words: *Black bear, ecoregion, home range, home range estimation*

THE POST-DENNING ACTIVITES OF THE AMERICAN BLACK BEAR (*Ursus americanus*) IN UTAH

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Tom S. Smith, Ph.D., *Wildlife and Wildlands Conservation Program, Department of Plant and Wildlife Sciences*, 451 WIDB, Brigham Young University, Provo, UT 84602, USA

Janene Auger, Ph. D., *Affiliate Research Faculty, Plant and Wildlife Sciences and Monte L. Bean Life Science Museum*, Brigham Young University, 190 MLBM, Provo, Utah 84602, USA

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ABSTRACT: Understanding the denning behaviors and timing of den emergence and departure of female black bears (*Ursus americanus*) in Utah will help biologists establish best management practices. We investigated these behaviors by placing motion-sensing cameras at 18 dens in March and April, 2011. Each camera was programmed to take two pictures with a one second delay between triggers, providing nearly continuous footage of bears at their dens. We documented emergence dates, departure dates, duration of time spent at the den, and behaviors performed outside the den. The mean emergence date for all bears was 21 March (range of 5 March - 4 April, SD ± 13 d, n = 16); the mean number of days between emergence and departure was 12 days (range of < .01 – 46.1 d, SD ± 18 d, n = 10); and the mean departure date was 4 April (range of 9 March – 4 May, SD ± 16 d, n = 10). There was no difference in emergence date between the bear cohorts (females with cubs, females with yearlings, and lone females). However, females with cubs departed their dens later than all other females. Mean departure date for females with cubs

was 13 April (range of 7 April – 4 May, SD ± 13 d, n = 6); mean departure date for all other females was 21 March (range of 9 March – 3 April, SD ± 10 d, n = 4).

Key Words: American black bear, behavior, denning, departure, emergence, *Ursus americanus*, Utah

EFFECTS OF FUEL REDUCTION TREATMENTS ON BLACK BEAR (*Ursus americanus*) SPATIAL ECOLOGY IN THE WHITE MOUNTAINS OF ARIZONA

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ABSTRACT: Throughout the southwest, forest fuel reduction treatments are being undertaken to reduce fire risks near communities. Although previous research on black bear habitat use has provided preliminary information on their responses to forestry practices, findings have been ambiguous with regards to selection or avoidance of regenerating timber cuts. To reduce risk of wildland fire to public and private lands adjacent to urban areas the Apache-Sitgreaves National Forest began implementing fuel reduction timber cuts near the communities of Greer, Nutrioso, and Alpine, Arizona in 2007. Between the spring of 2005 and the fall of 2011 we captured 52 (32m, 20f) adult black bears fitting each with a Global Positioning System collar programmed to collect up to 6 locations per day for a period of 28 months. To describe habitat selection by marked black bears relative to presence of forest treatment areas we randomly selected one location per individual/day and created seasonal and annual utilization distributions. We identified habitat covariates including treated and distance to treated areas for each pixel within individual bears seasonal and annual fixed–kernal home ranges and evaluated habitat selection based on the height of the utilization distribution. We included covariates that are thought to influence black bear habitat selection such as: vegetation type, canopy, slope, elevation, ruggedness, soil type and distance to major roads. We used both univarate and multiple regression analysis approaches to investigate the influence of forest treatments on black bear spatial ecology. Results of the habitat selection analysis relative to effects of forest fuel reduction treatments are discussed.

SPATIAL AND HABITAT SELECTION RESPONSE OF BLACK BEARS (*Ursus americanus*) TO THE WALLOW FIRE WILDFIRE IN THE WHITE MOUNTAINS OF ARIZONA

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ABSTRACT: Previous research in Arizona has documented changes in habitat selection and movements of black bears for several years following wildfires, however, the Wallow fire, the largest wildfire in Arizona history encompassing more than 538,000 acres, provided a unique opportunity to examine movements of black bears during and immediately following wildfire. We monitored 8 bears equipped with GPS collars programmed to collect 3-5 locations/day before, during, and after the fire. Marked bears did not appear to flee from the approaching fire line, and most stayed within their home ranges. Immediately post fire containment, marked bears seemed to select lower intensity burned area. Post re-vegetation some marked bears appeared to select higher severity burned areas while others moved out of the fire perimeter. We had no documented mortalities of marked bears, though there was one unmarked bear found that had been burned in the fire and was subsequently euthanized. We captured 6 bears after the fire was contained; none showed signs of injury that could be attributed to the wildfire and 5 of them were in good body condition.

USING THE RISKMAN POPULATION MODEL TO INFORM BEAR MANAGEMENT

ERIC HOWE, *Wildlife Research Team,* Ontario Ministry of Natural Resources

Abstract: RISKMAN is a stochastic life table model adapted to accurately simulate the growth and harvest of multi-annual reproducers such as bears. RISKMAN incorporates the inherent uncertainty in estimates of population size, survival and reproductive rates, and harvest rates and age/sex ratios to yield probabilistic estimates (i.e. "risks") of future population growth or decline. It is used by researchers in several North American jurisdictions to inform management of black, brown, and polar bears. This workshop will introduce RISKMAN and highlight aspects of the model that make it uniquely useful to managers of bear populations subject to anthropogenic mortality, with examples. Participants are encouraged to download and install RISKMAN prior to the workshop (http://riskman.nrdpfc.ca/riskman.htm).

CONSERVING ANDEAN BEARS IN ECUADOR: STATUS AND CURRENT RESEARCH

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ABSTRACT: The Andean bear (*Tremarctos ornatus*) is the only bear in South America and the only living member of its genus. Andean bears occupy a wide range of ecosystems; the species altitudinal range starts at 250 m in dry areas of the Peruvian coast to 4,750 m in the Northern Andes. The species latitudinal range includes Venezuela, Colombia, Ecuador, Peru, Bolivia and northern Argentina. Andean bears are *Vulnerable* (IUCN 2008) and its habitat has decreased to 42% of the range. In Ecuador, 32% of bear habitat is protected under the national protected area system. Very little is known about the status and distribution of wild populations. No data has been collected to evaluate the impacts of habitat fragmentation on bear movement and gene flow. Empirical data on the number of bears remaining in the wild of Ecuador does not exist except for one study that reported a population size estimate for a bear population surveyed inside a protected area (Viteri 2007). In the last ten years, bears are increasingly killed by farmers and cattle ranchers because Andean bears are eating corn crops and cattle more frequently; conflicts are increasing and this problem has not been managed by the environmental authorities. If habitat loss and poaching continue at the current rate, this species will be extinct in the next 30 years (Castellanos *et al*. 2010, IUCN 2008).

I have worked on Andean bear research in Ecuador for 12 years. My work combines conservation genetics, landscape ecology and social sciences to understand and promote biodiversity conservation with social justice. Researchers, local non-governmental organizations, environmental institutions and people from mestizo and indigenous communities that live near Andean bear habitat have contributed to this research. We have developed

non-invasive genetic techniques for Andean bear research in tropical ecosystems and optimized laboratory protocols to study mitochondrial and nuclear DNA to evaluate Andean bear population status, trends and fragmentation (Viteri & Waits 2009, Viteri 2007, Viteri 2002). My research also explores collaborative approaches, participatory conservation research, transformative learning (i.e., combining science and traditional ecological knowledge for species conservation) and environmental policy for Andean bear conservation. I will present a summary of this work.

Andean bears are endangered and we need a combination of techniques and efforts to take action and understand the role of the environment, the people and the protected areas on Andean bear populations if we aim to conserve them from extinction in the next decades.

HUMAN BEAR CONFLICTS: ARE THEY INCREASING?

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ABSTRACT: Human conflicts with bears are reviewed for black bears and grizzly bears. Changes in numbers of both humans and bears are increasing conflict levels. The rate of increase is similar for both bear species. Factors contributing to these increases include more humans in bear habitat, bear populations that are increasing in both numbers and range, and increasing human activities that bring attractants into bear habitats. Human recreation is also a factor in increasing conflicts particularly when people recreate in grizzly bear habitat and ignore advice from agencies on how to be safe when doing so. I review the most recent human fatalities from grizzly bear attacks and the reasons for these fatalities. I also examine the detailed incident characteristics for the 83 times humans were charged by grizzly bears in the lower 48 states in 2011. The majority of these charges occurred while humans were hunting or hiking in bear habitat and 81% of grizzly charges resulted in no contact or human injury. Sixty-six% of these charges were in the Yellowstone ecosystem and 38% were in national parks. Bear spray was carried by 29% of the people charged. Of 80 charges where the reproductive status of the bear was known 56% were females with young. Bear managers are showing success in reducing human-bear conflicts where efforts have been underway for many years and where new human developments like subdivisions are few. In contrast, conflict reduction efforts face limited success at the edge of expanding bear populations, where there are many new residents, and where people resist the idea of living with bears and making accommodations in their lifestyle to accommodate bears and other wildlife.

A BEAR FOR THE PUBLIC: VISITORS AND THEIR MANAGEMENT AT DENS

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ABSTRACT: Agency, university, and private outreach efforts to promote conservation and appreciation of bears include books, newsprint, displays, photos, TV, speeches, or other media; but nothing conveys excitement and reality more than seeing a bear anesthetized at your feet, where it can be touched, smelled, and heard. For this reason we have invited over the past 20 years a variety of guests (students, friends, family, neighbors, hunters, politicians, doctors, lawyers, youth groups, colleagues, etc.) to visit hibernating adult female black bears and their offspring. One bear has been seen in her den every year but one since 1992 and has perhaps been seen in a den by more people than any other bear in North America. We document her reproductive performance, den types, and visitor outcomes. We share our "techniques" for managing guests to minimize risks and to provide a quality, up-close look at a hibernating bear. We appeal to all involved in black bear den work to share their research in the multidimensional world that field work permits. Given the response and interest of the public, we argue that one or two black bear females could be collared in local state jurisdictions for the sole purpose of the educational public relations bonanza they provide.

THE DARK SIDE OF HUMAN DIMENSIONS IN BLACK BEAR MANAGEMENT – LESSONS LEARNED IN NEVADA

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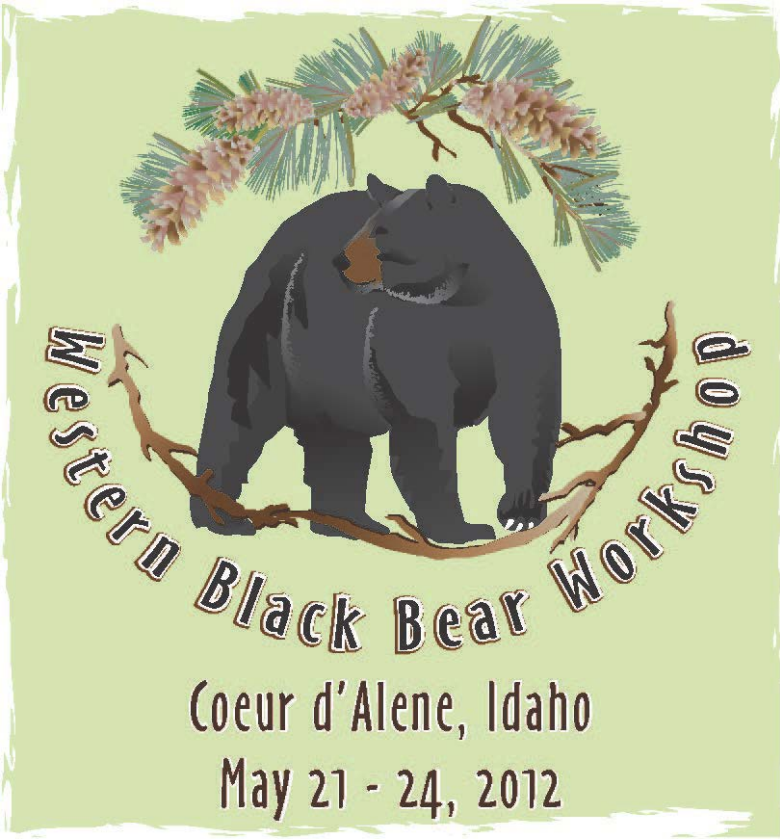
ABSTRACT: Black bear management policy often times has polarizing effects among the different stakeholder groups. Seldom is this division more prevalent than when population management is implemented. The tenuous relationships created between management agencies, bear preservation advocates, sportsmen's groups and the often times misinformed general public can drive the direction of policy and management decisions. Preservation and sportsmen's groups are typically not bound by the same standards of accountability that management agencies are, and at times this freedom of accountability combines with the use of modern day social networking sites is used to advance agendas of inaccurate and misleading information. Nevada experienced this firsthand following the decision to hold the state's first ever black bear hunting season in 2011.

***Key Words*:** black bear, Nevada, human dimensions, bear policy, *Ursus americanus*

Posters


Western Black Bear Workshop
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TRANSLATING FIELD STUDIES ON BEARS INTO SCIENCE BASED EDUCATION

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ABSTRACT: Bear Trust International and the Alaska Wildlife Conservation Center (AWCC) are developing and implementing a new science-based education program rooted in field research on bears. Lessons link directly to field research on bear ecology (e.g., population estimation), behavior (e.g., human-bear conflicts), and conservation (e.g., the effects of climate change). Science-based lessons include real data, incorporate technology (GIS, GPS, Program Mark), target high school learners, help youth develop conservation awareness through scientific inquiry, address STEM (Science, Technology, Engineering, and Math; a US campaign to help our students become more competitive in science and math) goals, meet National Science Standards, and address goals outlined by the North American Association for Environmental Education (NAAEE). The entire program will be web-based, project-based, and free on Bear Trust's Education Portal. In addition, an expanded version of this program will be hosted in the upcoming, state-of-the-art Bears Education Awareness Research Sanctuary facility (BEARS) at the Alaska Wildlife Conservation Center. Bear Trust and AWCC are collaborating to build a signature interface system within the BEARS facility that will connect visitors with field studies on bears worldwide and expand the message of bear conservation.

ESTIMATING THE DIFFERENCE IN POPULATION SIZE, DENSITY, AND SEX RATIOS OF URBAN AND WILDLAND BLACK BEAR POPULATIONS USING DNA BASED CAPTURE-MARK-RECAPTURE ANALYSIS IN MONO COUNTY, CALIFORNIA

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ABSTRACT: California Department of Fish and Game (CA DFG) currently uses statewide harvest data to estimate the population size, density, and sex ratio of black bears (*Ursus americanus*) for the entire state; however, the agency does not monitor their black bear population regionally or at a local scale. The CA DFG wildlife managers are modifying the current bear management plan to incorporate DNA-based capture-mark-recapture (CMR) analysis for future monitoring efforts. I am implementing non-invasive DNA-based CMR techniques using hair-snares for black bears in Mono County, California as an initial effort to test these techniques in the state. In Mono County, black bears inhabit wildland and urbanized areas. As far as the CA DFG wildlife managers and I know, these CMR techniques have not been implemented in urbanized areas such as those in Mono County. Anecdotally, wildlife managers in Mono County estimate their being 25 to 30 bears every year, regardless of natural food availability, inhabiting the non-hunted, 60 km^2 city limits of Mammoth Lakes. Certain individual bears are identified every year in town by their unique scars (e.g. half a nose) and color patterns (e.g. white chest patches). Some of these individuals have even been documented hibernating in town under uninhabited homes and in culverts. I plan to compare estimates of the population density and sex ratio of the bears that inhabit Mammoth Lakes and those bears that inhabit the wildland, hunted Slinkard Valley Wildlife area. These estimates will be calculated using a closed-population model in program MARK.

***Key Words*:** black bear, capture-mark-recapture, DNA, hair-snare, Mono County, urban landscape.

BROAD SCALE POPULATION STRUCTURE OF THE AMERICAN BLACK BEAR (*Ursus americanus*)

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ABSTRACT: Genetic data is a useful tool to delineate contemporary population structure and may also be used to infer historic population structure. The last glacial maximum during the Wisconsin glaciation occurred approximately 18,000 years ago and pushed species into one or more glacial refugia. Our objective was to infer historic population structure of the American black bear (*Ursus americanus*) and estimate the number and location of refugia. Using samples from hunter harvested individuals and supplemented with data from the literature, we analyzed mitochondrial haplotypes and 13 microsatellite loci. The mitochondrial phylogeny contains two clades. Haplotypes in clade A form two subclades with distinct east and west separation, except in the southern most populations where they are admixed. Haplotypes in clade B decrease in frequency moving eastward from the Pacific coast of British Columbia. These patterns were reinforced in the nuclear data where three genetic clusters were delineated: east, west, and Ozark Mountains. We hypothesize that the east and west clusters are products of expansion out of glacial refugia while the Ozark cluster is the result of founder effect from a contemporary reintroduction program. This preliminary data was collected to estimate genetic differentiation between samples to inform which samples to sequence for a SNP discovery project. Single nucleotide polymorphism (SNP) markers will allow finer scale inference of population structure.

METHODS FOR ESTIMATING DISTRIBUTION AND RANGE EXTENT OF GRIZZLY BEARS IN THE GREATER YELLOWSTONE ECOSYSTEM

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ABSTRACT: As litigation and political disputes over grizzly bear (*Ursus arctos horribilis*) delisting persist, the distribution of the Greater Yellowstone Ecosystem (GYE) grizzly bear population continues to expand into areas and habitats unoccupied since the early twentieth century. Up to date information on the extent of this distribution is crucial for federal, state, and tribal wildlife and land management agencies to make informed decisions regarding grizzly bear management. The most recent estimate of grizzly bear distribution (1990–2004) utilized kernel density estimators of

radio-marked individual bears as well as composite kernels of locations of conflicts, mortalities, female bears with cubs of the year. This method was logistically cumbersome and excluded observations of unmarked bears and incidences of conflict and/or mortalities that occurred outside of suitable habitat. Our primary objective was to develop a technique to document grizzly bear distribution that would allow for all valid data to be used in estimation techniques, as well as provide the simplicity to be updated on an annual basis as the grizzly bear population in the GYE continues to expand. We used a GIS to overlay a 3km x 3km grid over the GYE and then placed grizzly bear locations from 1990-2004 and 1990-2010 over the grid. We tested occupancy modeling and the spatial statistical technique kriging as potential methods for estimation of grizzly distribution. We will provide results on the suitability of each of these techniques and comparisons to the previously estimated 1990-2004 kernel distribution. We will also provide insight into areas of grizzly bear expansion and potential implications for grizzly bear management.

23 YEARS OF SUCCESSFUL AMERICAN BLACK BEAR REHABILITATION

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ABSTRACT: The American Black Bear (*Ursus americanus*) can be successfully rehabilitated at facilities near urban areas. Essential to success are opportunities to socialize with other cubs, good body weight and condition at time of release, release into sustainable habitat, and low potential for human interactions during the first thirty (30) days post-release.

At Idaho Black Bear Rehab, Inc. (IBBR), additional methods include a variety of enclosure designs, customization of dietary and medical protocols, remote observation tools, and cub-appropriate caregiver techniques.

Over the past twenty-three (23) years, radio collar tracking and post-mortem retrieval of ear tags have shown that few IBBR bears (< .015) have become involved in nuisance situations within 30 days post release, and (< .02) within 31 days to 1 year post release. Most bears (> .96) are successfully released. Based on recovered data, IBBR bears have survived up to 6 years post release.

Despite release success, differing ideas in management policies and guidelines can impede the effectiveness of black bear rehabilitation. Ethical and science-based protocols for rehabilitation should be incorporated into regulations and management plans. Consistent standards need to be developed to define nuisance activity with appropriate response methodology, including incorporation into public education programs for human-bear conflict. Agencies should integrate the fluid nature and adaptive needs of rehabilitation when drafting policies and procedures. Black bear rehabilitators should contribute to black bear management policies as they affect black bear rehabilitation.

Key Words American black bear, education, guidelines, human–bear conflict, IBBR, management, policy, protocol, rehabilitation, Ursus americanus.

COMPARING THE USE OF DNA HAIR SNARES, LIVE CAPTURE, AND TRAIL CAMERAS FOR OBTAINING POPULATION DENSITY ESTIMATES IN SOUTHWESTERN IDAHO

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ABSTRACT: DNA was collected from 4 different populations of bears in Southwest Idaho from 2007 through 2011 including the Middle and North Forks of the Boise River (Unit 39), Little Weiser River and Middle Fork Weiser River (Unit 32A), Middle Fork of Payette River (Unit 33), and the Deadwood River drainage (Unit 34). Through 2011, 422 individual black bears were identified. Preliminary modeling generated black bear density estimates of approximately 0.75 bears/sq. mile in the Unit 39 study area (heavily hunted) and 1 bear/sq. mile in Unit 32A (lightly hunted). Density estimates will be developed for the mark/recapture data for the Unit 39 live capture effort where we marked 39 individual bears over 2 years and continue to mark bears for a third year. Trail cameras will be set during the summer of 2012 to develop a population estimate using the mark-resight technique. The three population density estimates will be compared, and the techniques will be analyzed for cost, ease of use, and reliability of results. Modeling techniques obtained at the 11th Western Black Bear Workshop will be used in the analysis.

CAN THE USE OF A BEAR-PROOF WASTE COLLECTION SYSTEM TO MINIMIZE BEAR/HUMAN CONFLICT ALSO BE COST-EFFECTIVE?

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ABSTRACT: 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 the years. As the town grew into the surrounding wilderness, there came a problem with managing the residential curbside waste collection program specifically, how to limit wildlife, particularly bear, access to the waste.

One of the proposed solutions was a bylaw prohibiting garbage set-out before 5 am. 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 tickets for non-compliance at 3 am. In addition, it was found that bears adjusted their forage pattern to match the availability of curbside bags / carts. In the end this method was found to be ineffective at bear-proofing the waste collection system.

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, residents of the town had some concerns about the new system:

- It was a new and different solution to the waste collection problem;
- NIMBY – even if they supported the concept, people did not want the containers too close to their homes; and

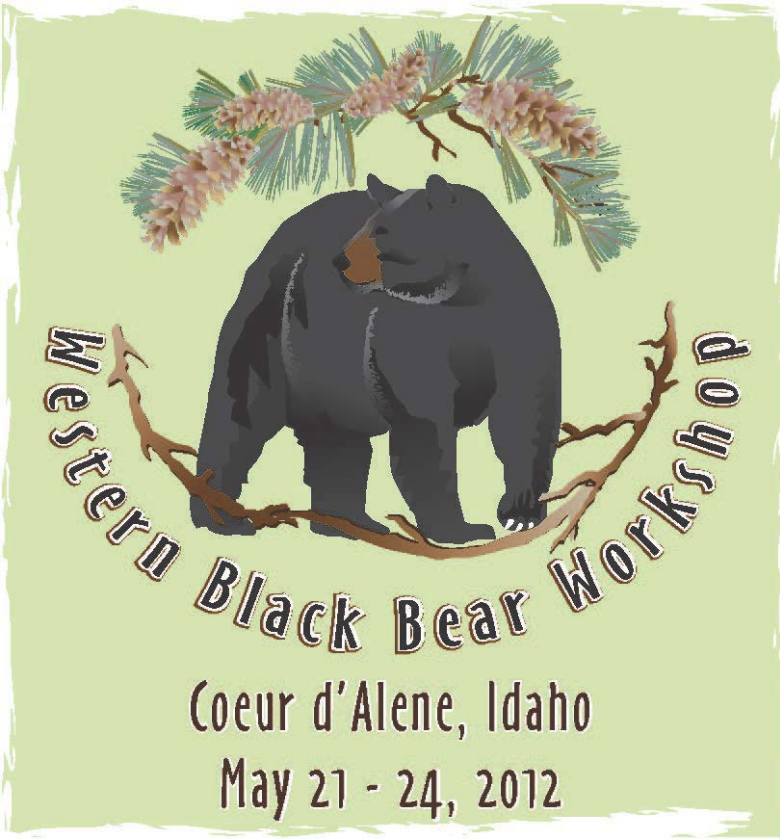
- Space constraints – containers needed to be set-up in all areas of the town to service single-family and multi-family dwellings.

Through an open and public process, the Waste Management Committee was able to alleviate the concerns of the citizens of Canmore. This process was made easier by the fact the containers would be conveniently located throughout the town allowing 24 hour accessibility. That, and the modular design, enabled aesthetic placement so as to not distract from the natural beauty of Canmore. The committee also promoted the benefits of semi-automated collection which eliminates 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 of 1999. The system continues to be a success and is now used for both residential and commercial waste. And now, multi-stream recycling has been added to the system for very little cost.

In addition to achieving the primary goal of ***virtually eliminating waste related bear / human incidents***, the system has also proven to be flexible, aesthetic, accessible, and cost-effective by providing the ***Lowest Total Cost of Ownership.***

State/Provincial Reports



ALBERTA BLACK BEAR STATUS REPORT

NATHAN WEBB, *Provincial Carnivore Specialist*, Wildlife Management Branch, Fish and Wildlife Division, Alberta Sustainable Resource Development, 2nd Floor, Great West Life Building, 9920-108 Street, Edmonton, AB T5K 2M4

ABSTRACT: An estimated 40,000 black bears occur over 488,000 km^2 of Alberta, including about 36,500 bears on provincial lands. Population densities are greatest in the mixed wood boreal forest of northern Alberta and agricultural fringe areas in western, north-central, and eastern Alberta.

Black bears have been hunted under unrestricted spring and fall seasons since 1953. Black bears may be hunted with bait only in Wildlife Management Areas (WMUs) without resident populations of grizzly bears. Hunting with hounds is not allowed. Hunters have the option of purchasing a second tag that may be used in WMUs with higher black bear populations in the agricultural fringe and boreal forest. A total of 14,908 licenses were purchased in 2011.

Annual harvests of black bears increased from an estimated 250-400 during the late 1960s to 2,000-2,700 during the mid to late 1980s, declined during the early 1990s, and have increased over the past few years. An estimated 2,590 bears were harvested in 2011. During the 2011 season, 12% of resident hunters were successful in harvesting a bear, while non-resident hunters achieved a success rate of 55%.

Public complaints regarding black bears have increased from an average of 1,312 complaints/year during the 1980s to 2,005 complaints/year from 2000-2011. In 2011, a natural food failure in northeastern Alberta resulted in an unprecedented number of black bear complaints (n=3,338). General nuisance activity (45%), problematic sightings (37%), and damage to human facilities (8%) are the most common types of complaints.

ARIZONA BLACK BEAR STATUS REPORT

RONALD L. DAY JR, *Arizona Game and Fish Department*, 5000 West Carefree Highway, Phoenix, AZ 85083, USA

ABSTRACT: Black bears are an important part of Arizona's wildlife resource. They inhabit approximately one quarter of state and are distributed in the central as well as the eastern portions of the state. Statewide hunter harvest has been relatively stable averaging 238 during the last five years. Current hunting strategies in use are a spring season where permits are limited and issued through a draw and a fall season with unlimited permits which is regulated through female harvest objectives set at 10% of the female portion of the population. Bear management issues include monitoring the adult female portion of the annual harvest, examining potential barriers preventing bear movement, recognizing and dealing with the human/black bear conflicts, and evaluating the impacts of large scale fire.

NEW MEXICO STATE BLACK BEAR STATUS REPORT

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ABSTRACT: Black bear (*Ursus americanus*) management in New Mexico has changed from very little management to Zone Management since the late early "00's". The current harvest strategy is to manage for stable or reduced bear populations in areas with historically high levels of human conflict and/or depredation. The balance of the state is managed for stable populations. Harvest limits, or female sub-limits, are based upon sustainable levels of harvest to the population as a whole and protection of the breeding segment of the population. The maximum zone harvest limits, or female sub-limits are a cap on harvest, not quotas to be met.

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