



ABSTRACT: This document is a synopsis of the presentations and discussions at the 5th International Human-Bear Conflict Workshop. Topics include tactics and tools for reducing conflict, measuring public attitudes toward bears, managing individual bears and populations, management among multiple jurisdictions, managing attractants, motivating people and building partnerships, the impact of human development on bears, and strategies for reducing conflict.

*Summarized by Dr. Janet D. Dalton
Appalachian Bear Rescue
Townsend, Tennessee*

WORKSHOP PARTNERS

Appalachian Bear Rescue
Counter Assault
Friends of the Smokies
LivingWithBears.com
USDA Wildlife Services

Bear Saver
Eastern Band of Cherokee Indians
Great Smoky Mountains Association
Tennessee Wildlife Resources Agency
Virginia Department of Game and Inland Fisheries

WORKSHOP SUPPORTERS: Blue Ridge Parkway Foundation, Greg A. Vital Center for Natural Resources and Conservation, Jamestown Advanced, Kodiak Products, Margo Supplies Ltd., Massanutten Resort, Safari Club International, Safe Capture International, Tennessee Wildlife Society, Tuff Boxx, UT Forestry, Wildlife, & Fisheries, Zoo Knoxville.

WORKSHOP SPONSORS: Appalachian Trail Conservancy, Baker Waste Equipment, Berryman Institute, Music City SCI, National Parks Conservation Association, NC Wildlife Resources Commission, Rocky Mountain Elk Foundation, Sabre Security Equipment Corporation, Safety in Bear Country Society, US Forest Service.

WORKSHOP CONTRIBUTORS: GOTEEZ, Kreider Machine Shop, Inc., Matson's Laboratory, Responsive Management, Ursack, The University of Tennessee Martin.

TABLE OF CONTENTS

MONDAY, MARCH 26	3
WORKSHOP INTRODUCTION AND PLENARY SESSION	4
<i>Ed Carter, Executive Director, Tennessee Wildlife Resources Agency</i>	4
<i>Cassius Cash, Superintendent, Great Smoky Mountains National Park</i>	5
<i>Smoky Mountain Black Bears: 50 Years of Research, Mike Pelton</i>	6
<i>History of Black Bear Management in the Great Smoky Mountains National Park, Kim DeLozier</i>	9
<i>Measuring Public Attitudes Toward Bears, Mark Damien Duda</i>	13
REDUCING CONFLICTS: TACTICS AND TOOLS	17
<i>Wildlife in the Cloud: Using Technology to Enhance Human-Wildlife Conflict Management, Sarah Barrett</i>	17
<i>A Qualitative Assessment of the Polar Bear Viewing Experience, Jessica Fefer</i>	19
<i>Assessing Survival and Spatial Ecology of American Black Bears Released from Appalachian Bear Rescue, Coy Blair</i>	20
<i>Use of GPS-radiocollared Bears to Identify and Delineate a Community “Bear Wise” Zone, Jessica Giacomini</i>	22
<i>Question and Answer Session</i>	25
<i>Efficacy of Bear Deterrent Spray Versus Polar Bears, James Wilder</i>	27
<i>Conducted Electrical Weapon Use for Wildlife Management in Alaska, Larry Lewis</i>	31
<i>Evaluating Conducted Electrical Weapons as an Aversive Conditioning Tool for Nuisance Black Bears in Great Smoky Mountains National Park, Ryan Williamson</i>	32
<i>Coexisting with Grizzly Bears, Gillian Sanders</i>	34
<i>Brute Force: Reducing Food Attractants Through Modification of Trash Containers, Mike Orlando</i>	36
<i>Question and Answer Session</i>	37
<i>Panel Discussion</i>	38
TUESDAY, MARCH 27	45
UPDATE ON GRIZZLY BEAR RECOVERY IN THE LOWER 48, HILARY COOLEY	45
BEAR MANAGEMENT AMONG MULTIPLE JURISDICTIONS	47
<i>Hikers vs Bears-Management Challenges on a Long-Distance Trail, Morgan Somerville</i>	47
<i>Managing Bears Across Multi-Jurisdictional Boundaries, Jay Honeyman & Steve Michel</i>	49
<i>Question and Answer Session</i>	51
MANAGING BEARS: INDIVIDUALS AND POPULATIONS	53
<i>Human-Sloth Bear Conflicts: A Significant Challenge to Conserve the Real Baloo of India, Nishith Dharaiya</i>	53
<i>The Savage Bear: A Case of Individual Bear Management in Denali National Park and Preserve, Patricia Owen</i>	55
<i>Human-Asiatic black bear interaction in the Kaghan Valley, Pakistan, Ashfaq Ali</i>	57
<i>Understanding Sloth Bear Attacks in Gujarat for Formulating Future Conservation Strategies, Arzoo Malik</i>	58
<i>Is it Addiction? Food-Conditioning in Grizzly Bears of Alaska’s North Slope, Dick Shideler</i>	59



<i>Research, Conflict Management, and a Network of Organizations Reduces Conflict Mortality of Grizzly Bears, Michael Proctor</i>	62
SUCCESSFULLY MANAGING ATTRACTANTS	63
<i>Challenges to Becoming a Bear-Wise or Bear-Smart Community, Joel Zachry</i>	63
<i>WildsafeBC: Current and Future Outlook, Mike Badry</i>	64
<i>A Stakeholder’s Perspective of Successes and Challenges with the BC Bear Smart Communities Program, Mike Badry</i>	65
<i>Management Techniques to Minimize Backcountry and Frontcountry Bear-Human Conflicts in Glacier Bay National Park, Alaska, Tania Lewis</i>	67
<i>Polar Bear Attacks on Humans: Implications of a Changing Climate, James Wilder</i>	69
<i>Panel Discussion</i>	72
WEDNESDAY, MARCH 28	78
NON-FATAL BLACK BEAR ATTACK ASSOCIATIONS, AND MANAGER PERCEPTIONS OF RISK, LITIGATION, AND POLICY, JANEL SCHARHAG	78
HUMAN-BLACK BEAR CONFLICT IN URBAN ENVIRONMENTS OF COLORADO, STEWART BRECK	81
<i>Question and Answer Session</i>	85
MOTIVATING PEOPLE: PATHWAYS TO SUCCESS	88
<i>Visitor Management of Commercially Guided Polar Bear Viewing, Robert Dvorak</i>	88
<i>The “Endangered” Polar Bear Viewing at the Arctic National Wildlife Refuge, Jeffrey Hallo</i>	89
<i>Black Bears in Big Bend: A Thirty-Year Perspective, Price Rumbelow</i>	90
<i>Wildlife Connectivity in the Pigeon River Gorge: A Proactive Approach to Mitigating Wildlife-vehicle Collisions, Jeffrey Hunter</i>	92
<i>Massanutten Village: An Imperfect Success Story, David M. Kocka</i>	94
<i>Question and Answer Session</i>	95
BUILDING PARTNERSHIPS THAT WORK	96
<i>Sharing the Range, Andrea Morehouse</i>	96
<i>Changing Bear Feeding Prohibitions in Florida, Sarah Barrett</i>	97
<i>Working with Residents to Secure Attractants and Prevent Bear-Human Conflict, Russ Talmo</i> ...	100
<i>Incentives for Local Governments to Be BearWise, Dave Telesco</i>	101
<i>Building Partnerships: Tyndall AFB Becoming BearWise, Kaitlin Goode</i>	104
<i>Collaborative Conservation: Coping with Increasing Polar Bear Use of Alaska’s Coastline, Susanne Miller</i>	106
<i>Florida’s Bear Response Contractors, Carol Knox</i>	109
<i>Building Partnerships to Reduce Grizzly Bear Conflict in the Bow Valley, Jay Honeyman</i>	111
<i>Panel Discussion</i>	112
POSTER SESSION ABSTRACTS	117
PRESENTATION ABSTRACTS	134



MONDAY, MARCH 26, 2018

WORKSHOP INTRODUCTION AND PLENARY SESSION
Moderators: Dan Gibbs and Bill Stiver

Dan Gibbs, Tennessee Wildlife Resources Agency

Dan Gibbs, 2017 SEAFWA Wildlife Biologist of the Year, welcomed participants and recognized workshop sponsors. Dan introduced the plenary session speakers.

Ed Carter, Executive Director, Tennessee Wildlife Resources Agency

Ed Carter welcomed participants to the workshop and specifically, to Tennessee. Carter recognized TWRA partners: The National Park Service and Cherokee National Forest and commented on the development of bear reserves as a result of that partnership. In discussing the workshop location, Gatlinburg, Carter mentioned the challenge of managing bears in a heavy tourist area. The Bear Wise program, developed from a previous human-bear conflict workshop, has been implemented in this area. BearWise.org is a regional program based in the southeastern U.S. that shares ways to prevent conflicts, provides resources to resolve problems, and encourages community initiatives to keep bears wild. As the director of TWRA, Carter says there are three big issues of bears and bear management. Carter discussed a survey Mark Damien Duda conducted for TWRA that found that over 80% of respondents like bears and want to see them, but not in their backyard. Carter discussed the problem of nuisance bears and bears that become involved in a conflict resulting in human fatality or injury. Carter provided an example of public outrage after a bear family had to be euthanized in Gatlinburg. Carter also recognized another TWRA partner - Appalachian Bear Rescue. Although the work of the rescue has no significant impact on the population of bears in Tennessee, it has a tremendous impact on public perception. Having a place to take injured or orphaned cubs and yearlings reduces pressure on the agency and provides the benefit of conducting research. Carter provided additional information about the three grand divisions of Tennessee. The Grand Divisions, East, Middle, and West Tennessee, are sometimes referred to as the "three states of Tennessee." The three regions are geographically and culturally distinct.



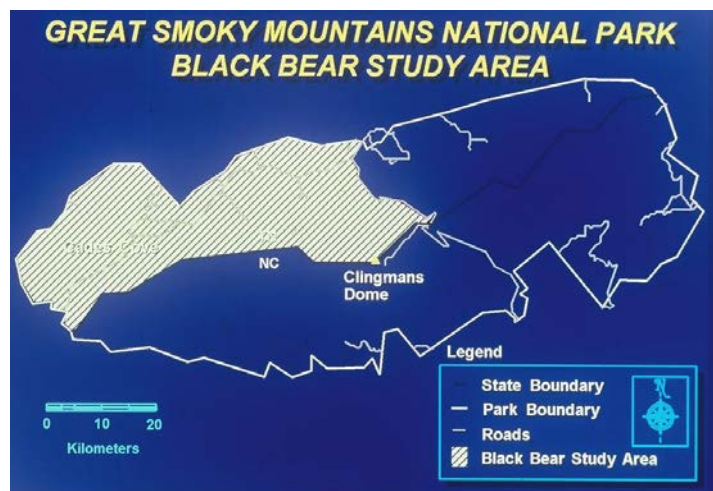
Cassius Cash, Superintendent, Great Smoky Mountains National Park

Bill Stiver, Supervisory Wildlife Biologist for the Great Smoky Mountains National Park introduced the park's superintendent, Cassius Cash, a native of Memphis, TN. Cash began his career as a wildlife biologist for the US Forest Service in Washington. He has served in a variety of leadership positions throughout the United States. He became the park's 16th superintendent in February 2015.

Superintendent Cash welcomed participants to Gatlinburg, Tennessee, the gateway to the Great Smoky Mountains National Park. Cash recognized Bill Stiver and Dan Gibbs for their work in bringing the 5th International Human-Bear Conflicts Workshop to Tennessee; the first time it has been held east of the Mississippi. Cash provided a snapshot of why the GSMNP is considered a national treasure. The park was established in 1934, consisting of roughly 522,000 acres. The GSMNP has the largest visitation of any national park in the United States, with 11.3 million visitors annually. Visitors to the park enjoy it in a variety of ways: hiking over 800 miles of trails, exploring 384 miles of roads with beautiful vistas, ten campgrounds with more than 1,000 campsites. Park visitors are responsible of over a billion dollars of economic stimulus to surrounding communities, creating a symbiotic relationship with the park. There are estimated to be two bears per square mile within the park boundary. A growing bear population and 11.3 million visitors increases the risk of human-bear conflicts within the park. Superintendent Cash provided a history of the growing bear population in relation to park visitors. In 1992, there were estimated to be between 400-600 bears within the park, with an annual park visitation of 8.9 million. In 2017, >1600 bears are estimated to live within the park with 11.3 million visitors. In addition to the annual visitors to the area, there are over 100,000 full-time residents in Sevier County, a population that has almost doubled from 51,000 in 1992. GSMNP has moved their bear management program from reactive to a more proactive approach, which began by addressing the management and removal of over 584 tons of garbage annually. Backcountry campsites contain food storage cables and the park supports research from the University of Tennessee. Superintendent Cash maintained that there is still much work to be done to address human-bear conflicts within the boundary of the GSMNP and challenged participants to get outside of their comfort zone as biologists during the workshop. "Our efforts will be blunted if we don't talk about the human side, as well. We have to talk about how we can come up with simple and succinct messages of having our visitors and residents seeing themselves as part of the answer." Cash further emphasized that we must leverage our efforts to get people involved to resolve human-bear conflicts.

Mike Pelton, Professor Emeritus, University of Tennessee, Knoxville
Presentation: Smoky Mountain Black Bears: 50 Years of Research

Dr. Pelton shared slides from his decades of black bear research in the GSMNP, demonstrating that there is no such thing as bear-proof, only bear-resistant methods. One of Dr. Pelton's studies focused on visitors involved in bear jams, which found that 100% of the time someone fed the bear, giving it positive reinforcement. A short hike in 1949 led to Dr. Pelton's love of the Smokies and his decades long work with the park. While backpacking the AT in the 1950's, Dr. Pelton has his first encounter with a nuisance bear on Spence Field. It was in 1968 that he joined the University of Tennessee faculty and received a phone call from the park service. The park was concerned about the status of the black bear in Tennessee; they were not seeing many bears. Both Tennessee and North Carolina were taking extreme measures to enhance the bear population. Tennessee shut down its hunting season and North Carolina created some bear sanctuaries. There were four questions to be resolved: How many bears were in the park? Could the population be tracked through time? How can nuisance issues be dealt with? What is the natural history of the black bear; the icon of the Smokies? Dr. Pelton and his graduate students began by studying the wild bear of the backcountry, not the nuisance bears. Over forty master's and PhD students have completed studies on bear projects within the park. Between 1968-1970, the "Night of the Grizzly" incident in Montana, polar bear issues, and the scarcity of the black bear resulted in organizations and agencies forming to address the various issues concerning bears. This period was a defining moment for bears in North America. There were three significant things that occurred that almost took the population of bears in the GSMNP and surrounding areas to total extirpation. One was the settlement pattern of the Scotch-Irish people in this part of the country, who cleared lands, hunted wildlife, and lived off the land. The second was unregulated timber harvest that took place in large sections of the national park. The third was the most devastating event, which was the American chestnut blight that swept southward out of New York and eliminated the species from the overstory of the Smokies. The chestnut was prime food, not only for bears, but for other wildlife as well. In over seventy-five years, there has been good recovery since the establishment of the park. The GSMNP is surrounded by six national



forests and millions of acres of public land, in the Southern Appalachian region of four states. This is the origin of the Southern Appalachian Black Bear Study Group, which has met twice a year since the 1970's. The northwestern section of the park with over 125,000 acres was chosen as the study area. The area could only be accessed on foot by using existing index trails within the park, with elevation changes from 900 to over 6,000 feet. Studying a population on foot was a daunting task. The selected index trails were multi-purpose allowing study of black bear food habits, activity patterns, and mark trees. Pre-baiting was used to determine sites being actively used by bears. For years, trails were hiked every two weeks from May to October, covering over a hundred miles or more. Dr. Pelton acknowledged the efforts and commitment of the students and volunteers. They determined that bears were ridge runners and gap crossers. Collection of scats and study of food habits resulted in a succession of studies in corresponding years. Over 691 mark trees were identified and catalogued over a period of three years. Pre-baiting was successful to the extent of its correlation between baits taken and what was occurring in the bear population. Pre-baiting evolved into the bait station survey currently used. Dr. Pelton shared the progression and advances of immobilization drugs, traps, and snares over the course of the years of study. Early in the study, drugs being used resulted in the death of bears. Modifications were made to snares to make them safe and humane. An interesting finding was that with over 1200 bears in the study area, nuisance bears were rarely trapped.

A desire to increase sample size led to the examination of the characteristics of isotopes needed for population estimates. During the study, 30-100 bears were being captured, but there was concern about the recapture rate and the accuracy of population estimates. Out of 2,000 isotopes, four were found to be useful to determine population estimates. The isotopes were injected into the trapped bears. The bears were released, and the "recapture" involved collecting scats along the trails, giving decent population estimates. The use of isotopes has also been used in studies involving other species of wildlife as well. Red wolves introduced in Eastern North Carolina had isotope tags so that individual animals could be identified when collecting scat.

Black bears are normally crepuscular but have behavioral plasticity dependent upon their environment. A finding of the study was the amount of time bears are arboreal. They spend lots of time in trees, which is evident from the damage to trees as limbs are pulled in for feeding particularly during hyperphagia. In the Smokies, the acorn has replaced the American chestnut and now dictates the population dynamics of black bears in the mountains, their natality, their mortality, and their movements. Black bears change behaviorally, ecologically, and physiologically during the hard mast. White oaks are preferred, and Dr. Pelton described the hard mast as a "boom and bust" in terms of availability of acorns and how the bears

respond. Hard mast failures in this area are dramatic and result in a significant shift of home ranges. In 1978, a hard mast failure led to a prediction of no cubs being born, however, it was one of the best years for wild grapes that carried bears through till denning. Bears in the Smokies prefer to den in hollow trees, 100-250-year-old trees with hollow cavities. The dry, well-protected den for females and cubs calculates to >40% energy savings to bears in tree dens, as opposed to ground dens.



In the fifty years of study, some anomalies have been noted, such as the amazing recuperative power of bears during hibernation, and the monitoring of a white-footed bear. An advancement made is the new procedure of catching hair instead of catching bears using a bait side surrounded by barbed wire. Dr. Pelton discussed the cultural carrying capacity of the maximum number of bears acceptable to humans as being the core issue of human-bear conflicts and solving issues. Communication, cooperation, and collaboration are vital to resolving human-bear conflict issues. Dr. Pelton further emphasized the benefits of long-term studies in fully understanding issues concerning bears. The decades long park bear study has reached four continents, seven countries, thirty-seven study areas, six species of bears, and eighty graduate students.

Research Topics 1968 - 2018 80 students (M.Sc. and Ph.D.)

Natural History	Activity Patterns and Behavior
Population Indices	Movement Ecology
Physiological Markers	Habitat Use and Modeling
Trap Response	Effects of Roads
Population Estimation	Effects of Fragmentation
Population Dynamics	Landscape Ecology and Bears
Long-Term Monitoring	Metapopulation Dynamics
Morphology	Mark Trees
Hibernation	Genetics
Den Site Characteristics	DNA Mark-Recapture
Reproductive Biology	Human-Bear Interactions
Physiology	Human Attitudes Towards Bears
Food Habits	Nuisance Behavior
Caloric Production	Nuisance Bear Ecology



***Kim Delozier, Wildlife Biologist (Retired), Great Smoky Mountains National Park
Presentation: History of Black Bear Management GSMNP***

The Great Smoky Mountains National Park is the focal area for the southern Appalachian area. Decades ago, success was measured by the number of visitor injuries. Some of the challenges for early bear managers in the 1940's-60's was lack of experience, equipment, and knowledge. Garbage, food storage, and education about bears were issues, but not significant at that time as there were very few bears in the park. Education was a simple focus on "don't feed the bears," meaning actual hand feeding. In the early days of the park, the disposition of problem bears included: capture and relocation, and bears being shot by park staff and dumped at a designated site between Pigeon Forge and Gatlinburg. This dumpsite was a "black eye" for the park service for decades as the public perceived this as normal procedure for dealing with nuisance bears. Poaching removed some bears in both the front and backcountry. In the early days, there were few bears outside the park. Bear hunters would enter the park boundary and illegally trap and relocate a bear to an area where they could legally hunt the bear. Additionally, roadside poaching was an issue, specifically with the use of blasting caps hidden in meat to kill the bear. In the 1960's, bear management showed signs of change. The Singer/Bratton study from 1964-1976 evaluated human/bear conflicts. Annual visitation in the park increased from five million to eight million visitors. There were 107 human injuries, 715 incidents, 332 captures and relocations of bears, with eighteen being euthanized. Increased visitor use led to food storage violations in front and backcountry shelters. The late 1960's began the installation of bear proof/resistant garbage containers. As backcountry shelter camping was increasing, chain link fencing was installed to provide enclosed camping in shelters where bear problems existed. The bear population was increasing, but there were no reliable numbers to know exactly how many bears existed in the park. Basically, bear management was "trial and error" and a "just do something" approach.

The 1970's brought more changes as the bear population was estimated to be 200-400 bears park-wide. The securing of garbage in the front country was progressing; there were improved visitor education efforts, and the development of food storage regulations. The addition of full-time positions for wildlife management for the first time since the park's development, improved biological data collection began by Bill Cook, and the first use of a personal computer to store individual wildlife data were significant changes in the 1970's.

Bear management completely changed directions in the 1980's. The bear population had grown to an estimate of 400-800 park-wide. The primary action continued to be relocation. Bill Stiver's research on capture and relocation found that a bear would need to be relocated forty air miles from the capture site for

relocation to be successful. Annual visitation increases meant an increase in the amount of garbage in the park. Viewing bears was popular and became an expectation, especially in areas such as the Chimneys picnic area. A bear attack in this area in 1989 was a “game changer” for bear management in the park. The park responded by closing the picnic area and implementing nighttime monitoring of the area. Twelve bears were observed in the picnic area simultaneously feeding on garbage that was scattered throughout the picnic area. The park realized there was a major unsecured garbage issue in the picnic area at night, which they had been unaware of due to early maintenance shifts cleaning up the trash each morning. While searching for solutions, they began using volunteers and interns to clean the area at dark, moved people out, and closed the gates. Furthermore, they began trapping bears at night, and upon Dr. Mike Pelton’s suggestion, implemented a “catch and release on site” approach. As a result of all the efforts, they began to see fewer day active bears and had less relocation of bears. Some of the challenges during this time included getting support and buy-in from the community. Bears were “good business” in Gatlinburg. Visitor satisfaction decreased as fewer bears were seen. After using volunteers and interns to clean up the picnic area for more than a year, the park began to look to other divisions, such as maintenance and law enforcement, to assist after dark with securing garbage, cleaning grills and picking up food scraps at dark, and closing the gate. Wildlife crews would arrive after dark to manage active bears in the area. This resulted in resistance from the maintenance staff that had been asked to change their schedule. Over time, the new methods began to work. Local business owners also resisted because visitors were not seeing bears to the degree they were before. An increase in the amount of garbage necessitated a modification in the garbage collection system from small containers to the use of dumpsters. The results from all the combined efforts in the Chimneys Picnic area were as follows:

1988-1990

Captured 24 different bears
35 relocations (11.6/ year)
3 bears euthanized
1 significant human injury

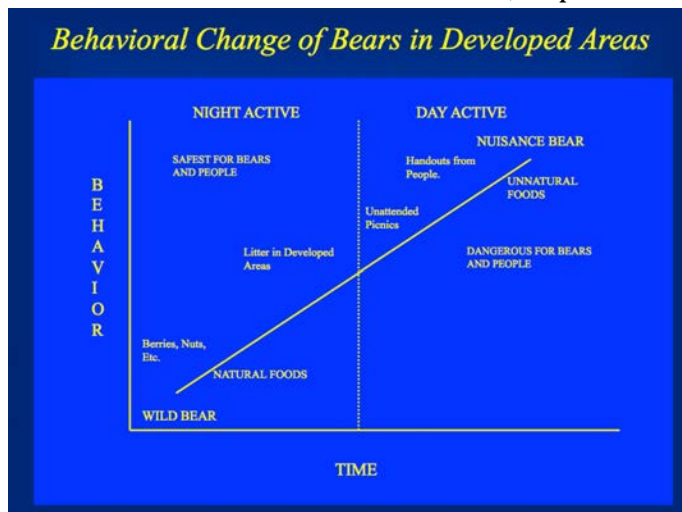
1991-2016

Captured 75 different bears
93 Capture/release-on-site
29 relocations (1.1/year)
1 bear euthanized
No significant human injuries

***Success depends on
consistency,
thoroughness, and a
teamwork approach.
-Kim DeLozier***

The Chimneys Picnic Project resulted in a new understanding about bear management. Picnic areas are training grounds for behavioral changes in wild bears. Night-active bears that are food rewarded become day-active bears. Unsecured night garbage is the primary factor in starting behavioral changes in bears. Cleaning or securing an area at dark is paramount. Aversive conditioning tools, such as capture and release, are generally effective for night-active bears, but not a cure all and result in minimal success on day-active bears. Many people are not pleased if they are not able to view bears. Success depends on consistency, thoroughness, and a teamwork approach.

The 1990's brought a more reactive approach to proactive bear management as the bear density was approaching nearly 2K with more visitors and more garbage. Using the knowledge gained from the Chimneys Picnic Area, the park implemented better materials for visitor education, improved front country food storage in



campgrounds, and the conversion of ground grills to elevated grill stands. Although the primary purpose of the elevated stands was for handicap accessibility, they were beneficial for bear management. The round, ground grills led to a tendency for people to throw garbage and dump uneaten food, which attracted bears. With assistance from the ranger division, food storage was improved in

campgrounds. Key picnic areas were closed at dark and aerial food storage cables were installed at backcountry campsites. Moreover, the chain link fencing was removed from shelters as it was felt that the "enclosed camping" approach encouraged campers to be less responsible with food and garbage. Backcountry campsite management through the use of closures and posted warnings were effective.

The 2000's began a decade of refocusing and refining bear management in the park as visitation to the park exceeded ten million people. The park continued its proactive approach to bear management. The bear population was estimated to be 1600 and the



park saw its first human fatality in the eastern US or a national park. A discussion with Stephen Herrero led to the park refining their message about bear encounters. The message informed people to separate themselves from their food if approached by a bear. After the fatality, the park completed an annual evaluation of bear management. The park issued more warnings and enforced more closings and implemented the fifty-yard rule that people cannot willfully or intentionally approach a bear within fifty yards, or any distance that disturbs the bear. An overall refining of reporting, response, and education were noted improvements as well.

Social media has created both positive and negative impacts for bear management. Social media is not going away. The first major exposure for the park was concerning an incident where a visitor was bitten on the foot by a bear on the Laurel Falls trail. The bear was captured and held for five days before being euthanized. During that time, a Facebook page entitled *Save Laurel the Bear* was created and had 7,000 hits in five days. While this seemed to be a large number of hits, an incident between an elk and a photographer netted 200,000 hits in just twenty-four hours.



Major support factors for bear management included Dr. Ed Ramsay and the University of Tennessee Veterinary Medical Center staff, and the development of Appalachian Bear Rescue, which provided alternatives to the euthanization of small cubs and yearlings that with proper care, time, and the use of methods that did not habituate or food condition the bear, could be re-released. While ABR's

efforts did not impact the management of a population of bears, the benefit to an individual bear and the importance of animal welfare provided wildlife agencies credibility with the general public as they were giving bears a second chance.

From 2010 to the present, the park has seen annual visitation exceed eleven million annually as they continue their proactive approach to bear management. DNA matching has aided in accurate identification of problem bears. The use of GPS telemetry collars has been used in research to learn about bear behavior, travel patterns, and locations resulting in bears becoming food conditioned. The park has

also implemented bear attack response training to improve their response to human-bear incidents.

The park's proactive bear management practices have seen the number of relocations and human injuries decrease although the bear density has increased. Bear management is people management. Good bear managers are typically good people managers and develop strong relationships and partnerships.

***Mark Damien Duda, Executive Director, Responsive Management
Presentation: Measuring Public Attitudes Toward Bears***

In thinking of the concept of wildlife management and how it works, Bob Giles of Virginia Tech asserted that there are three legs to wildlife management, fish and wildlife Populations, fish and wildlife habitats, and human populations. In working with fish and wildlife populations and habitats, fish and wildlife professionals incorporate a scientific, deliberate, orderly process. The approach toward the third aspect of human populations is not so scientific. For years, we have not brought science to people in the way that we do to our populations and habitats. There is a double standard in dealing with people in a manner that is not deliberate.

***“The problem of game management is not how we shall handle the deer...the real problem is one of human management. Wildlife management is comparatively easy; human management difficult.”
- Aldo Leopold, Game Management***

Responsive Management is an internationally recognized public opinion and attitude survey research firm specializing in natural resource and outdoor recreation issues. Their mission is to help natural resource and outdoor recreation agencies and organizations better understand and work with their constituents, customers, and the public. Over the past twenty-eight years, Responsive Management has conducted 1,000 human dimension studies in fifty states and fifteen countries. Responsive Management has worked with every state fish and wildlife agency and most federal resource agencies, bringing the human dimension side to wildlife agencies, including over thirty studies on how the American public views bears, their attitudes toward bears, and what they know about bears.

There are advantages and disadvantages of data collection methodologies. Both qualitative and quantitative research has been used in studying people and their perceptions about bears.

Quantitative Modes

A variety of quantitative survey modes are used, which include telephone, mail, online, and on-site intercept surveys. Telephone surveys are one of the fastest data collection methods. Along with mail, telephone surveys typically achieve the most representative sample as telephone ownership is near universal, and it is eco-friendly. Disadvantages are that costs are moderate to high, answering machines/screening can impact response rates, area codes reflect the area of purchase and not necessarily where the individual resides, and interviewers must be hired and trained. Mail surveys provide excellent coverage (address-based sampling) and allows for the most representative sample. Mail surveys do not require a large staff of people, is convenient for the respondent, and allows for the use of graphics and visual aids. A response bias toward males in general population studies, illiteracy issues (43% of U.S. adults read only at the most basic level or are illiterate), multiple mailings, incomplete surveys, a response rate of six weeks or longer, and risk of data entry errors are drawbacks to the use of mail surveys.

Online surveys are one of the fastest data collection methods, are anonymous, costs are low, utilize computerized data collection, and allow flexibility in the types of questions that can be asked; however, they are not representative, not probability-based samples, can be difficult to calculate response rate, and difficult to assess nonresponse bias. On-site surveys are best for personal interaction, including probing and clarifying of questions, allow for in-depth exploration of issues, allow for observation of non-verbal cues, and ensures all survey questions are answered. On-site surveys are costly, time-consuming, have potential for interviewer/interpretation/acquiescence bias, and may not be a representative sample.

“Wildlife values in the United States are shifting from traditional domination to mutualism orientations.”
– Dr. Mike Manfredo

Qualitative Modes

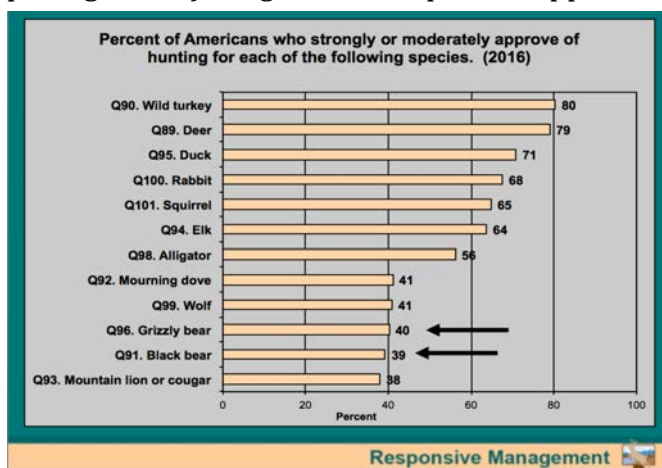
Focus groups, public meetings, and online public input forums are examples of qualitative modes used by Responsive Management. Focus groups are a tried and true method that allows group interaction, replicating what happens in the real world, allows for probing and clarification, and allows for the identification of issues not previously considered. In contrast, focus groups can be costly, findings can't be quantified, results cannot be generalized to a larger population, and have the potential for moderator bias.

Many agencies are legally obligated to conduct public meetings in order to identify issues most important to attendees, provide a forum for public input and feedback, and help agencies maintain transparency and encourage public investment in

decision-making. Public meetings may not be representative as for low salience issues, attendance is often low and may be unusually high and concentrated in both extremes for high salience issues. Public meetings also allow for constituent groups to “stack the deck” and be dominated by certain personalities and viewpoints.

Findings from the research

Of the thirty studies relating to bears, there are common themes. Every survey has shown that bears are important to the public. Hunting black bears is still supported, but not as strong as maybe hunting of deer or other species. In recent elections, the vast majority of statewide, municipal, and county ballot initiatives concerning funding and support for conservation-related causes passed (upwards of 80% passage rates). In general, the public supports having black bears in their state.



Ecological/existence values are more important than utilitarian or recreational values. People may never see a bear, but they care that bears are there. These values are important when developing messages to the public about bears.

The public has low knowledge levels of bears when it comes from a factual position.

Bears are a classic case of “not in my back yard.” They want bears

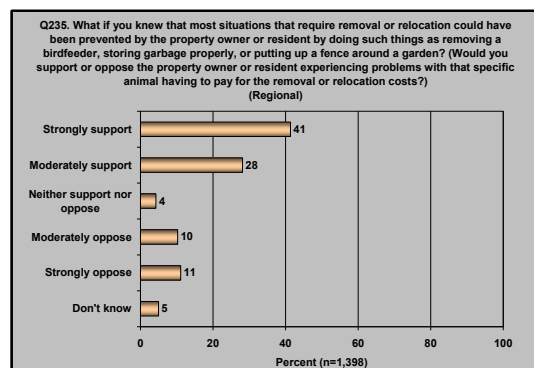
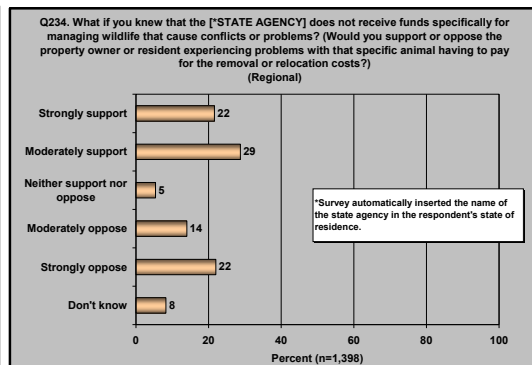
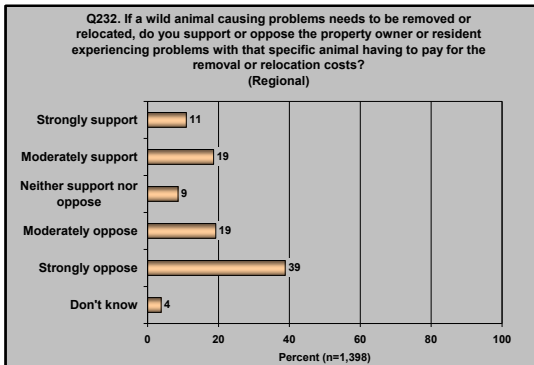
close, but not too close. The public generally wants bear populations to remain the same or increase.

Bears are causing nuisance issues, but not at the level of other species. Studies show about 25% of population has some type of problem with wildlife. With bear nuisance issues, the concern is safety. Generally, garbage and bear presence are the main issues. U.S. residents are supportive of hunting in general, but less supportive of black bear hunting.

Seventy-nine percent approve of hunting, but only about thirty-nine to forty percent support bear hunting. Public support of hunting changes as it applies to species. The majority support animals being used by humans as long as the animal does not experience undue pain and suffering.

Support for lethal methods varies based on the specific situation. Nonlethal methods are preferred over lethal methods for dealing with problem/nuisance black bears. The public feels most problems with bears can be resolved through prevention and support taking preventative measures. The public supports the

agency taking action to curb bear-related problems. Education is the key. Public opinions are malleable with the more information provided. The next three graphs demonstrate how public response changed as additional information was provided.



Lessons Learned

Public support for fish and wildlife agencies is often silent, but strong due to agencies frequently only hearing from the dissatisfied. The loudest constituents may not always reflect the majority. Comments at public meetings and in online forums tell a different story than probability-based random samples. It's important to use the full range of research techniques to assess

public opinions and attitudes. Scientific surveys and focus groups are critical, but public meetings and online forums (non-scientific methods) allow opportunities for *all* to provide input; however, relying *only* on non-scientific methods can lead agencies away from majority views and preferences. The ideal structure for public meetings combines a neutral, third-party mediator with a strong agency presence. Citizens groups or workgroups should be used in addition to, not in place of, scientific data and should remain data-driven. Agencies should recognize their own credibility and use it accordingly. Surveys can help clarify the extent to which the public trusts the state agency. Exploration of controversial topics through reliable human dimensions data is always a good thing. Residents want to hear from agencies and ongoing communication with the public can be as important as conservation, restoration, protection, and enforcement efforts. Words matter when communicating with residents and marketing programs to them. The public needs targeted information on agency funding mechanisms. It must be stressed that biological and ecological projects are only possible through dedicated agency funding. Social constraints are often bigger obstacles to outdoor recreation than are resource or structural constraints.

REDUCING CONFLICTS: TACTICS AND TOOLS (PART 1)
Moderator, Dan Gibbs, Tennessee Wildlife Resources Agency

Sarah Barrett, Florida Fish and Wildlife Conservation Commission
Presentation: "Wildlife in the Cloud: Using Technology to Enhance Human-Wildlife Conflict Management"

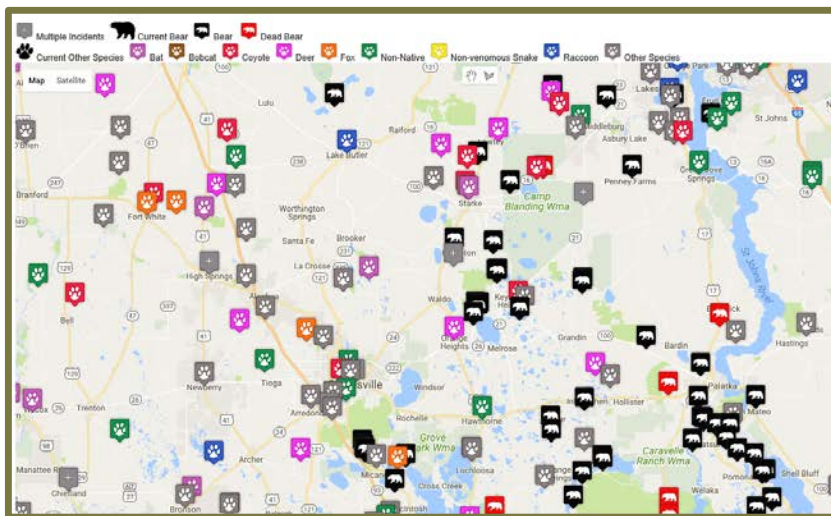
Sarah Barrett discussed the use of the Salesforce platform to manage human-wildlife conflict data. Bear Management had been utilizing a free database since 2000, which started with less than 1,000 calls per year; however, after exceeding 6,000 calls per year, the program became obsolete. They consulted with Alligator Management about their use of the Statewide Nuisance Alligator Program (SNAP) system that has a growing annual volume of greater than 18,000 calls. Exotics and Natives were logged in various access databases, but accessibility was limited for staff statewide. A few species of wildlife were simply logged manually, in Excel spreadsheets, or not at all.

In 2013, an action team was formed to develop a centralized incident management system to record all wildlife incidents agency-wide, regardless of species, collecting data on caller information, agency response, and the outcome of human-wildlife incidents. This cross-program effort included representatives from the Division of Law Enforcement, Wildlife Impact Management Section, Alligator Management Program, and Bear Management Program. The team worked with various programs to create a basic outline that met their needs.

A competitive bid process followed the creation of a robust scope of work that included key components from all the management programs. Seventeen proposals were received with costs ranging from \$52,000 to \$800,000 and a timeframe of eighteen weeks to ninety-one weeks to full implementation. The variation in time and cost was due to the type of solution proposed, existing software with modifications to meet the need, or having to create software from scratch. The team utilized a decision matrix to evaluate all bids and interviewed the top four. The team chose The Canopy of Technology as the primary vendor for overarching management. Thatcher Mathias assisted as liaison between the agency and Coastal Cloud, the company that performed the technological build, completed the actual code work, and made modifications. The cost of the project was \$187,000. The system was projected to take eighteen weeks; however, full implementation was more than six months due to species differences and the discovery that the system could do more than the agency initially realized. This delay was no fault of the

vendor but was due to the agency wanting to take advantage of all the aspects of the program.

Salesforce is the program chosen for modification by the vendor. Salesforce is technically a customer relationship management program (CRM); however, it is an out-of-the-box solution that stores data in the cloud. The agency owns the data, but it is stored in numerous locations, so agency server space is not used for backing up data. The Single User Sign-On allows for ease of access; once logged into the agency user profile, the user has access to Salesforce. The program has varying levels of licenses allowing for limited access to higher-level functions, layout, and adding/deleting users. Salesforce performs maintenance and upgrades automatically, three to four times each year. Individual user profiles are linked to



work programs specific to the species they manage. Alligator management staff doesn't need to see bear management data, but Wildlife Assistance Biologists can access data pertaining to all species.

The system began by building a common framework needed by each program, which included contact mapping, caller name, caller information, incident location, and type of incident.

Some of the highlights included email for follow-up, reporting, auto fill fields, related fields, searchable maps, Bear Response Contractor access, and is customizable to the needs of a specific program. This allowed the agency to find tools and designs that work for each program using the same database. Salesforce has the capability for other programs to join and build onto the system. With each addition, existing programs have the opportunity to gain new functionality from the added program. Future programs that may join the database are bird strikes/mortalities, fish kills, DEA drug logs, the panther program, captive wildlife permitting, derelict vessels, wildlife necropsy, and customer service.

Jessica Fefer, Clemson University, Department of Parks, Recreation and Tourism Management

Presentation: A Qualitative Assessment of the Polar Bear-Viewing Experience: A tool for identifying experience indicators in the Arctic National Wildlife Refuge

Jessica Fefer provided background on the Arctic National Wildlife Refuge (ANWR), commercially guided polar bear viewing, and visitor use management plan in Kaktovik, Alaska. This study focuses on understanding the important indicators of the visitor experience. Few studies have been dedicated to identifying indicators of quality for wildlife viewing. The purpose of this research is to expand this body of work.

Use occurs because of desirable experience and the benefit of interaction with nature and/or wildlife. Visitor use management is a top priority for the protection of natural and cultural resources and uses an “Indicators and Thresholds” based approach. Indicators of quality are measurable, manageable variables that are important to the visitor experience. Indicators of quality for wildlife viewing include:

- Boats at one time (BAOT)
- Distance to bears (Miller & Freimund, 2017)
- Number of species/polar bears observed (Skibins et al., 2012)

The study uses qualitative methods such as interviews and visitor-produced photographs to gain a deeper understanding of the visitor experience. Jessica applied at ANWR to identify potential indicators of quality for the visitor experience while polar-bear viewing. Twenty-four on-site interviews were conducted and nineteen post-visit photo elicitations from those interviewed. Visitors were asked to identify photographs that fit into specified categories, allowing for better analysis of the data in terms of what is indicative of the visitor experience. Visitors were asked what they were expected to see. The relationship between what is expected and what is actually experienced is linked to a quality experience. Visitor expectations fit into two categories: seeing polar bears in their natural environment, and remote, Native Alaskan village settings. Visitors were asked about epiphanies experienced. When asked without pictures, visitors mostly focused on their personal views on bears and community-bear relationships. In the photo elicitation interviews, the setting, environment, and climate impacts were frequent responses. In spoken interviews, there was nothing that added or detracted from experience other than photographers having technical issues with their own camera equipment or non-photographers having movements limited due to photographers. In photo elicitation interviews, much more was captured in terms of things that detracted from the experience. Themes that were expressed dealt with positive or negative community interactions, viewing environment, and accommodations.

In conclusion, photographs captured different types of information compared to spoken interviews. Interviews and photo elicitation corroborate past research to highlight important experience indicators (BAOT, distance to bears). Potential indicators that emerged from interviews/photo elicitation include:

- Number of bears
- Vessels in view/distance to other boats
- Opportunities to formally learn about bears and native culture
- Un-spoiled/un-commercialized setting

Coy Blair, University of Tennessee, Appalachian Bear Rescue

Presentation: Assessing Survival and Spatial Ecology of American Black Bears Released from Appalachian Bear Rescue

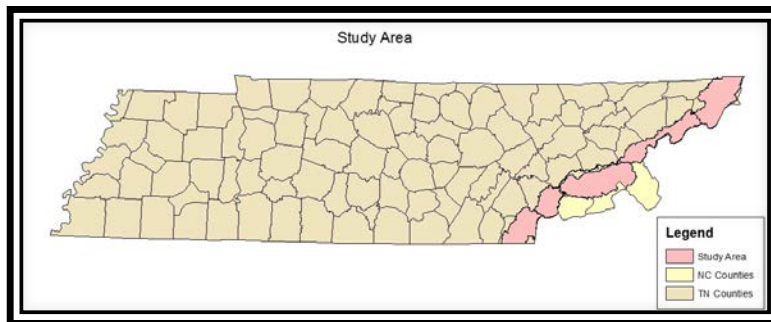
Coy Blair shared preliminary results from his graduate research assessing survival and spatial ecology of black bears released from Appalachian Bear Rescue (ABR).

Managers have six options when dealing with orphaned bears:

- Do Not Intervene
- Euthanize Humanely
- Reunite with Biological Mother
- Foster
- Place in Permanent Captivity
- Rehabilitate

This presentation focused on the rehabilitation option. Literature is limited on research for cubs of the year and yearlings. Appalachian Bear Rescue is one of few rehabilitation facilities that release cubs of the year. Since 1996, ABR has released over 260 bears back to the wild. In 2015, a year of synchronous breeding of black bears in Tennessee was followed by a significant mast failure. ABR rehabilitated a record number of thirty-six orphans. In 2016, an additional twenty orphaned bears were received, resulting in a record season of fifty-six bears. The large sample size allowed for research to close the knowledge gap and learn about the effectiveness of ABR's methods.

Purchasing GPS collars from Vectronics Aerospace, forty-two ABR bears (twenty-three males and nineteen females) were released as cubs of the year and yearlings. Collars were programmed to transmit location every three hours and drop at sixty weeks. Overall study objectives were to assess survival, conflict behavior, and spatial ecology.



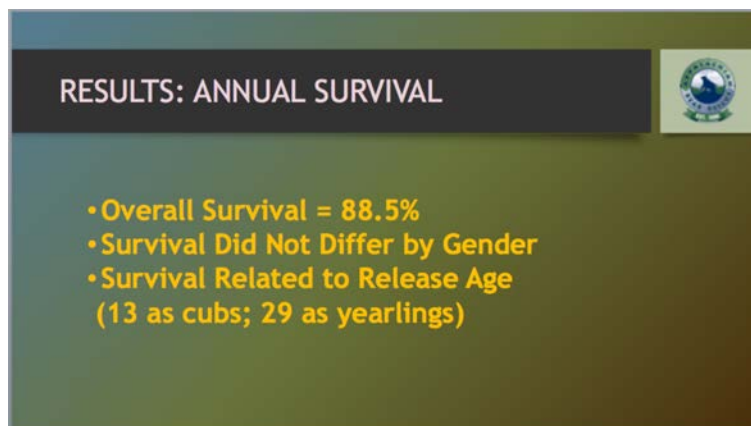
The study area encompassed the Great Smoky Mountains National Park and North and South regions of the Cherokee National Forest.

The results were a high overall survival rate of 88.5%. The study also examined how the effects of gender, release area, release age, intake age (age of orphaning), release weight, and number of care days impacted survival. Survival did not differ by gender; however, release age was related to survival, specifically the older the bear, the greater chance for survival. For example, the youngest bear in the study was 292 days old and had a probability of survival of 60.5%, as opposed to the oldest bear in the study, which was 548 days old and had a survival probability of 99.7%.

Cause-specific mortality one-year post-release was 9.5% with four total mortalities. Reasons included one conflict removal, two road killed, and one unknown cause. One female, hit by a car in Townsend, Tennessee, was admitted and cared for at ABR for 2.5 months, released back into the wild, and one year later was hit on the same highway and died as a result of her injuries.

Conflict behavior one-year post-release was 7.1% with three (all males) of the forty-two bears having engaged in conflict behavior ranging from raiding a bird feeder (one relocated), approaching humans (one relocated), and damaging property (one euthanized). Another

aspect studied was to determine how many bears exhibiting conflict behavior had mothers that had a conflict history. Of the forty-two bears collared, seven had mothers with a known history of conflict behavior, including the three that engaged in conflict behavior. The remaining four, who came from mothers with a similar history, did not engage in conflict behavior, including two who were siblings of one of the bears that did.



The mean dispersal distance from release site was 9.86 kilometers, with females going farther at a mean of 11.26 kilometers. Out of six bears dispersing over twenty kilometers, five were females. The mean dispersal distance for males was 8.72 kilometers.

Most of the bears in the Smokies select trees for denning. The denning ecology for twenty-seven of the study bears where dens were visited was as follows:

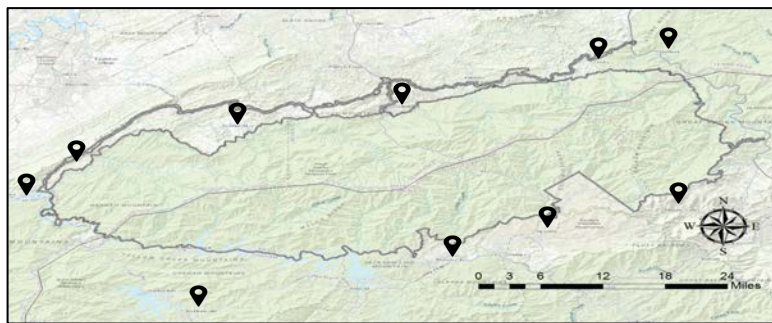
- 15 tree dens (55.6%)
- 9 ground nests (33.3 %)
- 3 excavated dens (11.1%)

In summary, of the six options managers have when finding injured and orphaned cubs and yearlings, bear rehabilitation offers help to bears, managers, and is greatly supported by the public.

Jessica Giacomini, University of Tennessee

Presentation: Use of GPS-radio collared Bears to Identify and Delineate a Community “BearWise” Zone

The Great Smoky Mountains National Park (GSMNP) has one of the highest black bear densities in the world, with an estimated population of approximately 1600 American black bears.



The GSMNP is about 2100 square kilometers in size with eleven million visitors to the park annually. With a relatively high bear density and so many visitors, human-bear interactions are common; however, these interactions are not constrained to park boundaries. Human-populated areas surround the park with bears becoming food-conditioned and comfortable with people.

Gatlinburg, Tennessee is considered the gateway to the Smokies and draws lots of tourists who produce tons of trash. Gatlinburg is one of the most well-known communities surrounding the park boundary, is an important stop for park visitors, and is the only city with enforcement in place for human-bear conflicts.

**Tennessee Wildlife Resources Commission Proclamation
Feeding of Black Bears Prohibited**

**Proclamation 00-17
August 23, 2000**

Pursuant to the authority granted by the Title 70, Tennessee code Annotated, and Sections 70-1-302 and 70-5-101 thereof, the Tennessee Wildlife Resources Agency hereby proclaims the following regulations pertaining to the feeding of black bears:

Sections I. Black Bear Feeding Prohibited

It is unlawful to intentionally or knowingly feed a black bear or intentionally or knowingly leave food or garbage in a manner that attracts bears. It is also unlawful to engage in any indirect or incidental feeding of bears if the activity occurs after the notice from either the City of Gatlinburg or a law enforcement officer thereof or from an employee of the Tennessee Wildlife Resources

Agency to the person responsible for such indirect or incidental feeding. Such notification shall include the type of activity which is prohibited. Further such activity by the responsible person after notice shall be a violation of this section.

Section II. Areas Closed to the Feeding of Black Bears

For the purpose of this proclamation, areas closed to the feeding of bears include the Corporate Limits of the City of Gatlinburg and Chalet Village North Subdivision, as posted. A more complete description may be found on file in the office of the Tennessee Wildlife Resources Agency in Nashville, Tennessee.

Penalty

Violation of this law is a Class C misdemeanor punishable by a fine of up to \$50 and a court cost of \$180.50. In addition, the punishment may involve community service.

In August 23, 2000, an ordinance was put in place prohibiting the intentional or unintentional feeding of black bears with violations being a Class C misdemeanor. An example given of a violation was from 2016 when visitors intentionally fed a bear and posted it on social media. The post went viral and the two tourists were fined \$250 each with additional court costs of \$270.

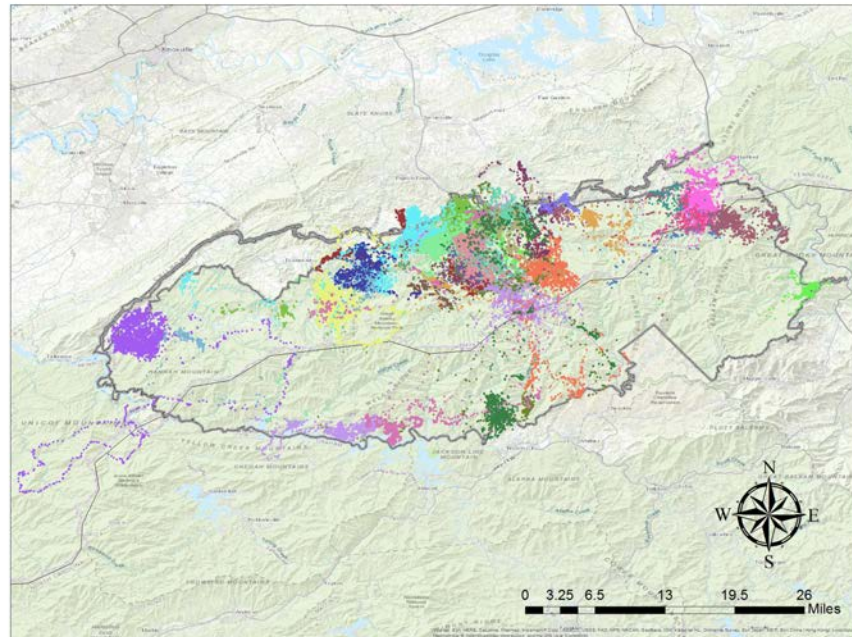
In addition, Gatlinburg has a city ordinance requiring animal-resistant garbage collection devices, enclosures that do not allow entry by wildlife, or are located inside a structure and taken to an approved garbage collection site by the owner. This ordinance, however, does not apply to all areas of Gatlinburg. The ordinance covers approximately 9.5 square kilometers and was intended to be a buffer zone. The prevailing thought was that if bears entered the buffer zone and couldn't get into garbage, they would be deterred from going farther into the city.

In 2015, Jessica, working with the GSMNP, began a conflict bear study, collaring and tracking the movements of fifty-one bears. Collars transmitted a location every two hours when the bear is inside the park boundary but transmits every twenty minutes when the bear leaves the park boundary. The goal was to determine how the bears were using the park boundary, were they going into town, and were they accessing food when in town. In spite of the ordinance and the "buffer zone," over 50% of the collared bears entered the city of Gatlinburg. The bears were not exclusively using Gatlinburg and were going into other communities and towns surrounding the park. Only seven exclusively used Gatlinburg.

One question contemplated was how improvements could be made upon bear ordinance zones. One thing worth incorporating into the design of ordinance zones is home range estimates. Male home ranges are 20-25% larger than females.

Female home range is roughly the same size as the ordinance zone.

Each color in the map represents an individual bear.



Bears are using all areas of the park and are accessing all types of human foods, particularly at

points along the boundary of the park. Males are traveling longer distances. The small ordinance zone in only Gatlinburg is not sufficient. There is evidence of bears leaving the park and finding natural foods. An example was shown of female traveling nightly through Gatlinburg to feed on acorns.

Male bears are exiting the park boundary more than females; however, the data has shown their home range to be larger, but for three males in the study, the city of Gatlinburg was a commonality, although they were also traveling to other parts of the park as well. The data suggests that the “buffer zone” is not sufficient to stop food conditioning from happening.

This research raised more questions for future study.

- Is it time to revisit ordinance zones around Great Smoky Mountains National Park?
- What criteria do we use to create the boundaries of an ordinance zone?
- How can we use scientific data to delineate these boundaries?
- Should we expand the current bear ordinance zone? The entire city of Gatlinburg? Beyond that?

- Should other communities create ordinances? Do we need a region-wide perspective?
- Within the ordinance zone, is it being regulated well?

With any ordinance, to be successful, enforcement is important. BearWise.org lists examples of over twenty communities that have become Bear Wise, including Gatlinburg. With all the communities that surround the park, and a high density of black bears, it is surprising that more communities have not made efforts to create ordinances. A region-wide approach with a buffer zone around the entire park and all communities in compliance is a recommendation from this study.

Question and Answer Session

Question: Does Gatlinburg use any kind of aversive condition on problem bears? How many have been euthanized?

Dan Gibbs, TWRA: They use all the tools in the box. If they have opportunity for aversive conditioning, they will take advantage if the situation necessitates. It works on some and doesn't work on others. Euthanasia has been used, which usually doesn't go well for the park or TWRA when it happens, but I don't have the number.

Question: Did you see any difference between females with and without dependent young if they went out of the park?

Jessica Giacomini: Out of the females that left the park, home ranges were right around the park boundary or completely outside the park. The females didn't leave the park unless they lived close to that area. An exception was the hard mast failure of 2015, which saw females leaving the park, traveling far.

Question: What software did you use to determine home ranges?

Jessica Giacomini: The collars were from Vectronics Aerospace. The software they use is GPS PLUS X software. You can export as a kml and use GoogleEarth. A lot of the other maps were done in ArcMap.

Question: How much of the activity in Gatlinburg was related to natural food availability?

Jessica Giacomini: In 2015, there was a hard mast failure where we saw a lot of bears going into towns; however, a lot of the bears are getting human food, so it isn't related to natural food availability. We do see increasing nuisance behavior when berries dry up in summer. Nuisance bear behavior was not necessarily tied to natural

food availability as much as it was that the bears were habituated, and food conditioned.

Bill Stiver: *Several collared bears went to a white oak stand in the fall abandoning human food and garbage in the fall when it was available.*

Question: *Does ABR do the releases themselves and were they hard or soft releases?*

Coy Blair: *Jurisdictional authorities conducted the releases and they were hard releases.*

Question: *For Sarah Barrett about annual maintenance cost of Salesforce software.*

Sarah Barrett: *The annual cost is the \$1900 license fee. We have two IT people that have what I call the “god” license, we have approximately forty-five staff that have the \$320 license, and about thirty folks that have the \$75 license. That’s our annual cost.*

Question: *Who enforces the ordinance in Gatlinburg? How often are violations given? How often do fines occur? Is there pushback from the public?*

Dan Gibbs, TWRA: *The agency (TWRA) enforces that ordinance per agreement with the city of Gatlinburg. We have an officer dedicated to that work. Officers write the citations, but convictions are dependent on the courts. Gatlinburg put together a task force to look at standardization of bear resistant containers.*

Question: *What was the time period for the ABR survival rate?*

Coy Blair: *One year, post release*

Question: *If the bear’s natal home range could not be identified, how was release site determined? What factors were considered?*

Coy Blair: *There is a working relationship between the National Park Service and the Tennessee Wildlife Resources Agency. If a bear originated in a county around the park boundary, the park will take that bear back into the national park. If it came from a county away from the park, the bear is taken to or near the site of the original county where bear came from. They use the Cherokee National Forest and other bear reserve areas.*

Bill Stiver: *The state of Tennessee, the national park, and the Cherokee National Forest have a great working relationship. There is a cooperative agreement between NPS and TWRA to move bears out of the GSMNP when needed. The hard mast failure in 2015, bears moved into Sevier/Blount/Cocke counties, out of the park. It was clear that the orphaned cubs showing up in surrounding counties were coming from the park. We have an agreement that bears in those counties will be released into GSMNP.*

Question from Rich Beausoleil: *In my experience rehabbing cubs, socialization, release sites, and distance from people are big factors in determining success. Does*

your data suggest the same thing? Second, the animals that got in conflict with people, were they the first cubs to show up and not have the benefit of socialization with other cubs?

Coy Blair: *Some of the release sites are close to human habitation, but for the most part, there haven't been issues. For the three individual conflict bears, we had an influx of bears in 2015-2016, so for the most part, all had littermates and were housed with another bear.*

Demonstration: How Cloud-based technology Gives a Holistic View to Wildlife Management Professionals – John Receveur, Senior Consultant, Coastal Cloud

Coastal Cloud, a business and technology consulting company that utilizes the power of cloud-based technologies to transform the way organizations work. Coastal Cloud is well versed in the public sector, as well as non-profits to help utilize the best technology. John Receveur demonstrated the wildlife management solution as presented earlier by Sarah Barrett, Florida Fish and Wildlife Conservation Commission, which provides tools for solving problems in human-wildlife conflict management.

REDUCING CONFLICTS: TACTICS AND TOOLS (PART 2)
Moderator, Michael Proctor, Birchdale Ecological

James Wilder, U.S. Fish and Wildlife Service

Presentation: Efficacy of Bear Deterrent Spray Versus Polar Bears

This presentation was based on the initiatives of the five polar bear range states to test the validity of concerns about using bear deterrent spray on polar bears, specifically wild polar bears. Polar Bear Range States (Norway, Canada, Greenland, the Russian Federation and the United States) have a long record of cooperation on polar bear conservation. A primary management goal of the Range States is to ensure the safe coexistence of polar bears and people. The Range States recognize that human-polar bear conflicts will increase in the future due to expanding human populations, industrial development, tourism in the Arctic, and a continued increase in the number of nutritionally stressed bears on land due to retreating sea ice. The Range States also recognize the need to develop comprehensive strategies to minimize potentially dangerous human-bear conflicts. To date, polar bear attacks on humans have been rare, but when they do occur, they evoke strong negative public

reaction, often to the detriment of polar bear conservation. In some communities, those negative reactions can last for decades.

Conventional wisdom is that bear deterrent spray is not effective with polar bears due to misconceptions about wind and cold rendering bear spray useless and possibly incapacitating the user, close proximity required for use, and chemical strength, or lack thereof to fend off a polar bear. Some polar bear management authorities have banned bear spray from their jurisdictions for a combination of some of the above commonly stated objections. Bear spray is currently illegal in both Greenland and Norway.

In order to responsibly recommend bear spray as a tool to mitigate human-polar bear conflicts, a data-based assessment of its effectiveness under Arctic conditions was needed. This work follows on research that Tom Smith et al. published in 2008, which showed that bear spray has proven effective against both brown and black bears, as well as polar bears. This paper had a significant impact on the public's perception of how effective bear spray was as a bear deterrent; however, critical concerns remain for people many throughout the Arctic who believe that bear spray doesn't work vs. polar bears.

The methods to determine the use of bear spray versus wild polar bears were simple and the sample size small. Data was collected from available sources (n=17) from Canada (9), Russia (5), and the United States (3).

The overall finding was that bear spray does indeed work and works very convincingly. Bear spray was successful in 94% of the incidents when it was used to deter polar bears.

Successful outcome was defined as bear spray having stopped the undesirable behavior of the bear. For example, bears that no longer pursues a person,

breaks off an attack, abandons attempts to acquire food or garbage, or turns and leaves the area are examples of successful outcomes.



Spray incidents were deemed to be failures when the bear showed no change in its undesirable behaviors and persisted in attempts to acquire food or garbage. A bear not leaving an area after being sprayed, however, was not deemed a failure so long as its undesirable behaviors or direct risks to people ceased.

An example of successful use of bear deterrent spray on polar bears involved an incident in 2013 on Baffin Island, seven kilometers east of Pond Inlet. This incident involved two experienced backpackers who were on the eighth day of a nine-day trip. Prior to the trip, they had met with park personnel to plan their trip. The park service loaned them an assortment of bear deterrents and background information. On the eighth day of their hike, they hiked three kilometers inland to camp where they encountered an adult female and her two-year old cub. The bears appeared more curious than aggressive. The hikers deployed the bear deterrent spray twice; the first traveled two meters, not reaching the bears. The second, deployed about three meters, sent the cloud drifting into the polar bears. The bears turned and raced over the hill. As Smith et al. found, sometimes the mere sight and sound of deploying a blast of bear spray is enough to deter bears. On ten occasions (14%), the sight and sound associated with spray release were reported as key factors in changing bear behavior, based on a startle effect.

In the incidents analyzed, the meant distance between when the bear was first seen was twenty-six meters. The mean distance between the user and bear when bear spray was used was two meters. The probable cause of bear spray incidents was categorized as curiosity, predatory on humans, dog attacking bear, human food/garbage, and defense of cubs. The largest number of bear spray incidents was attributed to curious bears. The same number was attributed to aggressive bears (predatory, fighting with dog, defense of cubs).

Bear spray works when other deterrents don't. In seven of seventeen incidents, other deterrent types were employed multiple times without success prior to successfully using bear spray. Bear spray provides users with a very valuable tool to de-escalate bear incidents that start out at a relatively low level (e.g. bears testing and probing people) before they have time to escalate into something more serious.

In considering the body condition of bears involved in spray incidents, bears in above average body condition generally did not cause problems for people; however, polar bears in poor body condition may be more motivated and harder to deter in general. Bears in poor body condition were bolder in approaching people and exhibited predatory behavior. Attractants such as food and garbage did not play a prominent role. In some cases, the human was the attractant. The presenter asserted that in that context, a fed bear is a happy bear and is not interested in people.

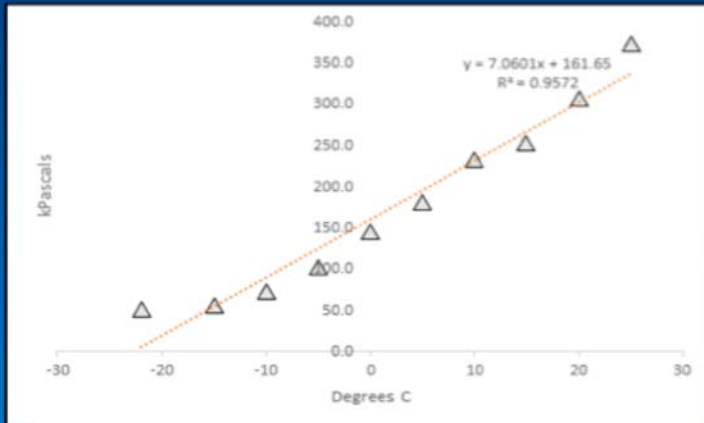
Bear spray has been used successfully on polar bears in all four seasons. The majority of incidents occurred during summer and fall when bears come to shore as the ice melts and retreats off the continental shelf.

Contrary to Smith et al. who reported that, in the majority of instances, 83% of people did not report any adverse effects from using bear spray, this research found that 50% of incidents resulted in the spray having minor effects on the user. However, in ten bear spray incidents, users reported the spray having had negative side effects upon themselves, ranging from minor irritation in eight cases to near incapacitation in two cases. Importantly, there were no reports of polar bears having taken advantage of these effects to gain food or to injure humans. In 7% of bear spray incidents, wind was reported to have interfered with spray accuracy, although it reached the bear in all cases.

Bear spray was used successfully to stop five attempted attacks by polar bears. In three other incidents in which bears were exhibiting persistent aggressive behavior, bear spray successfully altered the bear's behavior after other deterrent efforts failed. In one case, follow-up with a rubber shotgun slug was required to make the bear leave the area. Of the people carrying bear spray, 98% were uninjured by bears in close-range encounters. In fact, only three people out of the 175 people involved in seventy-two separate incidents suffered injury by bears that had been sprayed with bear spray. All bear inflicted injuries (n=3) associated with defensive spraying involved brown bears and the injuries were relatively minor (no hospitalization required). People injured in bear spray incidents included two hikers and one field biologist. One person halted the attacking bear by spraying it at close range in the face, and the other two people were unable to spray a second dose because the initial attack knocked the spray canister from their hands. Nonetheless, only one of the three reported that the spray had failed to protect them. No mechanical failures of spray canisters were reported in the seventy-two cases.

The study analyzed eighty-eight attacks, and attempted attacks, by polar bears throughout the Arctic to see if bear spray could have been used in those incidents. In twenty-eight of the incidents, bear spray could have been used if it were available, if the bear was first sighted at an adequate distance, the interaction lasted an adequate length of time, and/or other deterrents were used and failed. In those twenty-eight incidents, eight people were injured, three were killed, and twenty-three bears were killed. In fourteen of the twenty-eight incidents, multiple deterrents were used without success. If available, bear spray may have saved lives of both the people and bears involved.

Results- Canister temperature and pressure



Objectives of this research included determining the effects that temperature, wind, and expiration date have on bear spray performance. The research compiled all known existing records of bear spray use on polar bears. They also tested head pressure from -20⁰ C to +30⁰ C and found a strong positive linear relationship. Linking pressure to distance has

yet to be completed. The result was that bear spray works effectively even in the cold, but cans that are chilled to ambient are unreliable; they must be kept warm (inside coat) until needed.

Three aspects of the spray plume distance were measured and found that plume gains both distance and width as the canister warms; however, even when chilled to -23⁰ C, a can of bear spray easily jets out to 4.5 meters, concluding that while cans are most effective if kept warm, the plume will still hit a bear squarely that is fourteen meters distant at very cold temperatures.

In conclusion, the question of firearms or bear spray should not be viewed as an either-or proposition as they are both useful tools with different applications in different situations and are a valuable part of the tool kit in bear country.

Larry L. Lewis, Alaska Department of Fish and Game
Presentation: Conducted Electrical Weapon Use for Wildlife Management in Alaska – Adapting Law Enforcement Tools and Technology to Natural Resource Conservation

The Alaska Department of Fish and Game is often the primary response agency for conflicts with a duty to respond. Response may mean controlling or altering an animal's behavior by the safest, most effective and expedient method available. Responses are controlled by, and dependent upon, concern for human life and safety, concern for the welfare of the animal, rules and regulations, public and

professional perception, and tools available for use. As new technology becomes available, alternative methods may be used such as situations only require a quick fix and release, a non-projectile discharge response due to safety and other concerns, for hazing and aversive conditioning purposes, for staff safety when dealing with wildlife, or for protecting the public's safety. Adopting new technology will help responders by providing them with additional tools to use.

Axons's TASER X2 (Taser is an acronym for Thomas A. Smith's electrical rifle), works by delivering high voltage (~1,200 volts) delivered at nineteen pulses per second, at extremely low amperage. It is important to note that Axon/TASER does not endorse or provide training support for wildlife usage. The motor nervous system, which controls muscle movement, is affected. The electricity overrides any captured motor nerves but does not override the central



nervous system. This results in neuro-muscular incapacitation and involves pain sensation during transmission. After transmission, there is muscle memory of the pain sensation. There has been 100% flight response where conducted electrical weapons have been used. Capture comparison research will be published in 2018 in the Berryman Institute Human-Wildlife Journal.

Ryan Williamson, Great Smoky Mountains National Park

Presentation: Evaluating conducted electrical weapons as an aversive conditioning tool for nuisance black bears in Great Smoky Mountains National Park

Conducted electrical weapons (CEWs) were evaluated for use as an aversive conditioning tool for nuisance black bears in the Great Smoky Mountains National Park. The GSMNP study area has an estimated population of 1600 bears; two bears every square mile. There are eleven million visitors to the park annually. GSMNP partnered with Sequoia and Kings Canyon National Park for a three-year approval from the Institutional Animal Care and Use Committee (IACUC) Institute, a group that research facilities must appoint in accordance with the Animal Welfare Act (AWA) and PHS Policy on Humane Care and Use of Laboratory Animals.

The purpose of the research was to evaluate CEWs (specifically TASER) as an alternative to euthanasia when bears enter buildings/shelters, enter vehicles, flip dumpsters, or display area persistence or severe nuisance behavior. The current management strategy has area closures, warnings, hazing/aversive conditioning, capture and release onsite, relocation, and euthanasia as alternatives. Although an average of only two bears per year have been euthanized in the park, this research was conducted to find alternatives to euthanasia.



to

A goal of this research was to standardize the methodology in order for bear managers to be able to use this technology. The method begins by capture of the bear, work-up (ear tags, biological measuring, etc.), and fitting the bear with a GPS collar in order to monitor movements. Currently, GSMNP cannot deploy a CEW in a campsite or area where the bear is found due to adverse public perception of hazing and aversive conditioning techniques. Therefore, the bear is captured and released near the area of capture. Bears are given a funneled exit to control the direction and allow time to use the CEW. After the CEW has been deployed and the bear is in full neuro-muscular incapacitation, vocal re-enforcement/aversive conditioning is used as deterrents. The GPS collar is used to monitor the bear for continued nuisance behavior.

From June 2016-August 2017, CEWs have been deployed fourteen times on eleven bears (seven males, four females) of which nine were collared. Eight bears had entered buildings, tents, or cars, five were for area persistence, and one had flipped a dumpster. The CEW was an alternative to euthanasia and achieved 100% flight response. Since beginning the research, 35,517 GPS collar locations have been obtained with additional spatial/data analysis forthcoming. Of the fourteen deployments on the eleven bears, four have remained persistent in the area (all females), with two having been tased twice. Two bears have never returned to the area, two bears returned, but with no problems reported, one had to be recaptured after one year and was tased twice, one went missing after nineteen days (collar never recovered), and one had no collar and was not monitored.

More data, more bears, and more time are needed to verify that the use of CEWs is an effective alternative to euthanasia. The data showed that the use of CEWs was more effective on males than females, possibly due to females having smaller home ranges. There are many variables yet to be considered; however, CEWS are an additional tool for wildlife management professionals. What is known about aversive conditioning is that it must be used early and consistently to be effective.

Gillian Sanders, Grizzly Bear Solutions
Presentation: Coexisting with Grizzly Bears

Grizzly Bear Coexistence Solutions works to improve grizzly bear/human coexistence through education, collaboration, and the use of practical tools. The basic project premise is that education is great but isn't necessarily enough to motivate change in human behavior. The presenter asserted, "It only takes a couple of chickens to kill a grizzly bear." Private property and agriculture overlaps with low elevation linkage habitats that are necessary for large-ranging animals. Properly installed and maintained electric fencing is an appropriate non-lethal response to livestock depredation and property damage from bears. Electric fencing can be used to teach bears that previously killed livestock to avoid the fenced area, allowing the bear to remain in the population. Reducing bear predation and property damage increases public tolerance for bears moving through private property. There is a real social cost to living with bears; therefore, a cost share incentive is needed for rural residents.

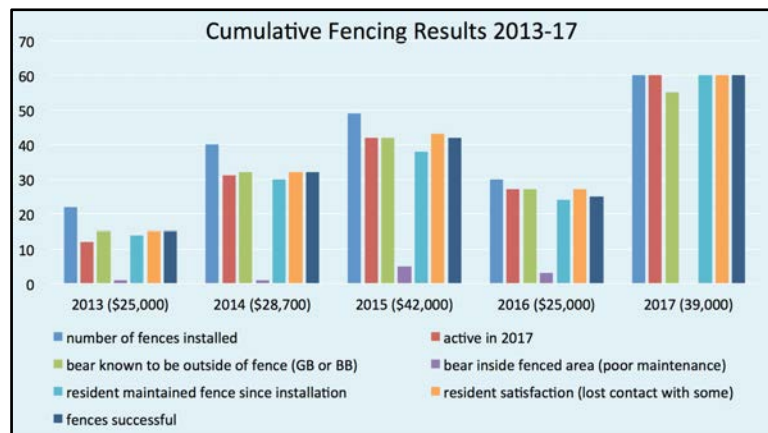
"It only takes a couple of chickens to kill a grizzly bear."
-Gillian Sanders

Good fences make good neighbors. Over the last five years, GBS has installed 201 electric fences throughout the Kootenay region of British Columbia with funds from a variety of non-governmental organizations (NGOs) for outreach and fencing cost shares. Fences work, and as word spread amongst rural neighbors, it created a social norm. Twenty-one fencing workshops have been held in the Kootenay/Boundary region, as well as grizzly bear safety workshops for communities and groups. GBS has also produced "how to" videos and pamphlets for installing and using electric fences.

The methodology focused on grizzly bear linkage areas, areas of repeated conflicts, and also served to prevent black bear conflicts. Using word-of-mouth, social media, and conservation officer service recommendations, residents were made aware of cost sharing and incentives. Cost sharing was provided if residents used recommended fencing requirements (energizer with minimum output of one joule and 7,000 volts, good grounding system, at least five hot wires for all hot fence or

four hot/three cold for alternating ground fence). To make fencing accessible to low-income residents, the project's portion of the cost share was paid directly to the store. The participant paid their portion when picking up the equipment. Free consultation and help with installation were provided when needed. Many livestock owners know how to install fencing, so there was ownership in installing their own electric fence. Residents were 100% responsible for fence maintenance. Fences were tracked through site visits, emails, phone calls, and fence pictures.

The success of electric fencing was determined by the known exclusion of bears from a fenced area, (judged by bear sightings, bear sign outside of the fence, or neighboring conflicts), fence maintenance by the resident, and resident satisfaction.



Co-existence is possible as demonstrated in Meadow Creek, British Columbia. Twenty-five grizzly bears were identified by DNA hair capture from 2011-2014. Greater than 500,000 kokanee spawned at Meadow Creek Spawning Channel until a massive food collapse in 2015 that saw less than 1% return to spawn in the last three years. An electric fence was installed at the spawning grounds to protect egg redds from bears in 2016-2017. There were very few bear conflicts in the community due to attractant management, education efforts, and corresponding increase of community tolerance of bears.

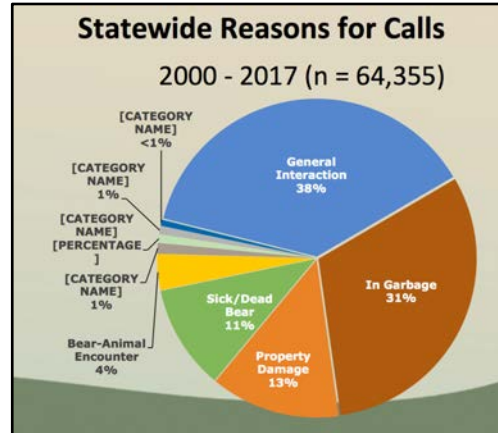
Lessons Learned – Prioritizing relationship building is necessary, as people aren't always logical in terms of their private property. Negative attitudes resulting from bear conflicts can lead to negative attitudes towards solutions. Fencing is a win-win situation and allows you to sleep at night when bears are active in your area. It is easier to set up a fence than stay up all night with a shotgun. Don't over-compensate; start small and make sure each fence is installed correctly to build confidence in the tool. People need to buy into the fence to maintain it. When installing an electric fence, it is important to make the fence as user-friendly as possible for the residents. It takes patience and persistence to change human behavior (eight-ten years).

Future directions for GBS is to expand activities in East Kootenays, especially Cranbrook south, provide fencing workshops and outreach to large agricultural associations and groups, and help to set up similar programs throughout British Columbia with focus on threatened or recovering grizzly bear populations.

Mike Orlando, Florida Fish and Wildlife Conservation Commission
Presentation: Brute Force: Reducing Food Attractants Through Modification of Trash Containers

The Florida Fish and Wildlife Conservation Commission (FWC) has experienced an increase in the number of human-wildlife conflict calls from the public over the last few decades. Florida has an estimated 4,000 bears in a state with twenty-one million people, with over 5,000 tourists daily, which makes for an interesting dynamic.

Approximately 1/3 of bear related calls that are received by the FWC involve bears accessing unsecured garbage, and another 38% report bears being attracted into an area, typically getting into bird seed, pet food, or other human-provided foods. Securing the attractants to reduce conflicts guides the actions of the FWC. With bears coming in to the urban areas, most likely looking for human-provided food, securing garbage can decrease the number of bears in an area.



a gravity latch on the side.

There are three methods of handling garbage in Florida: owners take their own garbage to a dump, commercial dumpsters, and residential garbage. For commercial dumpsters, dumpsters with metal lids have replaced those with plastic lids easily raised by bears. By attaching a chain and clip/carabiner to the side door, a bear can be prevented from accessing the garbage inside. Dumpsters with plastic lids have been modified by the addition of a steel H-bar and lock bar with

Residents have utilized hurricane-strength structures and sheds to store garbage, yet some bears have easily accessed some of those buildings. FWC has created documents to instruct residents how to make homemade latches and straps for garbage cans. There has been some success with homemade latches; however, when tested using bears from the Central Florida Zoo, the bears were able to breach some of the homemade options. All cans have some failures, which reinforces the assertion that things are bear-resistant, not necessarily bear-proof.

Most bear-resistant cans are semi-automated, which presents a problem as companies have moved to fully automated waste-service systems. Traditional bear-resistant trashcans require a person to unlock the can before it can be serviced, which makes them incompatible with fully-automated waste service systems. The FWC reached out to local government staff and trashcan manufacturers to pre-test prototypes of new bear-resistant trashcans that were designed to be compatible with fully-automated waste collection systems with three criteria: 1) resident satisfaction, 2) compatibility with fully-automated trucks, and 3) bear resistance. Cans were pre-tested with both captive and wild bears, waste collection trucks, and residents after which the can manufacturers submitted their designs to be tested and certified by the Interagency Grizzly Bear Committee to be bear-resistant.

The challenge was to get the cans into the field for use by residents. In 2017, FWC awarded \$825,000 in cost-share grants to eleven counties, three cities, and two homeowner's associations (HOAs) to offset the costs for residents and/or businesses to buy bear-resistant containers or modify regular containers to make them bear-resistant.

Question and Answer Session

Question for Ryan Williamson: *You said five bears remain persistent problems. How does this compare to traditional methods?*

Ryan: *Most of the bears persistent in the area were not first-timers. They had been captured multiple times, with one as many as eight times. I don't know how it compares because we have tried everything in the book and are at our wit's end and trying to manage the problem.*

Bill Stiver: *Ryan's study bears were the worst of the worst. They were the bears on the "chopping block." We were looking for an alternative to killing them. I feel confident that if we have a night-active bear that has just started out in a campground, this will be an incredible tool, but that is not what we are using it for at the moment.*

Question: *What is the cost per unit/charge?*

Ryan Williamson: *Each cartridge is about \$39 per trigger pull. The unit itself is around \$1,000.*

Question for Larry Lewis and Ryan Williamson: *Given the dramatic nature of the videos, have you experienced backlash from the public?*

Larry Lewis: *We got approval from PETA...if it saves the bears, it was worth it. What I showed you was ten minutes from thirteen years' worth of work. This was not a*

stand-alone thing. We were also doing other things in conjunction – cleaning up garbage, working in communities, etc. This is an extra step to take prior to pressing the trigger. The animal rights groups I dealt with were supportive if it saves bears.

Ryan Williamson: *We were very cognizant of public perception but have not encountered resistance from PETA or other groups yet.*

Question for Mike Orlando: *Do you still encourage use of bear lockers?*

Mike Orlando: *Yes, lockers are very effective in mobile home communities or areas where people do not have garages.*

PANEL DISCUSSION

REDUCING CONFLICTS: TACTICS AND TOOLS

Moderator, Dave Telesco, Florida Fish and Wildlife Conservation Commission

Question for Gillian Sanders: *What was the funding source for the cost share program?*

Gillian: *I had a variety of sources on an annual basis, one of which is Mike Proctor. Also, in the southeastern portion of BC, we have treaty agreements with the states regarding water and hydroelectric damming of the Columbia River. There are funding sources through that. I tapped in to all NGO money.*

Question for Gillian Sanders: *Have you thought of or do you currently use a manual that you could put together to give residents on a more widespread basis?*

Gillian: *I am writing a manual now.*

Question: *There are levels of deterrents. How do you know which deterrents are most effective for a given situation? How extreme or how light do you give deterrents?*

Larry Lewis: *You don't until you are there. As a field respondent, every situation is different. There is no cookie-cutter or matrix approach. One animal may respond to human presence and another may not. We can escalate from human presence just to deadly force determinate upon the situation. In the use of bear spray there are no long-term effects that have been measured on wild bears. It is very difficult in wild stock to measure these different things and their responses. As a field person, it is what you find effective at the time.*

Gillian Sanders: *The primary deterrent is taking proactive steps like making that food source unavailable.*

Michael Proctor: *The IUC and BSG, a group of bear specialists and researchers from around the world, quasi-associated with the International Bear Association, are working on a one-stop-shop volume of bear conflicts, so you can go through and*

determinant upon your conflict, you will have a suite of options. It will be published in a year or so. It is designed to cover all the different species of bears.

James Wilder: *I would add that if you have bear spray and a bear gets close enough to spray, you should spray it. Bears are smart and will learn and apply what you teach them to the next human encounter they have. Bears will learn from unpleasant experiences.*

Question for Mike Orlando: *What was waste management response and what is standard cost?*

Mike Orlando: *Garbage companies are not in it to lose money. We had meetings trying to convince them of public safety issues. Even some of their employees driving the trucks had been confronted by bears. They understood there was a problem but getting those cans on the ground was not cost efficient for them. It takes five seconds for them to pick up a can, dump it, and put back on the ground. Any longer than five seconds and they lose money. There was initial resistance, but persistence/annoyance paid off. Waste management began to recognize the impact and realized that customers wanted bear resistant cans. Cans are around \$70 up to \$200. People will pay for the reduction of bear conflicts.*

Question: *Are they required to pick up garbage scattered by bears?*

Mike Orlando: *Yes, in some areas, they are required to get off the truck and pick it up. Some ignore that, so unless residents call it in, they get away with it.*

Question for Ryan Williamson: *Katmai has considered getting TASERs. Safety for the user is a consideration. What happened with the situation of the bear turning around on you?*

Ryan: *As long as the bear has a clear path to leave, they will choose that path. In the example of the bear that turned on me, I had darted it at one of our backcountry shelters and I didn't have a culvert trap to stick bear in for recovery. I had administered BAM, gave the reversal, and the bear awoke, I gave chase with the TASER, fully locked him up, and when he woke up, we were in a Rhododendron thicket. I'm not sure if he perceived me as a threat or if I was in the way, but the bear was very close by the time I tased him the second time. I realized that it would be nice to have lethal backup just in case. If tasing free-range, 100% of time they will run away. I'm not sure if he was intent on harming me or if I was just "standing in the door."*

Question for Mike Orlando: *Have you developed scholarship fund availability or cost sharing?*

Mike: *Yes, Dave will share more on Wednesday, but yes, we are doing everything.*

Question: *Question about the accuracy of tasers on a moving target.*

Ryan Williamson: *When taser barbs leave the taser, it's about 290 feet per second...slower than a bow and arrow. A sixty-five lb. bear leaving a culvert trap at sixty miles per hour, there's a lot of trial and error and wasting some cartridges, but funneled exits giving the bear only one way to go, it gives you time to hit the bear.*

Larry Lewis: *Must be relatively close. We have experienced outstanding flight response, but we have protocols established (lethal backup). In a disentanglement situation. We are always prepared. You are dealing with individual (animal) personalities and you never know what that animal will do in any given situation. Also, in regard to the cost share question, we have tried, but were not allowed to influence city ordinances. We were cost sharing them for \$50. Waste management saw it as a bonus because they were picking up new customers.*

Question: *What kind of rules/policies to prevent homeowners from getting their own TASER and using it on bears?*

Larry Lewis: *Alaska allows ownership of TASERs. It is illegal to use to take wild game. Technology is advancing faster than regulatory standards. Axon will only sell someone fifteen ft. cartridges. It isn't precluded in a defense of life or property scenario, but there is no catch and release TASER hunting.*

Question for Ryan Williamson: *Bear after being tased going into town...did it continue to pursue trash?*

Ryan: *The bear avoided that area, but is in another area now, which is TWRA's problem now. Did the bear learn to avoid a specific area or to avoid trash? In that instance, the bear learned that area was not friendly to hang around, which was the point there, but it didn't make him afraid of people or keep him from garbage. We didn't cure the bear, but I fixed my problem of him hanging around Mt. LeConte.*

Bill Stiver: *The Mt. LeConte tasered bear tore into a building. Where did this bear come from? We have been seeing bears with those behaviors at Mt. LeConte and other areas within the park where we have bear-resistant containers, maintenance people picking up garbage, and yet, we have this highly escalated, food-conditioned behavior. It led us to determine where nuisance bears are coming from, which led us to Jessica's project. We partnered with TWRA and UT to collar bears around the park boundary to determine where/how they are becoming food conditioned. As Ryan said, we corrected our problem at Mt. LeConte and I didn't have to kill him. The reason for Jessica's project was highly food conditioned bears that previously would have been euthanized.*

Jessica Giacomini: *We've had some differences with males and females and the effectiveness of the tasers. I wonder if that has to do with the bear density in the Smokies. We see that the use of aversive conditioning in a certain area works, but then, they go cause problems somewhere else while the females are staying and causing problems in that one area.*

Question for Coy Blair: *In terms of survival of rehabbed cubs, can you describe your program, the feeding, and any lessons learned about what contributed to their success?*

Coy Blair: *Basically, everything we do, starting off with a neo-nate cub that comes in starts in what is called Level One care in our nursery. The first thing we would do is try to foster that cub in the wild with a surrogate if possible. The key to that is having ongoing research to have surrogate mothers available. Nursing cubs will be weaned early, anywhere between eight-twelve weeks of age with extremely limited human contact. They will go to Level Two care with even more limited human contact. At that point, they are weaned, so feedings can be stretched, and we can reduce the times we are down there in the area. At that point in the care system, we can monitor the bears with the twenty-one cameras installed recently. Level Three care is a larger pen and Level Four is the wild enclosure.*

Question for Ryan Williamson: *How did you set up safety protocols and get support for your study?*

Ryan: *We're still developing protocols. We worked with Law Enforcement to get certification. Management bought into it because it was an alternative to euthanasia and a good avenue to research.*

Bill Stiver: *We worked closely with Law Enforcement staff. Supt. Cash said to look for an alternative to euthanizing bears. This was the best alternative.*

Question for Gillian Sanders: *Question about setting up/maintaining fence and level of support – Is there a requirement that homeowners have to assist with the installation of the fence? Do you find they are more likely to maintain it?*

Gillian: *There is not a requirement if someone is physically unable to set up the fence; however, they need to have someone capable of maintaining it. There is flexibility in that. The first year of the project, we were paying for the installation of the fence as well as the cost sharing. I don't have any hard evidence, but I do have a feeling some were taking advantage of the cost sharing. In-kind cost sharing is fine, and some have helped install the fence. It is a case-by-case basis.*

Question for Sarah Barrett: *With all the data you are collecting, is there any interactive platform that is available to the public?*

Sarah: *We have looked to having a public/interactive side to this. We are looking at an interactive map with the data for public access. It will cost \$30-40,000 to provide. We're looking at some grant sources. We annually put data on TRGIS such as, calls, dead bears, carcasses, etc. Florida has a "Govern in the Sunshine" law. Everything is public record.*

Bill Stiver: *A side project of Jessica's project...there is an elementary school just down the road. We took one of Jessica's bears and are sharing the data to a 7th grade class who has adopted the bear. The thought was to get buy-in to kids to get buy-in from*

kids where bear proof containers need to be and what they need to do to bear proof their community.

Question: *Would an interactive map encourage poaching by providing bear locations?*

Sarah Barrett: *Data shared is of bear relocated that isn't there anymore. Most recent hunt in 2015, we did not collect specific latitude/longitude locations purposely. We have a reasonable time to respond.*

Question: *Did the Florida hunt decrease the number of conflict bears?*

Dave Telesco: *Yes, it did. In 2016, our conflict calls dropped by about 1,000; however, we as an agency removed 115 conflict bears, 304 bears were killed in the hunt, and 250 were hit by cars. You can't depress the population and expect there won't be repercussions. I'm rescinding what I said that the hunt removed conflict bears, but a paper published in Ursus talked about how animals in the wild land urban interface are exposed to hunting mortality. In the situation with Florida, we never proposed the hunt as being for conflict, but for a population dampening.*

Question: *Person from Arizona...community got ordinance, but enforcement was difficult due to hurdles/obstacles. There were multiple visits required before issuing citation. What we found was that we were issuing citations to the person who called to report the problem, yet there were other violations in the same neighborhood. Do those of you who have had ordinances longer have some insight into how you get ahead of that?*

Dave Telesco: *We have a notice of non-compliance that can be issued to anyone, whether they made the call or not. Like you said, it is basically self-incrimination when a caller reports a bear in their garbage.*

Bill Stiver: *We have a task force here in Gatlinburg, the Gatlinburg Black Bear Task Force that has been in existence since 1989. It includes the park, TWRA, the city of Gatlinburg, and Appalachian Bear Rescue. There are a bunch of us at the table and I know that issue of getting compliance and getting in touch with the rental owner – the people owning the chalets don't even live here, so getting ahold of them to make them compliant is a challenge. I know our guys have had hurdles trying to enforce that.*

Dick Shideler: *Someone mentioned intent and issues with enforcement. We had a similar provision about enforcement and the feeding of game. We had to issue the person a warning and couldn't give them a citation. Then, there had to be follow-up. If it persisted, that demonstrated intent, and this was a regulation that had the intent language in it, so we finally succeeded in getting rid of that. Now, you can go to the neighborhood, and if there are bears in the neighborhood and you have garbage, you can bust the people without having to show intent and have to follow up.*

Larry Lewis: *It was about negligent and intentional feeding with negligence being a lot lower standard having to prove. It's a \$300 fine, but the problem with that is that*

we have to be able to prove the animal has been feeding out of that source. One of the ways I got our municipalities engaged in enforcement of garbage ordinances, was to go to planning and zoning, city council, and chamber of commerce meetings, and make presentations as the friendly fish and game guy on the problems they were having in town with bears and moose, and the public safety issues involved with that. I would invite a reporter from the newspaper or local radio station to come along and listen. I would show them pictures of what was going on, make them aware of the problem in their municipality, and offer to help them. I would make them aware of the liability issues they would face if someone got injured. They would get interviewed and the next day, the phone would be ringing off the hook with the city manager, chief of police, etc. calling. It was how I got them to start policing themselves. It was effective until we got shut down and told that we could no longer affect the ordinances. All we did was say that we were there to help. Now, all of our municipalities have ordinances, and some have seasonal enforcement officers.

Question: Sarah asked a question about liability concerns with use of tasers and the animal shows up somewhere else and causes a problem.

Bill Stiver: You run into liability when you do nothing. We have had one female that tore into a car. We have the support of the superintendent to try this.

Larry Lewis: If we are practicing due diligence and operating under standards of care, there is some legal protection against liability. Doing nothing once you've been made aware of a problem opens you up to liability. We have ownership in every situation where we respond. These are public trust resources, so we have to try and avoid unnecessary killing of these animals. This concern (human injury as a result of being tased) is why Axon and other companies do not support the use of tasers on wildlife.

Bill Stiver: At the 2012 HBC workshop we talked about the Ives case. The lawyers told us had they just put up a warning the case would have turned out differently. Again, we are doing something.

Larry Lewis: That's called a breach of duty if you don't do something and that can hold you liable.

Challenge by Rich Beusoleil: Bill, at the beginning of the conference, you and Supt. Cash asked us to challenge one another, so I'm going to do that...I'm going to "poke the bear," so to speak. First, the best way to get buy-in is to not talk out of both sides of your mouth. We fine for putting out garbage, but as agencies, we allow baiting. You may say that you don't have bear baiting in your state, but you might have bear baiting for turkey, or for deer. This is literally hundreds of millions of pounds of food, so if we solved all your problems, I truly believe we're only halfway there. The second (challenge) is that we have started this category of "nuisance bear" and that term, "nuisance;" we have to graduate beyond that term. I don't know how or when...it was a category for data collection, but we need to stop using that term because it has the

connotation of blame and being the bear's fault. If we use that term to describe the bear, people will say, "It isn't my fault. I'm good. I like bears." If you keep saying these terms, we're never going to get anywhere. Those are two huge agency pieces that we probably won't discuss a whole lot here, but we need to turn the finger inward.

Gillian Sanders: *I describe it as bears that have learned the wrong behavior.*

Michael Proctor: *Or nuisance humans. I have a comment about Gillian's project. The difference between when you want to clean up a community by putting up fences, putting out garbage cans, and whatever, there are two ways to go about it. One is where you educate the public and the other is where you actually go out and help them get the job done. We have several communities in my study area, some where we do only education and others where we've gone in and raised money. Looking at the graphs of bear mortality in education communities, it is still rising. Communities where we are intervening, we are seeing a decrease.*

Remark from audience: *To address his (Rich's) point, is that the difference between bear baiting and negligent attractants is that baiting is regulated and bear baiting or baiting for other species has certain restrictions. You have to be ¼ mile from a road and ¼ mile from a dwelling amongst many other restrictions. For unintended attractants in an urban situation, there is no control or regulation on that, so you are invoking a troublesome situation in an urban setting. The other part of that is that there isn't any empirical evidence that baiting for wildlife had human food conditioned animals, specifically bears. It has been hypothesized, I see it in journals, I see it from agencies, but there's no data to support that.*

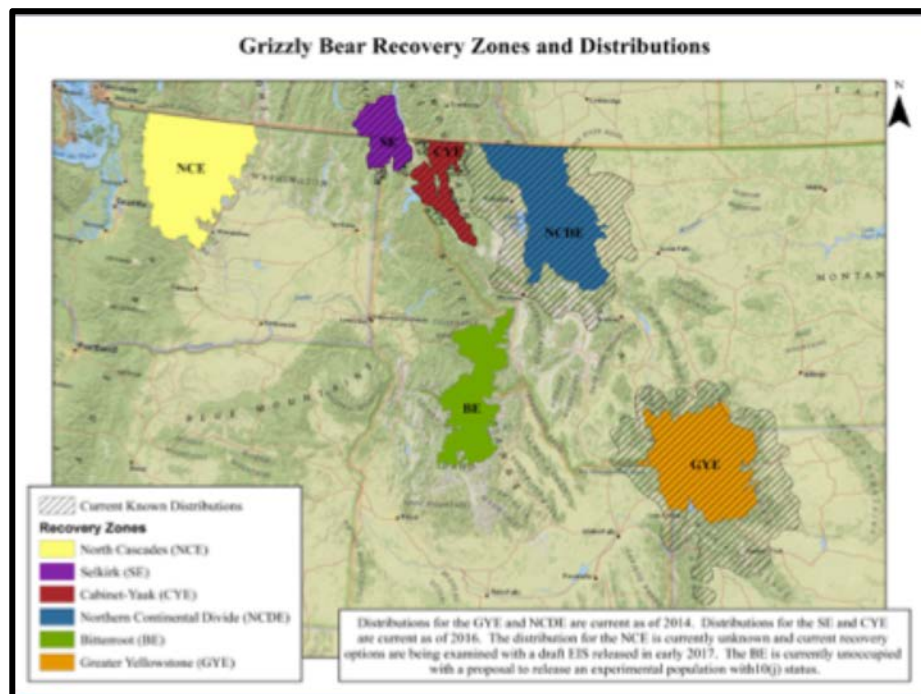
TUESDAY, MARCH 27, 2018

Hilary Cooley, U.S. Fish and Wildlife Service

Presentation: Update on Grizzly Bear Recovery in the Lower 48

Historically Grizzly bears occupied the Western United States, all or parts of seventeen states, Western Canada, and Mexico. Like many large carnivores, they were eradicated throughout most of their range in the lower forty-eight states. Grizzly bears were placed on the endangered species list by the United States Fish and Wildlife Service; however, two years later, in 1975, they were listed as threatened due to excessive human-caused mortality, habitat destruction, and range loss. Listing a species as threatened allows for special rules; a 4(D) rule, which allows certain exceptions pertaining to that species. The 4(D) rule allowed exceptions to the taking of grizzly bears under the circumstances such as the removal of conflict bears, the Grizzly bear hunt in NW Montana, self-defense or defense of others, and federal or state scientific or research activities. In 1982, the USFWS published their Grizzly Bear Recovery Plan, which was updated in 1993. The 1993 plan is still used extensively. The plan details where bears are recovered, criteria for recovery zones, and steps to meet recovery goals.

The USFWS has five staff members working on grizzly recovery in six eco-systems in the lower forty-eight states. The North Cascades Ecosystem (NCE) is the second largest recovery area consisting of 9,500 square miles. The NCE is classified as have “no



population,” meaning not having two or more females with young. BC contains approximately six bears. The overall population status of the grizzly bear in the greater NCE is unknown; however, it is highly unlikely that the NCE contains a

viable grizzly bear population. Only four detections of grizzly bears have been confirmed in the greater NCE in the past ten years, all of which occurred in British Columbia and may comprise only two individuals. Because of the small documented number of grizzly bears, a very slow reproductive rate, and other recovery constraints, the grizzly bear in the NCE was found by the USFWS to be warranted for up-listing to endangered status but was precluded by higher-priority actions. In 2015, the USFWS began the process of public scoping and drafted four alternatives for the NCE ranging from a no action alternative, ecosystem evaluation, incremental restoration, and expedited restoration with the restoration goal being 200 bears. Combined, the U.S. and Canadian portions of the greater NCE constitute a large block of contiguous habitat that spans the international border but is isolated from grizzly bear populations in other parts of the two countries.

The smallest recovery area is the Selkirk Ecosystem at 2,200 square miles, encompassing Idaho, Washington, and British Columbia. The Selkirk Ecosystem has a population of seventy-eighty bears in the US and Canada and a growth rate of 1.8%. The USFWS has a monitoring and research component involving noninvasive methods (cameras, hair surveys), capture and marking, denning chronology, diet analysis, and berry production monitoring. Each of the six ecosystems have similar recovery criteria with targets for females with cubs, human-caused mortality limit, female human-caused mortality limit, and distribution of females with young. Each recovery zone is divided into bear management units with requirements to have a certain number of females with young.

The Cabinet-Yaak Ecosystem covers 2600 kilometers with a population size of fifty-five bears and a growth rate of 1.6%. Similar to Selkirk, the USFWS also conducts monitoring and research in the Cabinet-Yaak. Since 1990, a population augmentation with nineteen bears released, has been conducted with mixed success. Of the nineteen bears released, six left the area, three were killed within four months, one was killed sixteen years later, and two females reproduced. One female produced ten first generation offspring, thirteen second generation offspring, and one third generation offspring. The second female has produced two offspring.

The Bitterroot Ecosystem is the largest contiguous block of wilderness in the Rocky Mountains (5,600 square miles), and is almost fully contained in Idaho. The BE is classified as “no known population” with only two verified sightings in the last sixty years. The management focus in the BE is on information and education and a non-invasive monitoring program. In 2000, EIS and ROD published to reestablish by introducing twenty-five bears over five years, but in 2001, the reintroductions were suspended for lack of funding.



The Greater Yellowstone Ecosystem is the third largest recovery area covering 9,200 square miles. The United States Geological Survey (USGS), the United States Forest Service, and the state agencies are heavily involved in monitoring and research in this ecosystem. The 2017 estimated population was 718 bears with 95% of suitable habitat occupied. Sixteen of the eighteen bear management units are occupied by reproductive females. Forty-six mortalities (thirty-nine human caused) have been documented. The GYE grizzly population was delisted in June 2017. The area is currently under post-delisting management, being state managed by Wyoming, Montana, and Idaho state agencies. Wyoming and Idaho proposed a fall 2018 hunt, yet continue conservation strategies monitoring mortality limits, occupancy females with offspring, and establishing a minimum population size.

The GYE is currently in litigation with four NGO groups, one individual, and one tribal lawsuit. Complaints include inaccurate application of science, inadequate regulatory mechanisms, tribal issues, and policy application. The USFWS requested a stay and had a hearing on March 13, 2018. Five cases have been consolidated and are being heard by the US District Court in Missoula, Montana. Briefing could begin in summer 2018.

The Northern Continental Divide Ecosystem covers 9,600 square miles and is the largest ecosystem. In 2004, the estimated population was 756 bears. In 2014, the estimate had grown to 960 bears, but is believed to be over 1,000 currently. The USFWS has begun its recovery and delisting process for this ecosystem. Steps toward delisting include finalizing a conservation strategy, documenting recovery criteria evaluation, completing a threats analysis, and the issuance of a proposed delisting rule.

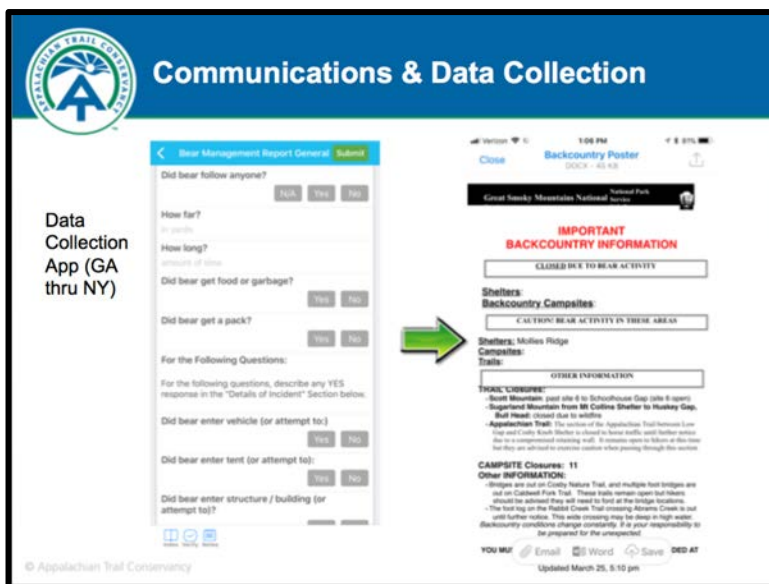
BEAR MANAGEMENT AMONG MULTIPLE JURISDICTIONS
Moderator, Casey Dukes, North Carolina Wildlife Resources Commission

Morgan Somerville, Appalachian Trail Conservancy

Presentation: Hikers vs Bears – Management Challenges on a Long-distance Trail

The national trails system is made up of nineteen historic trails and eleven national scenic trails. The trails range from 215 miles long to 4,600 miles long and are scattered throughout the United States. Many of the trails allow for backpacking, which is where interaction with bears mostly occurs. The Appalachian Trail (A.T.), is a 2,191-mile-long public footpath that traverses the scenic, wooded, pastoral, wild, and culturally resonant lands of the Appalachian Mountains. Conceived in

1921, built by private citizens, and completed in 1937, the A.T. is managed by a cooperative management system known as the “three-legged stool” comprised of the local, state, and federal agencies partners which include the National Park Service and US Forest Service, the Appalachian Trail Conservancy, numerous state agencies and thousands of A.T. maintaining club volunteers. Multijurisdictional issues specific to the Appalachian Trail, include crossing 150 local townships, eighty-eight counties, 287 adjacent communities, six national parks, eight national forests, two TVA preserves, and two USFW refuges. Assisting with managing the A.T. are thirty-one A.T. maintaining clubs up and down the trail with sections of the trail that range from a few miles long to 250 miles. The main challenges on the A.T., in terms of bear management, are campers. Other challenges include



communications and data collection, diversity and inconsistent regulations, increasing visitation and over-capacity facilities, and hiker education. The Appalachian Trail Conservancy has made inroads to utilizing technology in the form of apps for data collection purposes. This improves not only the ability to communicate, but for the speed of communication. The implementation of a mobile application has led

to quick utilization by A.T. partners regarding closures, bear activity, and incidents. The app is in use from Georgia to New York, but there is still much of the trail where data collection is not available. The ATC will continue to develop data collection methods to improve communication along the trail.

The A.T. is famous for its diversity of users and scenery as the trail goes through fourteen states at a variety of elevations. Regulations along the trail are inconsistent due to the multiple jurisdictions. Increasing visitation and over-capacity facilities have become a concern for the A.T. In 2017, an estimated 3,839 NOBO (northbound) hikers started the trail, which was a 14% increase from the previous year. The success rate of completions of the A.T. has risen from 10% in the 1970's to almost 25% currently. Hence, more campers in bear country equals more incidents. Additionally, the increasing visitation means more novice campers are on the trail. Novice campers sometimes sleep with their food, hang it inappropriately, and leave



food waste in campfire rings, privies, and campsites. The ATC has implemented ridge runners, caretakers, and volunteer trail ambassadors at popular sites along the A.T., as well as providing food storage devices at many designated overnight sites. The conflicting regulations along the trail regarding food storage, is confusing for hikers. For example, one five-mile USFS section in Georgia has a bear canister requirement, 402 miles of USFS trail sections have no food storage requirement with camping allowed anywhere, and national parks vary in their requirements. The Great Smoky Mountains National Park requires food to be hung from cables and allows camping only in designated sites along the seventy-two miles of the A.T. in Tennessee. Shenandoah National Park requires food to be self-hung from a tree, on a pole, or the use of a bear can. APPA, which is the acronym for the Appalachian national scenic trail NPS unit, allows cables, boxes, self-hung food storage, or bear cans at dispersed or designated sites. The ATC is now strongly recommending and seeing increasing use of bear canisters, in addition to hiker education courses aimed to help hikers start well, finish well, and how-to courses for hiking the A.T. The intention is to improve the behavior of hikers and their appreciation for maintaining resources. The sustainability of services provided, and funding those services, is an ongoing challenge with increased use of the trail. The ATC is considering transferring the facility costs to the users.

Bear cans are required on sections of the Appalachian Trail, the Pacific Crest Trail, and the Pacific Northwest Trail. The ATC would like to see them become the standard operating procedure for campers. Bear cans are required on several sections of the trail as bear incidents have increased. The Cherokee National Forest, in partnership with the Tennessee Wildlife Resources Agency, has implemented a forest-wide food storage regulation policy primarily directed at front country campers. The ATC is actively seeking optimal solutions for food storage and hiker/camper education to diminish the frequency and severity of human-bear incidents.

Jay Honeyman, Alberta Environment and Parks

Steve Michel, Parks Canada Agency

Presentation: Managing Bears Across Multi-Jurisdictional Boundaries

The Bow Valley Human-Wildlife Conflict Study Area consists of two major townships (Banff, Canmore), multiple smaller hamlets, First Nation reserve lands, protected areas with over five million tourists, a national railway line, a four-lane Trans-Canada highway, multiple secondary highways, and extensive trail-based recreation. Grizzly bears, currently threatened in Alberta, are using the study area and crossing jurisdictional boundaries.

The jurisdictions have different approaches for managing bears. They are managing a wide-ranging species that crosses jurisdictional boundaries resulting in the management of bears at a jurisdictional scale rather than a landscape scale. This results in bears, and people, receiving mixed messages because of different management strategies.

Outside of protected areas, there is private/municipal/provincial land use, industrial/agricultural/recreational pressures, and fewer secured attractants. Grizzly bears can struggle to survive where landscapes and social norms differ greatly from their place of origin. Due to different tolerance levels, agency capacity, and available attractants, habituated bears rarely survive outside of protected areas. Tolerance levels are generally more consistent in Protected Areas. There are different expectations on personal roles and responsibilities in wildlife coexistence. Residents in Protected Areas are more likely to accept personal lifestyle sacrifices to keep bears on the landscape. While there are greater resources in Protected Areas, there is less agency ability to spend time and money for managing individual bears outside of Protected Areas. In terms of management level challenges at the higher level, there are varying bear management approaches and policies, which include varying perceptions of risk and thresholds on when to remove a bear, differing opinions on the use of translocation as a tool, when to apply aversion, and implementation of human-use restrictions (seasonal proactive measures, reactive closures). The political influence regarding bear management decisions is a source of frustration as ground level decisions are frequently over-ridden.

Methods and approaches that have been successful include the Bow Valley Wildlife Coexistence Roundtable, the employment of similar aversive conditioning tools,



shared bear management and operational support, standardized mapping and signage, bear resistant garbage bins, mandatory bear spray on certain trails and special events, and attractant management. A multi-agency fruit tree removal initiative has been successful in Banff and Canmore.

Areas identified for improvement are the need for standardized systems, procedure, terminology, and reporting across all agencies, as well as improved interagency cooperation and trust coupled with consistent public/visitor communication strategy.

Question and Answer Session

Question: *In the Bow Valley Round table, do you have MOU commitment? Also, please talk about the issues with mountain bikers.*

Jay Honeyman: *The round table came about because of one bear in the Banff province. She came to the province and we relocated her. A lot of questions came out of that; social media went viral and all of a sudden, all the politicians were asking questions. The round table is in the final stages of completing a report with many recommendations that will set the stage for the next ten-twenty years to manage wildlife. Most of the key wildlife managers and others, were asking how we could do better. Buffalo berry bush is a prime food source for grizzly bears and is on trails where hikers and bikers are. Wildlife corridors are intended for wildlife use with limited human use. We must determine the purpose of use of these lands either for wildlife or recreational use.*

Steve Michel: *Some trails in Banff National Park, we've realized we have a problem with recreational areas where we have the Buffalo Berry Bush, which has created lots of conflict. The seasonal use by bikers has been limited during summer berry season due to bears.*

Question: *Is the AT going to consider recommending bear spray for hikers?*

Morgan Somerville: *We haven't considered that yet, but many of our ridge runners carry it and have received training.*

Question: *What is holding you back?*

Morgan: *The inherent danger of having a bunch of naïve people in the woods in close quarters with bear spray.*

Bill Stiver: *Visitors in the GSMNP are allowed to carry bear spray. We know of two incidents where campers were in the shelter where bear spray was used inside a shelter. We don't provide training, but it is a legal product. It used to be illegal and considered a weapon, but has been reclassified, so visitors are permitted to carry it.*

Question: *With differences in available personnel in and out of the park, how are you handling bears wandering in and out of the park?*

Jay Honeyman: *That is a struggle. The bear that wandered around the town of Canmore, we had one guy to deal with that. We haven't been successful in managing those things in an urban environment. For the first time ever, we had some Parks*

Canada guys come help us work these bears in Canmore. It was good and gave the parks guys a perspective on it being a different game outside the park. It was good for us to work alongside with them. I hope that becomes more of a regular thing.

Question: *Question about Banff from Michael Proctor. Has the province talked or started to think about opening the canopy (moving Buffalo Berry bushes) away from those corridors?*

Jay Honeyman: *The biggest issue is natural foods. We created enhancement blocks and have been removing it for two decades. We also been putting in as much as taking. What we are finding is that the big males are not providing access to other bears resulting in bears hanging around towns, especially younger bears and females with cubs due to grasses, fruit trees, and other foods, in spite of our enhancement blocks. It's not quite as simple as creating something over there and the bears will all go over there. It doesn't work that way for us.*

Question: *Have you seen backlash with feds working outside their jurisdiction and how will you prevent it?*

Steve Michel: *We have not seen backlash from our constituents. People were deeply connected with this particular bear; they wanted to see her survive. However, there's another segment of population that do not value bears with the same degree and don't value that use of tax dollars. Again, it speaks to differences in community tolerance levels. We preach "it's all about tolerance" to national parks.*

Jay Honeyman: *Internally, when we are tapped and understaffed, sixteen-hour days,*

"Intolerance often comes from an inability to manage."

- Jay Honeyman

seven days per week, there becomes an intolerance within the agency when you can't manage. Intolerance often comes from an inability to manage, so that next option doesn't come quite as quickly when you don't have the capacity to manage.

Question: *Since communication is one of the issues everyone is struggling with, how do you get your bear reporting app on the phones of the hikers on the AT? Could the app be expanded to provide info?*

Morgan Somerville: *In terms of the app, it is a subscription-based app. I'm not sure how we could get it to people. We are working hard to get into the 21st century with technology.*

Steve Michel: *The NPS in Canada are also way behind in having a reporting app. We have tasked our IT folks with creating automated messages that would go out.*

Question: *How do you recommend storing bear canisters?*

Morgan Somerville: *We presume they will put it in their pack or put it a bear box and stored 100-200 feet away.*

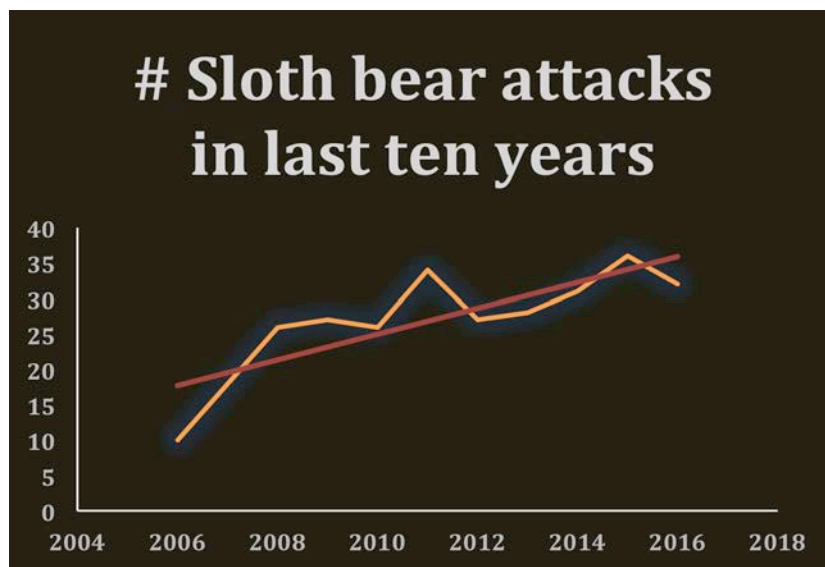
MANAGING BEARS: INDIVIDUALS AND POPULATIONS
Moderator, Colleen Matt, Conservative Planning Solutions

Nishith Dharaiya, HNG University, Patan (Gujarat) India

Presentation: Human-Sloth Bear Conflicts: A Significant Challenge to Conserve the Real Baloo of India

Managing sloth bears and convincing people to conserve sloth bears is a challenge in India. The sloth bear is the real Baloo as described in “The Jungle Book” by Rudyard Kipling. Historically, the sloth bear distribution was five range countries; India, Sri Lanka, Nepal, Bhutan, and Bangladesh. Sloth bears have been nearly extirpated in Bhutan and Bangladesh and currently more than 85% of sloth bear range is in India. Key threats to the sloth bear are habitat loss, degradation of remaining habitat, retaliatory killing, hostility of locals, and lack of proper rescue knowledge. Habitat degradation and human-bear conflict are the two major threats to this species. Sloth bears eat everything in the forest, so availability of food is not an issue.

Sloth bear attacks have increased 30% in the last ten years with more than 200 attacks recorded, yet many attacks are not reported by the Forest Department. Most of the attacks are deadly. Two recent significant cases highlight the issues surrounding



human-sloth bear conflict. June 4, 2016, a sloth bear was observed in a Castor crop field. Mob of locals frightened the bear and the bear ran to the nearby forest without harming any human. They tried to capture the bear without protective measures. The bear was trapped in a net, taken to a rescue center and released into a protective area after being treated for dehydration. The people were hostile

toward the bear and had intent to kill it. The mobs of people present challenges for forest service workers.

The second case involved a female bear that killed three people; two tribal members and one forester. In addition, two people were injured, all in the same day. On March 16, 2017, the Forest Department and police shot and killed a bear, with no confirmation of it being the bear responsible for the attacks. The attack became a political issue with the people demanding the bear be killed rather than rescued and released. Similar incidences happen frequently in India. Sloth bears are protected under the Sloth Bear Indian Protection Act, yet due to the hostility of people and political pressure, they continue to be killed.

Bear conservation is a challenge as India is lacking proper knowledge to rescue sloth bears. Over 60% of conflicts involve sloth bear attacks on humans, with the 60% of those occurring in non-protected areas and 30% around villages. There are conflict mitigation strategies in place, but lack of trained staff, local awareness, rapid response units, and proper guidelines, exacerbate the problem. There are guidelines in India for lions, leopards, and other species, but not for sloth bears.

Some of the constraints are shortage of staff, lack of equipment, lack of a bear rescue and conflict management team, research and monitoring, pressure from developmental activities, and lack of awareness in local communities. Management actions recommended include habitat management in ecological corridors and water containment points, capacity building of the forest field staff, communication system upgrades, enhancing field staff ground mobility, training on sloth bear specific rescue, and regular monitoring of sloth bears. Additional recommendations include research and monitoring of sloth bear distribution, habitat use, feeding patterns, identifying wildlife corridors in fragmented forest patches, mapping of land use by bears and humans in identified conflict areas, and conflict management, specifically community awareness, Rapid Response Units, and rescue and conflict management teams.

Future directions include awareness programs for tribal and school children, Forest staff capacity building, teacher training programs, and bear rescue trainings for field staff with the goal being to save both humans and sloth bears by promoting coexistence.

Question: *How many of the sloth bear attacks are provoked by humans?*

Answer: *In many of the cases we recorded, the sloth bear enters a village and the people come out in mobs to see the sloth bear. The bear's natural inclination is to attack and then, the humans try to kill it.*



Patricia A. Owen, Denali National Park and Preserve

Presentation: The Savage Bear: A Case Study of Individual Bear Management in Denali National Park and Preserve

Denali National Park and Preserve's six million acres is accessed by a single ninety-mile road. Private vehicle access is allowed only in the first 15 miles. The opportunity to experience the park for most visitors is provided by a bus system beyond that point. The furthest extent of the unrestricted section of the road is the Savage River. This popular destination, especially for independent travelers, includes parking/rest areas, picnic areas, a campground, and hiking trails.

Denali National Park receives about 640,000 visitors annually and mostly during a 100-day period known as "100 days of chaos." In June 2016, they received reports of a small, blonde grizzly bear in the Savage area. The area is bisected by the Savage River. The bear was small, somewhat aggressive, and not intimidated by people. On June 20, the bear crossed the river and walked within close proximity to people. June 22, the bear approached people on a trail. The people had a backpack of food, which they threw at the bear. The bear took the pack and consumed their food. After this incident, the park, in keeping with their bear management plan, closed the trail and the entire parking area. A culvert trap was placed on the east side of the river. There were reports of the bear in the area; however, it did not approach the trap. On June 26, the bear was observed in the Savage campground and was shot with two bean bag rounds. The bear left the area and did not return. Further inspection of the campground revealed the bear had flattened several tents. At this point, the park restricted the campground to hard-sided camping only; no tents. Five days passed with no reports of the bear being sighted. The park's bear management strategy was to reopen closures after five days of no activity. On July 1, the bear was detected again on a trail approaching people. This time, the bear approached three people who got down on the ground and "played dead." The bear approached a woman and began to paw at her resulting in minor injuries. The campground and trail were again closed with restricted walking and biking along the park road as an extra precaution. The park attempted to pursue and trap the bear numerous times with no success. On July 6, the decision was made to enter Incident Command System (ICS), which meant the campground, trail, and road was restricted. This incident involved the entire park staff, which was unprecedented up to this point. The week of July 24, more reports of a bear matching the description of the offending bear, being in the area. Aerial capture was discussed, which is standard capture procedure for Denali National Park. On July 26, a report of a bear feeding on vegetation was received. The bear was darted via helicopter and captured. Upon examination, the bear was discovered to have poor body fat, underweight, with a serious infection on the left front leg, and in overall poor

condition. Euthanization was debated, but the decision was made to collar the bear and conduct a hard release the following day. Due to the small size of the bear, it was difficult to fit a collar that would remain on the bear, which would make it difficult to track. On July 27, the park made the decision to euthanize the bear due to the likelihood of the collar falling off and the bear being difficult to track in a high visitor use area. A necropsy was performed revealing puncture wounds and crushed carpals on the front leg where the wound was located, most likely due to an interaction with a larger bear. There was initial concern about a gunshot wound, but tests did not detect metals in the wound. The bear had stomach ulcerations, dental anomalies and missing teeth, no body fat, weighed 130 lbs., and was determined to be three years old. The necropsy concluded that the bear had been starving and unable to sufficiently forage.

Following the incident, the park reflected on missing elements in their bear management plan. In the past, the park had not considered using ICS for similar bear incidents. They had good coverage with press releases and did not have negative social media reactions. The public information officer relayed in a press release the emotional and physical stress on the staff in making the decision of whether to euthanize or release the bear. This communicated to all staff, and the public, the depth of thought behind decisions made about bears.

Question: *Is there anything specific you did in communicating with the media that prevented social media backlash?*

Patricia Owen: *Press releases were put out on a daily or more than once daily basis and we also communicated through our Facebook page. We tried not to do things that appeared contentious in the public eye. The hardest part of this area is this being a public access area with private vehicles where people can hike/bike/walk without coming in contact with rangers. We mobilized volunteer groups to help in this area with education efforts.*

Ashfaq Ali, Huazhong Agricultural University, Wuhan, China

Presentation: Human-Asiatic black bear (*Ursus thibetanus*) interaction in the Kaghan Valley, Pakistan

The Kaghan Valley is located in the district of Mansehra, in the northwestern province of Khyber Pakhtunkhwa in Pakistan. River Kunhar is the major river in the valley that receives water from the surrounding catchments of the valley. The study consists of a significant population of Asiatic black bears. To date, there is no baseline information concerning human-Asiatic black bear conflicts. The methods used include conflict assessment interviews and sign assessment in the forest. The study area consists of mostly poor residents who rely heavily on agricultural crops and must enter the forest frequently. The residents share habitat and food with the Asiatic black bear resulting in human-bear conflicts. Those interviewed shared that the bears cause damage to their crops, orchards, and livestock with corn, goats, and sheep receiving the most damage. Fifteen percent of those interviewed report attacks on humans. The people retaliate after Asiatic black bear attacks by hunting and killing the bear.

Conflict between humans and bears increases during the months of July and August with food being the main source of conflict due to agricultural crops being raided by the bears. The attitudinal scores of villagers towards Asiatic black bears revealed that age and occupation influenced attitudes toward conservation efforts. Villagers under the age of thirty were more devoted to conservation of the species.



Sign assessment showed that Asiatic black bears preferred habitat areas with steep slopes and pine trees. Habitat degradation, lack of proper demarcation of boundaries, lack of professional, skilled wildlife management staff, and a lack of compensation schemes for damaged crops inhibit conservation efforts for the Asiatic black bear.

The study recommended a proactive resolution toward human-bear conflicts in the Kaghan Valley through increased efforts to provide conservation education at various levels, capacity building of wildlife staff, and further research on human-Asiatic black bear conflicts. The current study will be continued and will use the latest technology available for resolving human-Asiatic black bear conflicts.

Question: *What commitment of any sort do government funders in that jurisdiction is envisioned?*

Ashfaq Ali: *There is no activity from the government to provide a solution or an initiative in this area. We have made suggestions for compensation schemes, but there has been no response from the government.*

Arzoo Malik HNG University, Patan (Gujarat) India

Presentation: Understanding Sloth Bear Attacks in Gujarat for Formulating Future Conservation Strategies

Sloth bears are widely found in the lowland forests of the Indian subcontinent. There was a decline in population from the 1800s–1950s of greater than sixty percent. Sloth bears are endemic to the Indian sub-continent with 85% of the



population found in India. Conflict with humans is one of the major factors of the decline in population. The majority of conflicts are near the boundaries and settlement areas. Sloth bear attacks on humans have increased over the past ten years. A limitation on the data exists due to increasing awareness of compensation following sloth bear attacks.

Methodology of the study involved preparing a questionnaire, collecting secondary data, and the interviewing of victims. Forty-eight percent of attacks occurred during summer, 27% in winter, and 25% in the monsoon season. Humans are more active in forest areas in summer. Forty-eight percent of attacks were crepuscular, 43% occurred in the daytime and 9% occurred at night. The majority of sloth bear attack victims was between thirty-one and fifty years of age and was male. Humans and bears share food sources in the summer season. Humans and bears share fourteen out of thirty plant species in the summer months.

The study recommended targeting age groups in the eleven-thirty-year range to create awareness of how to avoid conflicts with sloth bears. The study also identified driving forces for conflict. Limited availability of water (especially in summer), habitat degradation, sharing of food resources, human population growth encroaching into the forest area, the promotion of ecotourism and pilgrimage, and lack of awareness were contributing factors. Potential conflict zones were identified

based on conflict and landscape characters. The study recommended habitat improvement, awareness programs for specific age groups (eleven-thirty years), monitoring conflict zones, establishing ecological corridors, implementation of bear rescue training, and research and monitoring. Furthermore, the study recommends implementing a liaison between forest staff and tribal representatives as human-sloth bear conflict is resulting in human-human conflict. There is a need for cooperation between forest staff and tribal to promote the co-existence between wildlife and humans.

Question: *Is there compensation for attack victims?*

Answer: *The government pays the compensation, which varies according to the injuries received.*

Question: *Do all victims receive compensation? Are there specific criteria.*

Answer: *Yes, there are criteria through the government and then compensation is provided.*

Dick Shideler, Alaska Department of Fish & Game

Presentation: *Is it Addiction? Food-Conditioning in Grizzly Bears of Alaska's North Slope*

Words matter when you are sharing information with the public. The terms food-conditioning, habituation, and addiction describe types of learned behavior that can affect how we respond to individual bears in a real or potential conflict situation. If the word addiction is used, it can limit the options of management for an individual bear. For this presentation, the terms were defined as follows:

Food-conditioning - Process by which bears learn to prefer human food and garbage and associate human activities (but not necessarily individual humans) with food.

Habituation - Process by which bears learn to ignore humans or to treat them as "normal" part of the environment.

Addiction - Chronic, relapsing brain disease characterized by compulsive [drug] seeking and use, despite harmful consequences. Genetic factors account for perhaps half of the likelihood an individual will develop addiction

The study area encompassed approximately 19,000 km² in the central Beaufort Sea coast region of the North Slope. The estimated density is ~ 2-3 bears/1,000km²; a population of forty-sixty bears. The generic term "oilfield" is used here to include the seven individual oilfields that encompass 2,000 km² on the Beaufort Sea coast

within the regional study area. All but two of the individual fields, Alpine and Badami, are linked to the others by a permanent road system. The oilfield consists of 1,000 km of main and connecting gravel roads, a web of above ground pipelines, more than 350 drill sites/processing facilities/ storage areas on gravel pads, three airports, large hotels (“camps”) for housing industry personnel, and the 14 ha. landfill.

The two major sources of attractants are Deadhorse, an outside oilfield open to the public, and the landfill (inside oilfield with no public access) operated by North Slope Borough. In the 1990s-2000s, bear “proof” dumpsters were installed, but the older dumpsters were left in the area and continued to be used for food disposal.

Several patterns of food-conditioned use were identified. Young females with litters used the Deadhorse/Eastern Operating Area (EOA) complex all summer. Many of the food-conditioned bears used this complex for several weeks in early spring and some used the complex in both early spring and just prior to denning. In some years, several adult bears did not use the complex at all and a few reverted to natural foods for most of their lives.

Demographic characteristics of food-conditioned bears indicated that over a reproductive life of twenty years, food-conditioned females would produce 2 more litters than natural food females. The survival of food-conditioned bears was very high compared to a normal survival rate of about 50%. However, although all food-conditioned females produced surviving litters, four of the sixteen adult natural food females produced 2/3 of all-natural food cubs. Some natural food females did not produce a surviving litter until well into their teens. There was a five-month difference between food-conditioned females and natural food females weaning their first litter. The weaning survival rate for food-conditioned bears was 61% while the rate for natural food females was 39%. The post-weaning mortality of food-conditioned bears was 91%. Only two food-conditioned females survived after 2002; the two smallest in body size of all the food-conditioned females. All but one food-conditioned bear died in a conflict situation. Of the twenty-one mortalities, fifteen were before the age of five.

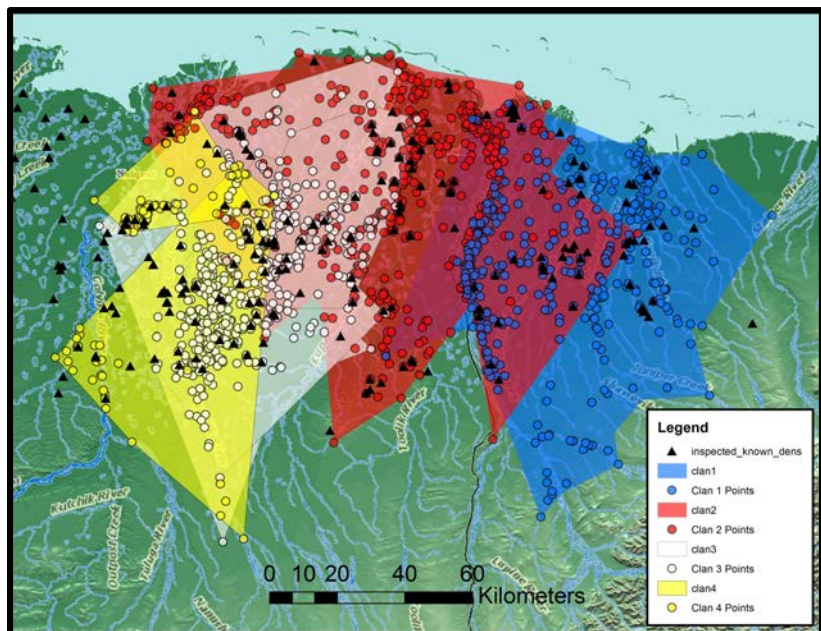
The body mass for food-conditioned bears was significantly higher than natural food females. The trend was the same for other body measurements such as length and girth. Food-conditioned bears displayed a significant increase in body size. The food-conditioned bears gained a lot of weight in early age classes. Only two food-conditioned females are still alive. In referencing a Yellowstone study conducted on grizzly bears after dump closures (Robbins et al. 2006), the presenter asserted that food-conditioned bears with large body mass cannot survive if that food source is removed, suggesting that after a “set point” is reached, the bear can no longer

survive on natural food choices. As a result, the bear either dies or is pushed into conflict situations.

Genetic data was collected on 155 bears revealing a large number of maternal clans. The map below demonstrates the social organization of the females into overlapping home ranges dominated by a related group of females dubbed “clans.” The “red clan” represents all but three of the twenty-five food-conditioned bears in the study. The blue clan accounted for the other three. Although both the red clan and blue clan overlap the eastern part of the oilfield and Deadhorse, and had access

to anthropogenic foods there, only the red clan contributed significantly to the food-conditioned group. Location or genetic predisposition?

In examining addiction, which requires a physiological change, partially genetic in order, the body size of bears reflects the available food resources and calls to question what happens to bears that exceed the available resource.



Genetic predisposition was not demonstrated in this study, but the genetic relatedness of the food-conditioned bears is intriguing and merits future study.

Comment: *If you are addicted, you are not able to get out of it without the help of your environment. So, addiction means you are pulling your environment/family/friends into the addiction, which applied to this situation is parallel. Addiction means you can't help yourself out of that. The bears can't get out of that. There's no choice for them; the choice is for the environment to do something about it, or not.*

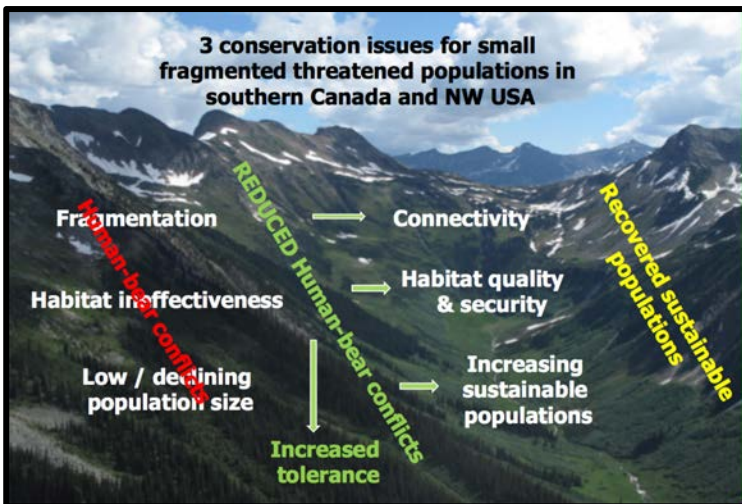
Dick Shideler: *I am not trying to say they are addicted. How do you know it isn't just cultural transmission? I don't know that, but if it is genetic, maybe the path for that is the natural inclination to put on weight, with the other part of that being tolerant of human activity. Those two things together, even though we don't associate them as genetic, may be driving this behavior. Also, the food-conditioned bears learned from*

their mother. Their environment doesn't help them unless they are a natural food bear. It is working against them because they will never satiate that need to continue to maintain their size.

Michael Proctor, Birchdale Ecological

Presentation: Research, Conflict Management, and a Network of Organizations Reduces Conflict Mortality of Grizzly Bears to Reverse Conservation Decline of Threatened Populations in the Transborder Region of Canada and USA

The presentation focused on the link between conservation and conflict with a dual theme of solving conservation problems caused by conflicts and bear mortality. Grizzly bear populations are fragmented from human settlement and transportation corridors. There are three conservation issues for small fragmented threatened populations in southern Canada and the Northwest United States: fragmentation, habitat ineffectiveness, and low population size declining from human-caused mortality. Human-bear conflicts cut across all three conservation issues. To address grizzly bear and wildlife conflict management, agencies must manage wildlife, habitat, and people.



The study area focused on three fragmented populations: a small isolated population in the southern Selkirks of less than one hundred bears, the Yaak area with less than fifty bears, which are separated by Creston Valley, and a large, healthy population of greater than 500 bears. In the center, lies a human-conflict area where

efforts have been concentrated. The Selkirk and Yaak area populations are slowly increasing. Through reducing conflicts, there is evidence males are dispersing into populations that have been isolated for over sixty years.

Conflict management in this area is three-pronged: before, during, and after. Education efforts are made before conflicts happen, intervention is made with non-lethal methods, and follow-up training and information is provided after a conflict incident. The success rate with females is 90% and 50% with males.

Scientists, government agencies, ENGOs, conservation organizations and individuals have combined efforts to create a comprehensive, multi-pronged suite of solutions to address conflict issues, which include cost-sharing for electric fencing, bear safety programs and bear spray training, non-lethal management techniques, strategic land purchases, government planning, and working with the people who live with conservation in their backyard. Backcountry conflict has been reduced through access management; limiting roads in high bear density areas. Lowering road density in the backcountry areas has influenced female reproductive success.

Non-hunt grizzly mortality trends across British Columbia have been increasing. The trend in the study area was increasing but has been declining since implementing conflict management programs. Currently, five-six reproductive females are living in the Valley Wildlife Management Area. Cherry orchards, bone yards, agricultural crops, and a wildlife management area are conflict areas that must be managed. A management plan is currently being developed for the valley to teach people how to contain agricultural foods, which is fueling the growth of bears.

Principles learned were: understand the food, use a multi-pronged approach, gather a diverse team, hire people to help solve conservation problems, education/direct action, develop peer-to-peer spread of mitigations, and plan for success.

SUCCESSFULLY MANAGING ATTRACTANTS
Moderator, Ryan Leahy, Yosemite National Park

Joel G. Zachry, Great Outdoors Adventure Travel

Presentation: Challenges to Becoming a Bear-Wise or Bear-Smart Community: Tourists and Hikers

This presentation focused on the community of tourists and hikers who venture in to bear country. The “community” was defined as tourists and occasional visitors,



assuming no ownership, and seeking personal gratification. They seek two things: a picture and a story to tell with no understanding of management or the rules, and care little about research. Engagement usually occurs in unfavorable circumstances due to a lack of, 1) awareness of their surroundings, 2)



education, and 3) recognition of “wildness.” *The presenter emphasized that “wildness” never goes away in a wild animal; wild means wild.* In terms of signage, people tend to disregard them. The definition of insanity is doing the same thing over and over again and expecting a different result. We have to meet people where they are. People are slow to change. Children model after adults. People will only listen if they trust you and they process what relates to them. Most individuals are not vigilant and fail to see signs of a bear’s presence. Visitors come to the parks and go into the backcountry thinking, “it won’t happen to me.” They either come ill-equipped, often ill-advised, and unfamiliar with potential threats or they bring bear spray or firearms without proper knowledge of use, benefit, or outcome. Most visitors are not knowledgeable and get their information from childhood stories and movies. Visitors come to the parks and go into the backcountry not realizing a bear moves at forty-four feet per second at full charge and is always unpredictably wild. Visitors do not understand that a bear that becomes habituated or causes injury is often killed: the visitor destroying what they came to see and enjoy.

It is important to recognize what has been lost such as, the American Chestnut tree and current damage to the national park by the Woolly Adelgid. It must be emphasized to visitors to “Keep it Wild.” Pick up trash, keep your distance, and get kids outside.

***Mike Badry, BC Parks and Conservation Officer Service Division
Presentation: WildSafeBC: Current and Future Outlook***

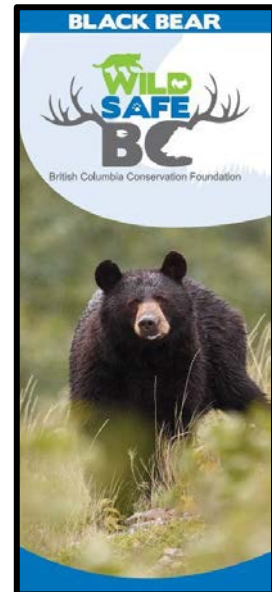
The WildSafeBC program is an educational component that has been developed over many years. There is an average of 29,691 wildlife conflict reports in British Columbia annually (five-year annual average). Over 17,000 calls involved black bears, which are the number one conflict species in the province. In spite of conflict reduction efforts, the province destroys over 600 black bears per year due to conflicts with humans. There has been one fatal attack by a black bear in the last five years, but most predator attacks have resulted in minor injuries.

The WildSafe program was introduced in the 1990’s as the Bear Aware program, which promoted the idea of proper attractant management to communities. Three years ago, the program morphed into the WildSafeBC program, which addresses multiple species of wildlife to be proactive, rather than reactive, with the public and provide information about wildlife that interests the community. The benefits apply to all human-wildlife conflict issues such as agriculture losses, industrial conflicts, wildlife diseases, species at risk, and invasive species. WildSafeBc serves over 100 communities with twenty-five coordinators and five seed grants. They make 18,000

door-to-door contacts and have over 5,000,000 social media contacts annually. Their community engagement efforts have expanded to a Wildlife Alert Reporting Program that is accessible to the community regarding wildlife conflict issues.

Additional WildSafeBC programs include Junior Rangers, “BC Goes Wild” Weekend, bear-resistant container testing, social media outreach, traditional media, and wildlife safety training. The province has provided \$275,000/year over the last three years; however, this amount is not sufficient, and they continue to seek funding from a variety of sources. For every dollar invested by the provincial government, an additional \$1.50 in partnership funding is leveraged from other sources. WildSafeBC has delivered programs valued at \$620-700,000/year.

Moving forward, the WildSafeBC’s vision is to expand education on the use of effective deterrents, such as the Electric Fencing Response Program, First Nations training and partnerships, and conflict reduction incentives (WildSafeBC certification). They are requesting additional funding to provide greater security and allow for program growth. Their priorities would be guided by a multi-agency steering committee administered through WildSafeBC.



***Mike Badry, BC Parks and Conservation Officer Service Division
Presentation: A Stakeholder’s Perspective of Successes and Challenges with the
BC Bear Smart Communities Program***

The Bear Smart Community Program is a proactive conservation initiative developed in 2004 that encourages efforts by communities, businesses, and individuals to reduce human-bear conflicts. BSCP efforts are focused on addressing the root causes of human-bear conflicts and is a voluntary program. There have been visible successes within communities that participate in Bear Smart; however, despite wide-ranging efforts, there are individuals who continue to be irresponsible with personal management of attractants. Moreover, high levels of human-bear conflict in non-participating communities persist.

The qualitative analysis examined common patterns across the Bear Smart communities and compared results of the described interventions and outcomes, compared criticism and proposed ideas with scientific literature on ecological and social concepts, and formed specific recommendations on the basis of feedback from

interviews and science reviews. This review beset upon opportunities to measure and improve the effectiveness of the program, as well as to identify additional opportunities to improve the program and promote collaborative initiatives to increase the number of communities attaining Bear Smart Community status. The eight Bear Smart Communities were surveyed via telephone interview to discuss success and challenges of the program.

The research findings were divided into four themes: leadership, communication, outcomes, and program design. In order to foster a sense of shared stewardship, responsibility for taking a leadership role in managing bear conflicts needed to be addressed. Building continuity and resilience in local Bear Smart programs and having municipalities lead by example in avoiding human-bear conflicts was identified as a leadership challenge. It was recommended that the Bear Smart Community Program remain a voluntary program with an established “community of practice” comprised of aspiring and designated municipalities from which local programs of champions could be developed.



Municipalities desired communication with conservation offices, especially during times of high conflicts with bears, which was a challenge for officers who were overwhelmed with handling conflicts. The council needed to be informed and supportive and have adequate communication, particularly in a human-bear conflict crisis, and follow-up at the conclusion of the situation. Incidents become emotional for communities and can have an adverse effect on a municipality. Often, those issues are not managed well, and education components are not delivered until after a bear has already been destroyed. It was recommended that shared responsibility be emphasized and repeated as a mantra of the program, as well as reframing the

message in a manner that aligns with community interests. The development of a simple communication protocol and joint human-bear conflict crisis management plan was suggested. In addition, training programs for conservation office staff and municipal leaders addressing relationship-building techniques and managing community responses in a crisis were discussed.

The third theme focused on outcomes of collecting data and establishing clear indicators of success, focusing on behavior and actions in ways that are important to the communities, and broadening the scope of program delivery to connect with

administrative and legal frameworks. Recommendations made were the creation of a shared database to better analyze and modify indicators of success, behavior change programs, which are far superior in affecting the necessary adjustments in individual behavior and expanding the scope of local program delivery to consider urban planning ranging from green spaces to provisions for residential and commercial waste management.

The fourth and final theme focused on program design to help communities work systematically towards Bear Smart status, find adequate resources for key issues, and work together to continuously improve the Bear Smart Community Program. Recommendations made were to provide an easier on-ramp giving communities time-limited entry level status, providing clarity on cost-effective methods, and re-evaluating the status of program delivery every five years.

Question: *How long is the certification process for a community to become Bear Smart? Is there a committed staff or do biologists share time?*

Mike Badry: *It depends on the size of the community to some degree. We began the program in 2004 and the first community was certified in 2009; however, we built the program based on what some of the communities were already doing. A three-four-year window is a reasonable timeline for communities putting forth a lot of effort. I am the provincial coordinator, but we have lots of conservation officers who are the ground people and sit on all these committees. They help the communities. We have biologists that assist, but it is mainly the community and the members of the community that are the driving force at achieving the criteria.*

Tania Lewis, Glacier Bay National Park and Preserve

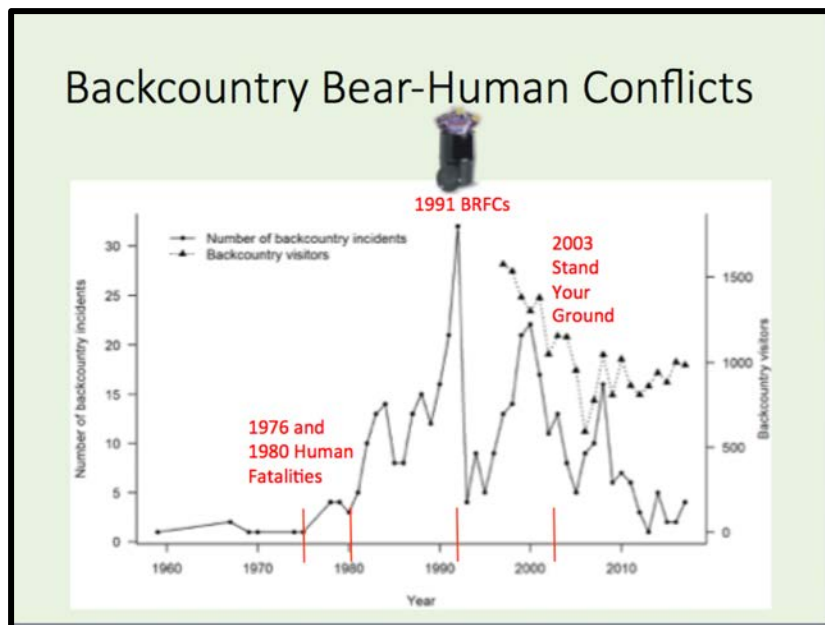
Presentation: Management Techniques to Minimize Backcountry and Front country Bear-Human Conflicts in Glacier Bay National Park, Alaska

Glacier Bay National Park is located eighty kilometers west of Juneau, Alaska. Rapid ice recession in Glacier Bay has resulted in a recolonization of both black and brown bear populations. It is a remote park only accessible by boat or plane with about 500,000 visitors annually during the summer months by boat. Park headquarters is connected to Gustavus, a town of about 400 residents, by a ten-mile road. The town has a landfill surrounded by electric fencing; however, only about 50% of residents use the landfill. Bears having access to trash in town, sport hunting, and defense of life and property kills are sources of conflict. Brown bears are abundant throughout the park, but most encounters occur in the backcountry in the northern part of the park. Black bears, and the rare color-phase Glacier “blue” bear are more common in the southern, forested region of the park. Both species use the shoreline due to

abundant food sources, and humans use the shoreline in both the front and backcountry. Most backcountry use is by kayakers who camp on the shore. Habitat succession continues to change the habitat and the distribution of black and brown bears as humans and bears share the use of a narrow shoreline.

The GBNP bear-human management program addresses food and trash storage and has been successful at controlling attractants within the park, with few exceptions. The program focuses on prevention, information, and response, which include advisories to inform the public, monitoring individual bears, site investigation, area closures to eliminate risk and rewards, and hazing. GBNP does not currently have a capture program at this time. GBNP bears are habituated and somewhat tolerant of people around the shoreline where they are encountered.

Bear-human conflicts are defined as a bear having made contact with, injured, or killed a human, as well as damaging property, obtaining food or trash, or entering permanent structures or vehicles. Records of bear incidents dated back to 1960 show the number of backcountry incidents



and number of backcountry visitors. Two fatalities in 1976 and 1980 involving lone kayakers have occurred. As the number of visitors increased, so did the number of incidents due to bears becoming food-conditioned in the backcountry. In 1991, the park implemented mandatory bear resistant food canister use, which had a significant impact on the number of conflict incidents. Visitation continued to rise in the late 90's, reaching a high point in 2000. GBNP began to reflect on their safety message, which encouraged people to back away from bears. This was resulting in people backing away from their camp and bears entering the camp and destroying it. In 2003, they revised their safety message encouraging people to stand their ground and defend their gear in the backcountry. As a result, conflicts in the backcountry began to decrease to about one-seven per year. Conflicts mainly revolve around unattended gear with the bears' natural curiosity drawing them to kayaks, inflatables, and especially tents. Visitors to backcountry are encouraged to

cook and eat in the tidal zone but are discouraged from placing their tent in this area.

Another area of conflict is the Bartlett River, which is located about a mile from park headquarters and is a popular fishing destination. Due to humans leaving fish carcasses behind after filleting their fish, the park established regulations in 2011 requiring all harvested fish to be kept within six feet of the angler, and fish must be packed out whole. The regulations have been successful at resolving this conflict.

Park headquarters, a lodge, and housing exist in the front country and is largely inhabited by black bears with occasional brown bear use. The front country is the most likely area for bear-human interactions and conflicts. The lack of a firearms instructor in the park has resulted in the use of hazing techniques as an alternative to firearms. In 2006-2007, the park had several family groups of bears that were frequenting the front country. While yelling, clapping, and chasing bears was effective on single bears (81% success), it was not effective on family groups (46%) due to the cubs climbing trees. The park developed a “gentle herding” approach with family groups, which was successful. The number of family groups has given rise to some young subadult bears getting into trouble in the front country. Due to training constraints, non-lethal firearms were not always an option, were cumbersome, and not always accessible. The need for smaller, lighter tools prompted the park to consider electric fencing, bull whips, sling shots, and paint balls for hazing.

James Wilder, US Fish and Wildlife Service

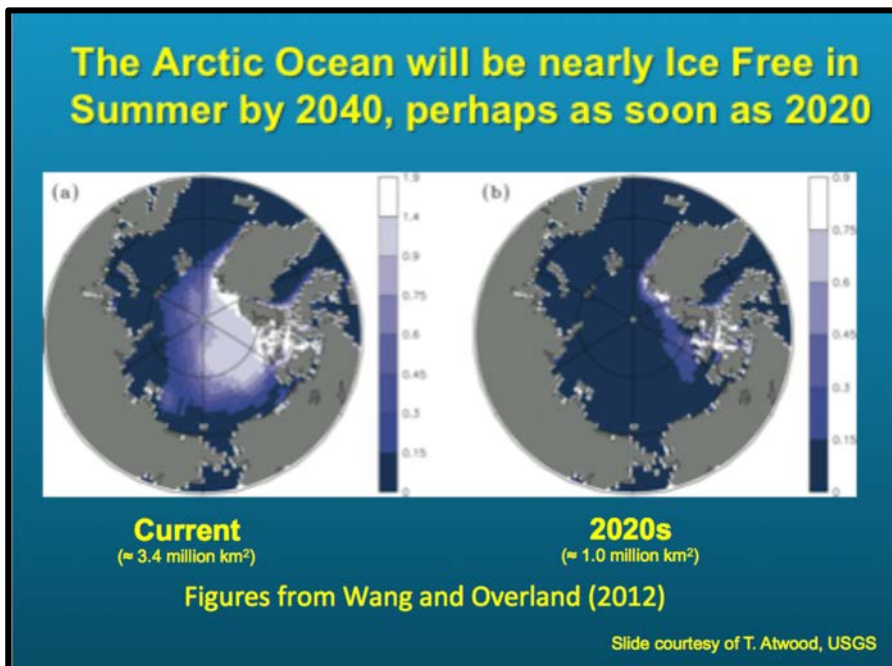
Presentation: Polar Bear Attacks on Humans: Implications of a Changing Climate

This presentation summarized the first comprehensive analysis on polar bear attacks throughout their five-country range (Canada, Greenland, Norway, Russia, and the United States). The study dispelled misinformation and misconceptions about polar bears being the most aggressive of all bear species, yet also raised concerns about how climate change plays a role in polar bear attacks. The study was published in July 2017.

The first documented polar bear attack occurred on the coast of Northwest Russia on September 6, 1595 and is recorded in *the Three Voyages of William Barents to the Arctic Regions.* (de Veer, 1876). Although this account was not included in the study, the details of the attack are eerily similar with recent accounts that were included in the study. For example, the bear in the 1595 attack was described as

lean, attacked stealthily and without warning, killed the first victim with a devastating bite to the head, and was so nutritionally stressed and food-motivated, it charged into the midst of a large group of men to grab the second victim. In spite of this account, polar bears have an undeserved reputation of being the only large predator that will actively hunt down and kill people. Most misconceptions are driven by media sensationalism.

The reality is that polar bears are creatures of the sea ice that prefer to spend their time in sea ice territory. This preference for sea ice habitat has historically served to keep humans and polar bears separated and thus, helped to reduce conflicts. Alarming, the Arctic is changing at an accelerating rate. The Arctic Ocean may be



nearly ice-free in summer by 2040, perhaps as soon as 2020. The loss of sea ice habitat will result in bears being highly motivated to gravitate to people in their search for food.

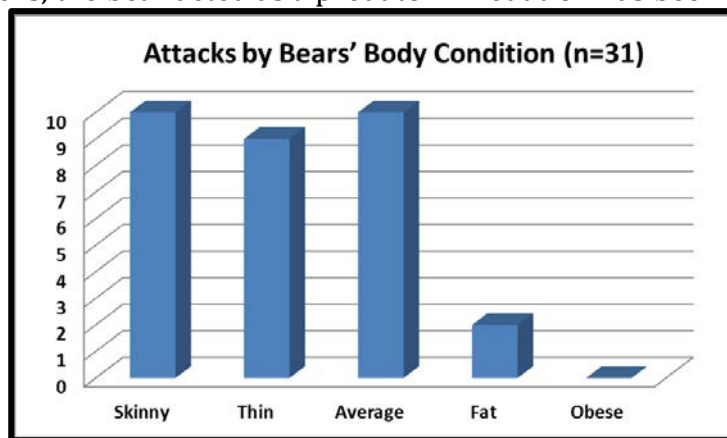
Recognizing this, the five countries formed the Human-Polar Bear Conflict Management Working Group to

address the issue and make Polar Bear management a priority for the Polar Bear range states. The group worked collaboratively to create a unified database to track and analyze circumpolar conflict data, populated the database with historic records from each country, and analyzed the records to provide a scientific assessment of polar bear conflicts and attacks, as well as recommend ways to prevent them in the future.

The predicted symptoms of climate change are the reasons why the working group has made human-polar bear management a priority. Attacks result in sensational media coverage, which creates irrational fears and fear of bears among people, neither of which contribute to Polar Bear conservation or human safety. Polar Bear attacks on humans have been extremely rare historically based on data compiled

from 1870-2014: one hundred forty-five years of data. During this time, seventy-three attacks have been recorded with twenty deaths and sixty-three injuries. In addition, data was collected on sixty-eight attempted attacks on people where the bear was intent on attacking but was killed or physically deterred prior to injuring a person. From the data, it is reasonable to conclude that under historic sea ice and climate conditions, the odds of a human being killed by a polar bear have been extremely low. Although the risk remains low, bears that are nutritionally stressed and in poor body condition are more likely to attack people. The study found that 61% of Polar bears that attacked humans were in below-average body condition, and 64% of bears in involved in fatal attacks on humans were in below-average body condition. In 59% of attacks, the bear acted as a predator. Predation has been the most common cause of polar bear attacks to date.

Since 2000, eighty-eight percent of attacks have occurred during July-December, the months of minimum sea ice extent. Twenty-seven percent of attacks on people have occurred in towns with 60% of those attacks being predatory and 56% of the



bears having below-average body condition. Yearlings and sub-adults represented 54% of the attacks. As sea ice conditions deteriorate, and bears are forced on shore for longer periods of time, these attacks will likely increase.

There are some major differences between polar bears, brown bears, and black bears. There are no known cases where a female polar bear killed a human in defense of cubs. Only one attack could be attributed to a bear's defense of a carcass. The proportion of fatal attacks by polar bears that were predatory (88%) was almost identical to that of black bears (87%). In other words, to date, polar bears have been no more likely to "actively hunt and kill people" than black bears. Independent, immature bears, such as sub-adults, two-year olds, and yearlings, have committed the majority of predatory attacks by polar bears. Twenty-seven percent of polar bear attacks have occurred in towns. Some polar bears are willing to attack large groups of people (>ten). In reference to bear-inflicted human fatalities in North America, based on data from 1900-2014, brown bears have killed twelve times more people than polar bears, and black bears have killed nine times more people than polar bears.

	North America	Alaska
Polar	7	1
Grizzly	86	47
Black	64	6

In summary, under historic sea ice and climate conditions, polar bear attacks on humans have been extremely rare. The Arctic Ocean may be largely ice-free for months at a time in the very near future, meaning that without the sea ice substrate, prey will be largely unavailable to polar bears. Increased nutritional stress will make some polar bears more willing to risk interacting aggressively with people to obtain food. This, combined with the evidence that bears in below-average body condition are more prone to attack people, should be a serious concern for all who live, work, or recreate in polar bear habitat, as well as for the agencies responsible for managing polar bears. The presence of anthropogenic food attractants is likely to draw the increasing number of land-based bears into close proximity to human activities, escalating the risk of conflict.

Question: *Do you think range limitation and low human population is a contributing factor to the low number of attacks historically?*

James Wilder: *There are less people in the Arctic than down here, and record-keeping has been poor. We recognized that more people have been attacked by polar bears than we were able to determine. Having worked with all three species, polar bears are just not as aggressive as grizzly bears are, particularly where their habitat overlaps. Polar bears exploit the rich, marine environment and really don't have any competitors out there, and are obligate carnivores, so it is not worth their time to get into conflict...they want an easy meal. Whereas, the northern grizzly bear has to make a living in five-six months.*

PANEL DISCUSSION
SUCCESSFULLY MANAGING ATTRACTANTS
Moderator, Jay Honeyman, Alberta Ministry of Environment

Question for Tania Lewis: *Your location seems to be ideal for bear dogs. Is that something you have considered?*

Tania Lewis: *Yes, we have thought about it, but it would take someone to have the dogs and train the dogs. If we had someone dedicated to supervising and training the dogs, it would be effective.*

Question for Mike Badry: *How do you communicate what it costs to become a Bear Smart Community, and do you have any case examples about how you share that information?*

Mike Badry: *I do not have a breakdown about what it costs communities to become Bear Smart. There are always questions about how much it will cost to do a hazard assessment. I share some experiences of other communities. We can give a ballpark figure of \$3,000-5,000 to do a hazard assessment. It can be relatively inexpensive, the same with the management plan. We tried to keep them simple. Where the resource intensive costs come are in the waste management aspect. Some things can be handled with by-laws, i.e. securing attractants.*

Question for Mike Badry: *So, a community becomes Bear Smart.... then what? What do they get out of that?*

Mike Badry: *That has been part of the discussion since the development of the program – what kind of incentives can we give communities for going through all the pain and agony. We wanted to provide a monetary incentive, but that didn't work out. When delivering the Bear Smart message, we focus on three things: public safety, reduction in property damage, and bears being killed. These are things most people will buy in to no matter what their feelings about bears. The other thing we talked about is the alternative, non-lethal methods of dealing with bears.*

Question for Mike Badry: *Have any of the communities identified how to measure success of the program? Were the things put in to place been the things that actually influenced those changes?*

Mike Badry: *We definitely want to start collecting information about what communities are doing to reduce conflicts and hopefully, some metrics about how successful that has been. We do audits inside communities and take a baseline followed by an educational campaign. Then, perform an audit again...do we see less attractants as a result of our endeavors. That is one thing we need to do better: measure our effectiveness and adapt our program so we are learning from mistakes we are making.*

Question for Tania Lewis: *I'm curious about enforcement...how did you initiate behavior changes and describe where the success came from?*

Tania Lewis: *We have an inter-divisional bear committee made up of law enforcement rangers, biologists, visitor outreach, visitor services, maintenance, etc. Whenever there is a problem, we meet and talk about the problem. Our enforcement has been pretty good with the exception of being understaffed in a large park. Depending on the staff in a given summer, depends on the success. Sometimes there is a bit of a turf war, but the committee tries to work on solutions. The river enforcement is a good example that if there is no monitoring or enforcement, people ignore your*

regulations, so we work together with visitor services and others who can warn people and talk to them.

Question for Mike Badry: Do you have any communities that have been Bear Smart fall “off the wagon?”

Mike Badry: No, we haven’t. The communities that have gone through trying to be Bear Smart have kept it up. It has become engrained in the community. We require wording in their community documents. It has become a way of doing business in that community. We had some struggling, but after we reconnected, they were right back on board.

Question for Tania Lewis: After you implemented the bear canister regulation, the behavior changed somewhat...the bears became more aggressive toward people to get what they wanted. Is that correct?

Tania Lewis: I wouldn’t say more aggressive. There were instances of bears getting food and causing property damage, which dropped off with the bear resistant food containers, but then, visitation in our backcountry increased. We had also been telling people to back away from bears, without any additional information, so bears were moving in and became rewarded by gear. It was a gear-conditioning rather than food-conditioning. Then, we started telling people to “Stand your Ground” and defend their gear. So, they weren’t more aggressive, but were more assertive and rewarded. The use of bear spray also gives people the courage to stand their ground.... they go together. We do recommend bear spray.

Question: Question about contrasts between brown, polar, and black bears and information about sloth bear attacks in towns. Is there a broader comparison across other species?

James Wilder: That is a ripe topic to investigate. It hasn’t been done across species, but the sloth bear is a grumpy, aggressive bear. In reference to previous comments on bear spray, the data from the 2008 paper; I’m not familiar with any incidents of bear spray use where a black bear has come after a person. In a situation with bears who have been food-conditioned to approach people to get food rewards, I would be telling everybody in that park, if a bear comes close enough to spray, spray it!

Question for Mike Badry: Did anyone look at changes in property values increasing as problems with bears decreased?

Mike Badry: No, we have not looked at that.

Question for James Wilder: What are your thoughts in terms of next steps to dispel myths and de-sensationalize attacks.

James Wilder: One of our next steps, for polar bears, is to address information being provided, often by agencies, tourist guides, etc. and to agree on appropriate language

for materials, signage, etc. Some of the bear safety messages would not be safe for people to follow. (example: play dead with polar bears).

Question: *Do you have the numbers on how many polar bears were involved in multiple injuries/attacks? What percentage of the polar bears that attacked/killed people were killed immediately after the attack?*

James Wilder: *I don't remember the number, but there were some attacks that were multiples...one specific example of a bear going from tent to tent. Another important factor is that some of the people had firearms, but in 25% of the cases, they were unsuccessful at using them. In this example, four different people tried to get a rifle to work before they killed the bear. I think the specifics are about 85-90% where the polar bear was killed immediately following the attack.*

Question: *Do you think it would be worth it to become more offensive with bears...Eastern black bears specifically to message to visitors, homeowners, and others to become more aggressive?*

Tania Lewis: *There's a difference between homeowners and visitors on a trail, and there's a lot of liability in encouraging people to haze when they are untrained. Homeowners may be in a position of having to do some hazing. Teaching people to do it safely is important. Teaching people to stand their ground and defend their gear is one thing, but when you are encouraging people to throw rocks...with a Grizzly that gets a little dangerous. We need to be careful with visitors.*

Mike Badry: *We don't encourage active hazing of bears. We talk about not wanting the bear to be comfortable in the community and not habituating it further. We encourage moving the bear along and making sure there are no attractants, but we do not encourage active hazing of bears.*

James Wilder: *Until you secure the attractants, it doesn't really matter.*

Jay Honeyman: *In certain scenarios in Alberta, we will give rubber bullets and bean bag rounds to landowners on a case by case basis. You can only secure attractants so much if you're a rancher.*

Question: *Is there any sense of anyone taking on Herrero's mantle and updating that work?*

Unknown respondent: *With all the multiple jurisdictions, it's an almost impossible task. A frustration is that if a bear damages property, there's a record of it, but if it attacks someone and runs off, it may not be recorded. There's a website that tracks fatalities through Wikipedia, but attacks, in general, I don't know that anyone is doing that anymore.*

Unknown respondent 2: *In the Eastern and Western groups now include that in our annual survey (attacks and kills), so we're trying to make it is easier to have that data.*

Unknown respondent 3: *If each state had someone designated to log that stuff it would be great.*

Question: *Has there been any discussion about Bear Smart communities and new real estate development and regulations?*

Mike Badry: *Some communities have touched on that and really worked in the planning stage about how they will manage waste, green areas, ensuring that landscaping is not an attractant, etc. We've seen that, but it is something that is a recommendation that we want to incorporate into Bear Smart criteria.*

Unknown respondent: *We have done that through purchasing land, conservation easements; we bought almost 40 million dollars' worth of land designed around all the linkage zones. It's a real estate ban by buying up the land. The management conservancy owns it. Conservation easements are a similar thing where you don't own the land, but you put covenants of behavior on it for a price. It lowers the value of the land but restricts the use of the land. It is mildly effective.*

Jay Honeyman: *Where I live, there is a system of wildlife corridors and patches around the town of Canmore. If a new developer wants to come in and develop land in that area, they're required to set a portion aside for wildlife purposes.*

Question: *For Mike Badry – If you have a bear come in to a Bear Smart community, what is the response when there is an issue in one of these communities? For James Wilder – Referencing picture of polar bear on a whale carcass – How often does that occur?*

Mike Badry: *It is our intention that we will be more responsive in Bear Smart communities with non-lethal methods being an option for a naïve bear. We still have some officers that need to be trained in using non-lethal options. The message we send to people is that in order to have that ability, we must bring the level of conflict down in that particular province.*

James Wilder: *Actually, that is not that uncommon. With percentages, of carcasses along that shore, polar bears are good at locating those carcasses.*

Question: *Why do you feel you don't have a need to capture bears?*

Tania Lewis: *We haven't had a lot of reoccurring problems. Last year, was an exception. We partner with Fish and Game when we need to capture a bear. The last time was actually in 1991 when we translocated a female and cubs. We don't have hunting in the park, so there isn't a need for population estimates; we are a large wilderness park. The benefits of the research have to outweigh the impacts on the wilderness, of which collars on bears are prohibited in the Wilderness Act. We just haven't had management need to collar bears.*

Question for James Wilder: *Has there been any hybridization documented between grizzly and polar bears? Is that cause for concern in the future?*

James Wilder: *I think there are only six known polar-grizzly hybrids in the northwestern Canadian arctic that stem from one polar bear female. The offspring of*

the hybridization adopted the polar bear way of life because it was learned from the mother.

Unknown respondent: *Alaskan lore speaks of a sea grizzly. It isn't clear that it was a hybrid, but it is likely that it was. According to stories, it was problematic around people. I suspect that will become an urgent question before too long.*

Question: *Have there been studies on the use of conducted electrical weapons on polar bears?*

James Wilder: *Not in practice, but we have schemed on it a lot. Folks in the oil and gas industry have a lot of former law enforcement for security and they are eager to test it.*

Question: *Have you seen any traits of habituation with polar bears entering settlement areas?*

James Wilder: *In general, no, but in Kaktovik, Alaska, they actively hunt bowhead whales and bring them back to the community for butcher. They have a lagoon where the remains are deposited. The polar bears utilize that lagoon when the ice retreats. In the highest years, there have been eighty polar bears feeding on the remains with the village only 1 kilometer away. There's an active polar bear control by the community members that takes place. The bears are moving in even before the first whale. The patrols have generally been effective. Once the whale remains are gone, the bears move out.*

Wednesday, March 28, 2018

***Janel Scharhag, University of Wisconsin-Stevens Point
Presentation: Non-fatal Black Bear Attack Associations, and Manager
Perceptions of Risk, Litigation, and Policy***

This project was developed from the presenter's personal experience as a wildlife (bear) technician and the difficulty in determining risk in given situations. Examples given were a sow and cubs regularly hanging around a campground area and a male bear following people on a trail but showing no signs of aggression. A review of literature revealed a lack of scientific investigation on non-fatal attacks by black bears.

The first successful lawsuit against a federal agency due to a wildlife attack case was in Utah (Francis vs the United States, 2013). Although not the first lawsuit against an agency for culpability, it was the first that had not been dismissed or overturned. Bear biologists were understandably nervous and it led many to request a better way to assess risk.

While there is a lack of research on non-fatal black bear attacks, there is research on fatal and non-fatal attacks by grizzly species. Grizzly attacks tend to be defensive reactions based on proximity. Fatal attacks by black bears tend to be predatory acts perpetrated by male bears in daytime hours. Anecdotally, non-fatal black bear attacks do not fit this same pattern.

The objective of this study was to fill the data gap regarding non-fatal black bear attacks, understand the attitudes of bear managers with respect to risk management and litigation, and assess the likelihood of using a risk management model. The study focused on compiling and analyzing a database of non-fatal black bear attacks from the lower forty-eight states from 2000-2017. The lower forty-eight states were chosen due to the differences in bear and human densities and disproportionate attack rates in Canada and Alaska. The study began with 2000 because previous estimates (1960-1980) of 500 injuries on human showed that 90% were from food-conditioned bears. Since those decades, much has been accomplished to remove anthropogenic food by making structural changes and removing access.

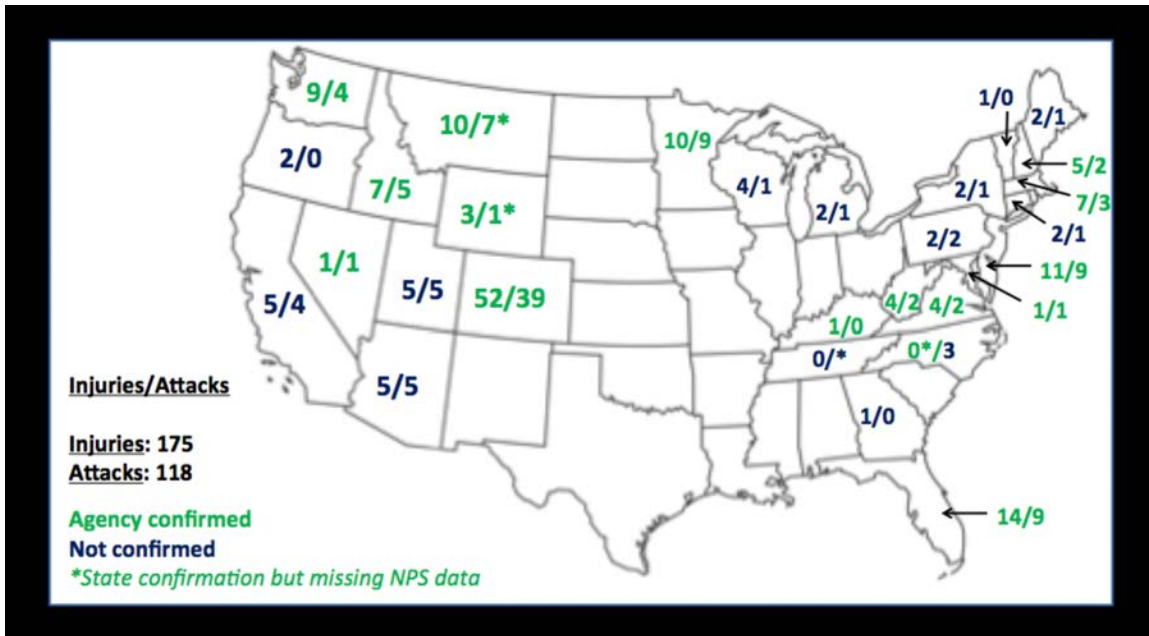
In the initial stages of the study, it became necessary to clearly define what constitutes an attack due to the various definitions from state to state. The definition chosen was based on Stephen Herrero's 2010 definition regarding coyote attacks. The definition excludes cases where humans initiated the contact, such as

intentionally feeding, getting between a bear and a dog, or hunters approaching a wounded bear. For the purpose of this study, an attack is defined as an intentional contact initiated by a wild (non-rabid) bear on a human, resulting in injury, which occurred at a single location and point in time.

For each case, the following biological non-fatal variables and attributes were considered: sex, age (adult and sub-adult), presence of young, behavior (defensive, predatory), density, and natural food production abundance. Managerial non-fatal variables considered were management tools (hunted, non-hunted), land type (public, private), nuisance activity, and whether or not bear proof structures were present. Non-fatal variables specific to the victim that were considered were activity, dominant or passive response prior to and during the attack, possible dog involvement, anthropogenic attractants, the number of people, and the relative size in the group. Variables were classified into two categories: encounter-specific and non-encounter specific. Encounter specific variables are unique to every human-bear encounter such as, sex, age, presence of young behavior, activity, response, presence of dog, attractant, and group size, whereas non-encounter specific variables such as density, natural food production, managerial tools, land type, nuisance activity, and bear proof structures remained the same over encounters in a place and time.

The hypothesis was that the majority of attacks are defensive, involve a dog off leash, involve female bears with young, and can be correlated with non-encounter specific variables. A media search was conducted to ascertain the number of cases and where they occurred, followed by contacting bear biologists from every state to confirm the cases and add additional cases and information regarding attacks. Media materials not confirmed by state biologists were not included in the analysis. The proportional data will be analyzed and areas in space and time, for non-encounter specific variables, attack and no attack, will be compared. A comparison of encounters that result in attack to no-attack encounters to generate probability estimates will be analyzed, with the best-case scenario being an estimate of encounters with not associated metrics. A limitation of the research is the inability to compare encounters that don't result in attacks to those encounters that do result in an attack; however, that information is not being collected as encounters that are not serious often go unreported. This limitation exposes the value of collecting this type of information.

The map shown below represents one-third of the data collected thus far. The two numbers represent #of injuries/# that meet the study's definition of attack. In total, there have been 175 injuries with 118 being defined as an attack per the study definition. The green numbers represent agency confirmation, with the black having been gathered by media search, but not yet confirmed.



Map represents one-third of data collected to date

Thus far, forty-six agency confirmed cases have been processed. Twenty-five cases meet the study definition of attack with twenty being defensive and five predatory. Females with young perpetrated fourteen of the twenty defensive attacks and eight involved a dog. Furthermore, of the forty-six processed cases, twelve of the twenty-five cases involved either prior nuisance activity or a food attractant.

Management implications from this study can be used to inform decision, such as closing areas to dogs and taking special precautions in times of low food production, providing education to the public on the differences between fatal and non-fatal attacks and their risk factors, and using data with other attack information to create a risk management model. These implications align with the objectives of the study to understand the attitudes and challenges of bear managers with respect to risk management and litigation and assess the likelihood of managers using a risk management model. Creating a better way to assess risk will result in the ability to better protect people from attacks and to better protect agencies from litigation in the aftermath of an attack.

***Stewart W. Breck: USDA-Wildlife Services-National Wildlife Research Center
Presentation: Human-Black Bear Conflict in Urban Environments of Colorado:
Results of 11 Years of Research Investigating the Impacts of Human
Development on Black Bears and Strategies for Reducing Conflict”***

National parks are leading the way in understanding human-bear conflicts in urban areas. The study (2005-2011), began in Aspen, Colorado and was initially welcomed; however, as sources of attractants were revealed, the city was not open to recommendations. *The presenter referred to Aspen as “the garbage pit of the world.”* The goal was to change human behavior through education efforts, yet it was not successful in Aspen. The town never embraced the research results, was tentative in handling garbage issues, had weak law enforcement, and held a perception that bear problems belong to wildlife managers.

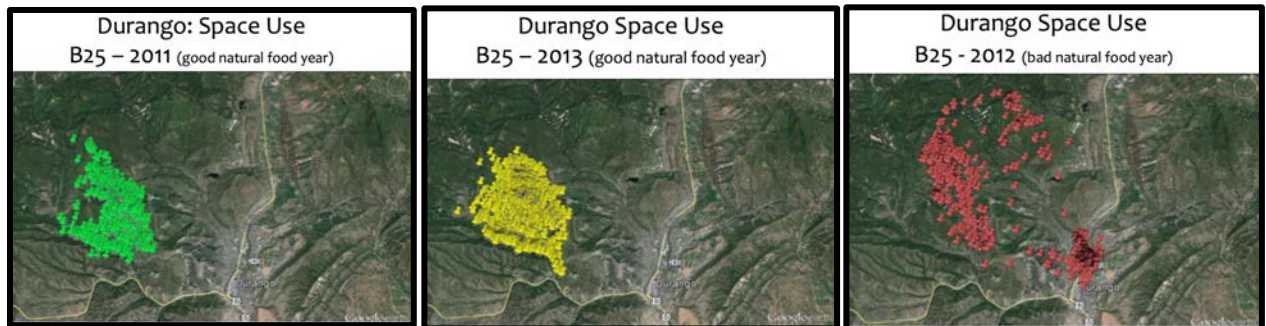
In contrast, the Durango study (2011-2017), embraced research results, invested \$600,000 in additional bear resistant containers, and had the support of law enforcement. Methods used in both study sites included bear capture, GPS-collaring, DNA mark/recapture, den visits, monitoring national food, conflict monitoring, performing garbage experiments, and human dimension surveys.

In presenting the key results from the Aspen study, the presenter challenged a statement from a 2017 study on ecological modeling, which stated, “all education methods reduce the number of human-bear conflicts.” In addition, the Wildlife Society published an article suggesting that educating people deters problem black bears. In reference to the Aspen study, the presenter asserted that education does not work. In Aspen, the education experiment with signage produces no treatment effect. The implementation of the Bear Aware program had no treatment effect. The elevation of law enforcement efforts only produced a minimal treatment effect. The education efforts in Aspen did not result in a change of behavior. The presenter asserted that in a critical situation, education is not a panacea for reducing human-black bear conflicts.

The Aspen matrix population model predicted that mountain towns can become sinks for bears. In addition, a theoretical model regarding bear conflict and urban food subsidy asserted that limiting urban food resources is much more effective than hazing. The model predicted that a 55-70% reduction in urban resources is an important threshold.

The Durango study (2011-2017) was a stark contrast to the Aspen experiment. La Plata County has an expanding human population in prime bear habitat resulting in the bears having to contend with human development, and ultimately, human food,

spreading throughout the landscape. Capture and trapping data were collected on females for 5,875 trap nights in 286 different trap locations. In total, 970 bears were captured, 432 bears were marked, and collared eighty-three adult females. The study kept about forty bears per year “on the air.” In addition to trapping and collaring studies, fruit/mast surveys were conducted. There was a total food failure in 2012, which provided opportunity to study how natural food failures impact bear



movement. The presenter displayed data representing a collared bear’s movements during 2011 and 2013, which were good natural food years, in contrast to 2012’s movements during a natural food failure. The bear moved more into the urban area when natural food was scarce. Natural food failure drives bear into urban areas. Both the Aspen and Durango studies found that urban areas appear to be tolerated, but not desirable for bears, which questioned the notion that “A fed bear is a dead bear.”

Another aspect studied how human development and warmer climate affect hibernation behavior. The analysis included 131 den events between 2011-2016 of fifty-one collared female bears. Response variables included the start of hibernation, the end of hibernation, and the duration of hibernation. Duration was calculated by the activity switches on collars and was affected by bear-specific and year-specific covariates such as reproductive state, body mass, age, natural food availability, urban subsidy, snow depth, elevation of den site, and temperature. For each response variable, a single global model with all covariates was analyzed.

The presenter highlighted three covariates in his presentation; temperature, urban subsidy, and natural food availability. Temperature trends in Colorado are increasing, which effects bears. The study analyzed the influence of minimum temperature on bear hibernation length and found that for every one-degree Celsius increase, hibernation decreased by about one week. Based on climate projections for Colorado, by 2050, bears will reduce hibernation by fifteen to forty days. Rapidly expanding development coupled with a warming climate will likely result in more bear-human interaction in the future. Delays in hibernation due to climate will also result in more mortality for bears.

The proportion of a bear's annual hyperphagia range as it overlapped development determined urban subsidy. Bears that used eighty percent urban development hibernated almost one month less, which has potential for human conflict.

The influence of natural food abundance had an effect on hibernation length. Bears delayed hibernation when natural food was abundant. There was a ten to fifteen-day difference based on the availability of natural foods. Reproductive status and age influenced hibernation length as evidenced by a twenty-day increase in hibernation for bears with cubs and a fifty-day difference between the youngest and oldest bears.

In determining the compounding impacts of human development and natural food shortage on the Durango bear population, the study identified multiple stressors affecting bear population dynamics. Food shortages without development resulted in reduced reproduction and cub survival, high adult survival, increased movements, and minimal impact on population growth. Food shortages with development resulted in bears moving in to urban areas, increased human-bear conflict, increased cub production, and questionable adult survival. The interaction of food shortage and use of developed areas may cause atypical increase in human-caused adult mortality.

The two primary objectives of the study were to quantify annual abundance and population growth rate and to investigate the influence of human development on spatial distribution of bears. Methods included non-invasive DNA sampling combined with telemetry data from 2011-2014.

The GPS collar data provided hourly locations with data collected during DNA sampling on females three years and older. The general approach combined DNA-based spatial capture-recapture data with GPS telemetry-based resource selection data and was conducted by Jared Laufenburg. The results revealed a marked decline (57%) in population between 2012 and 2013 following the natural food failure in 2012. Furthermore, there was a three-fold increase in mortalities over the previous five-year average. Human development areas may function as an ecological sink for bears. Declines are driven by human-caused mortality as bears are attracted to developed areas during poor natural food years. The analysis revealed a lower density in developed areas after

Success in reducing human-bear conflicts will likely depend upon our ability to change human behavior.
- Stewart Breck



food shortage. The frequency of future food shortages and the predicted increase of severe weather events are important considerations as the most severe decline was documented over a one-year period.

The frustration of their inability to change human behavior in Aspen led to an empirical test of the effectiveness of bear-resistant containers to reduce black bear-human conflicts. The number of reported and observed human-bear conflicts between 2011 and 2016 was over 4500, with almost 3,000 being related to food and garbage. The City of Durango deployed over 1200 bear resistant cans in two treatment areas of Durango (north and south). Control areas to the south of each neighborhood were also monitored. Cans were distributed in spring/early summer, with trash conflicts monitored two days per week. Pre and post treatment data were collected. Greater than 95% of homes in both the north and south treatment areas received containers. A critical observation was made as it was discovered that people did not always latch the containers properly. This resulted in the need for education in treatment areas and enforcement for residents out of compliance with the wildlife ordinance. Compliance was measured and based upon the bear resistant container being locked and secured. Ninety-four percent of the residences had no observed trash conflicts. This strategy of measuring compliance was also a test of how effective it is to change human behavior to reduce human foods for bears and thus, reduce conflicts. The results showed that trash conflicts were sixty percent lower in treatment areas, reducing the predicted number of conflicts. The difference was driven by an increase in the control areas. Compliance influenced conflict rates as shown by areas with eighty percent compliance having only forty-five conflicts, while areas with ten percent compliance reported two hundred seventy-two conflicts. Food reduction of greater than fifty-five percent in urban patches and greater than seventy percent in urban-interface patches resulted in avoidance by bears (of development).

The “take-home” message is that the distribution of bear-resistant containers resulted in fifty percent fewer conflicts than in the control areas. It is important to promote compliance with ordinances to reduce access to human foods by whatever means. The distribution of cans not only reduced conflicts, but positively changed public perceptions. Natural food failures drive conflict behavior and impacts bear population. Our tools have minimal success at reducing conflict. Success in reducing human-bear conflicts will likely depend upon our ability to change human behavior.

Question and Answer Session

Question from Dan Gibbs: *Question about the differences between the north and south treatment areas.*

Stewart Breck: *Part of the difference is the alley ways in the north that influenced this dynamic. The southern part is a newer part of town. It wasn't necessarily a difference in how people were behaving, it was more about how the areas were landscaped and designed.*

Question: *Question about the ability to reproduce bear resistant cans due to cost. At the scale we're at now, as we get to that being the norm of doing business, that will be an uphill climb for a lot of areas. How do you feel about that?*

Stewart Breck: *Your feelings are reflected in a lot of managers. I will disagree with you because this is the only answer unless you want to kill a lot of bears. Maybe that's okay if you want to bring that carrying capacity way down. The conflict never went down even though the bear population declined 57%. We have to be careful because the data is weak, and it hasn't yet been analyzed well, but you are not going to solve your conflict problem by just taking out bears. \$600,000 isn't that much to do something positive. It's whether people want to see a bunch of dead bears or do they want to do something positive. That should be our message.*

Question from Florida: *In Florida, the waste service companies tend to be the limiting factor. In Durango, was the city in charge of their sanitation or did they contract it out?*

Stewart Breck: *Durango has a single city-run trash operation, whereas in Aspen, there were four or five different companies who were competing and doing different things. That was a huge part of the equation and a huge distinguishing point.*

Jay Honeyman: *Everybody is talking about garbage, but very few have solved it and due to the point you bring up. We're going to be here twenty years from now and we'll still be talking about it. Start doing the math over time. We figured out this garbage thing in the Bow Valley about twenty years ago and it was a huge up-front cost. We have zero garbage issues anymore...it is a non-issue with us. My second point is that it did not stop our conflict. Our conflict continues, and it continues to increase; it's just a different food source. Garbage is really important, it is going to cost, and if people aren't willing to put the money in, you're going to be spinning your wheels. So, at some point you need to make the move and do it but get ready for the next food type you'll have to manage because during the next food failure, the bears will be looking. Then, it will be fruit trees. Maybe fruit trees aren't on the radar yet because the garbage is*

right in front of them. You take that away and the bears will shift to something else. That has been our experience in Bow Valley.

Question: *Regulations seem to be a big factor in getting people to actually use the bear resistant cans, what regulations were already in place in Durango, did regulations come in place because of this, and who enforces it?*

Stewart Breck: *Both Aspen and Durango had regulations, which are only as good as your enforcement. Aspen didn't enforce at all and was a major frustration point for us. We showed them the data, but they didn't care about enforcement. When we asked Durango to get serious with their enforcement, they did. I don't know exactly how they enforced it, but in Durango in general, is much better. The regulations are in place and have been for a while.*

Larry Lewis: *At what point, are humans the unfortunate mechanism of controlling the population in low food years? Are we the mechanism of death in bad food years and then, they rebound and go up?*

Stewart Breck: *This is a model I used from Kim (Delozier), Bill (Stiver), and the University of Tennessee. They were gracious to let me present this. I agree that you are going to have populations fluctuating based on natural food and it's going to be hard to manage, but the way we are going with development, the extremes we're seeing in the bear population is not how I would want to go.*

Larry Lewis: *I agree that this model applies to black bears, but not necessarily to grizzly bears. They're just not as resilient and reproductively fast, but the differences are kind of cool. It's a great study.*

Kim Delozier: *Something Steve Herrero shared with me was that they had tried to convince Canmore to spend some money on bear proof garbage cans and it fell on deaf ears. It wasn't until the first person was killed and then, it was like a million dollars floated out of the sky. Sometimes you have to wait for it to bottom out and get really bad before you get some action. Twenty or thirty years ago here (Park Vista, Gatlinburg), there were open dumpsters and people were making money off of bears. People came here to see bears, so even though they are educated and know what they should do, they want to ignore that because of the love of money, they want to make money, and it's good for business. I came to the management here and I told them we were going to be moving bears out of the area. TWRA and NPS came and there were 17 bears in this parking lot at the same time in the 1980's. I told the management that they knew what they should do. They put up a sign that said, "Bears will bite." I told them what the park was doing and what the state was trying to do, and I said, "If someone is injured or killed here, I will be testifying against you." I think the fear of litigation and the fear of their image will cause some change. At least it did with us here in this area.*

Stewart Breck: *A bear kills a person and litigation issues pop up today in our society. In Aspen, we had a quadriplegic who pushed a button and opened the door. A bear*

figured out how to do that as well. Thankfully, the bear ran out. That still did not motivate the city. How do we change human behavior? We need to be focusing on that instead of collecting data on human perceptions and values. We need to know how to change human behavior.

Linda Masterson: *Are there any studies on the cost of conflict?*

Stewart Breck: *That is a great point – what is the cost of conflict? We don't have any good data to show that, but just anecdotally, during a bad food year, I can remember in Aspen, the state throwing out figures like \$200,000 of man-hours. It was just chaos. From a state game agency, there is a lot of money spent on that, but I've never seen any figures on that.*

Question: *Any specific type of kind of can?*

Stewart Breck: *Yes, we regretted buying those cans when we realized people weren't latching them. I think the cans they are investing in now are automated. Take the human element out of it.*

How do we change human behavior? We need to be focusing on that instead of collecting data on human perceptions and values. We need to know how to change human behavior.

-Stewart Breck

Question from Sarah Barrett: *For the 60% compliance, does that need to be contiguous?*

Stewart Breck: *We're putting that out there because theory supported that and some of our empirical data supports that, so the message to get across is that we don't have to be 100% compliant. If we can do a lot, that's where you get the most bang for your buck. We're never going to get rid of the conflict. It's more of how we dampen it down to an acceptable level. I suspect that bears will figure out who does and doesn't have cans. They're too smart.*

MOTIVATING PEOPLE: PATHWAYS TO SUCCESS
Moderator, Carl Lackey, Nevada Department of Wildlife

Robert Dvorak, Central Michigan University

Presentation: Visitor Management of Commercially-Guided Polar Bear Viewing: A Collaborative Strategy for the Arctic National Wildlife Refuge

The purpose of the presentation was to describe how a collaborative strategy has been developed to management commercial polar bear viewing in the Arctic National Wildlife Refuge. Key stakeholders and partners were identified, best management practices determined, and competing and shared values were addressed. The ANWR consists of 19.6 million acres. The study focused on Barter Island, the northernmost part of the refuges and the native village of Kaktovik. The area has permanent annual residents, with the majority being Inupiat and other Alaska native peoples and is a traditional whaling community. Issues of importance include managing ecotourism and water-based viewing in an area that has seen a 1400% increase in visitation since 2011, community and public safety, protection of bears and important ecological processes, and protecting Alaska native cultural practices and ways of life. Commercially guided polar bear viewing is a lucrative operation in Kaktovik. The complexity of multiple stakeholders and jurisdictions requires collaboration and ensuring that everyone understands their role.



The study focused on three main areas – ecological conditions, native culture and subsistence, and experiential factors such as boat-based viewing encounters, visitor capacity, and education. Current management strategies include community patrols during times with high polar bear activity, island polar bear counts, efforts to improve food storage and reduce bear attractants, community youth ambassadors for outreach and education, a voluntary 30-yard distance buffer for commercial viewing, and only renewing existing operator permits in 2017-2018. Part of the ongoing planning process is the development of desired conditions and indicators for key polar bear viewing program elements, the determination of visitor capacity for polar bear viewing, the creation of monitoring techniques for current conditions, and communication and cooperation with local partners and key stakeholders.



Jeffrey Hallo, Clemson University

Presentation: The ‘Endangered’ Polar Bear Viewing at the Arctic National Wildlife Refuge: Input to Science-based Visitor management and Experiential Capacities

Commercial polar bear viewing in Kaktovik is culturally and economically vital and contributes substantially to the local small culture. Polar bears are highly sensitive to disturbance and are very few in number. As a keystone species, they substantially affect all trophic levels. The species is unique in that the subpopulation in Kaktovik could easily be eradicated by the loss of, or substantial impact of even one bear. The area lacks a formal management plan.

Understanding and managing visitor use and enjoyment is one of the most essential elements of protected area management and sustainability. Public lands are protected, and conservation efforts occur because they are relevant to society. Relevancy is substantially tied to use, which occurs because the experience is enjoyable or rewarding. Use and enjoyment of public lands occur mostly in the form of visitors engaging in recreation/nature-based tourism.

Visitor use management plans are emerging as a top priority. Inter-agency Visitor Use Management Council’s Visitor Use Management Framework (2016) relies on desired conditions, thresholds, and assessments of management strategies. Representative, accurate, and current visitors-based data are essential for a visitor use management plan. Social science was employed to inform visitor use management planning in the form of interviews and a survey of visitors to the Kaktovik area of the Arctic National Wildlife Refuge. One of the experiential indicators was visitor perception based on the proximity of the bear and indicated that proximity to the bear is not critical to visitor outcomes; however, the boats in view was a significant indicator. Two to four boats in view were the range of acceptable experience for visitors. Visitor perception of management strategies was also assessed. Overall, people were very accepting and supportive of a variety of management practices that could be implemented to protect their experiences, and in certain cases, the bears.

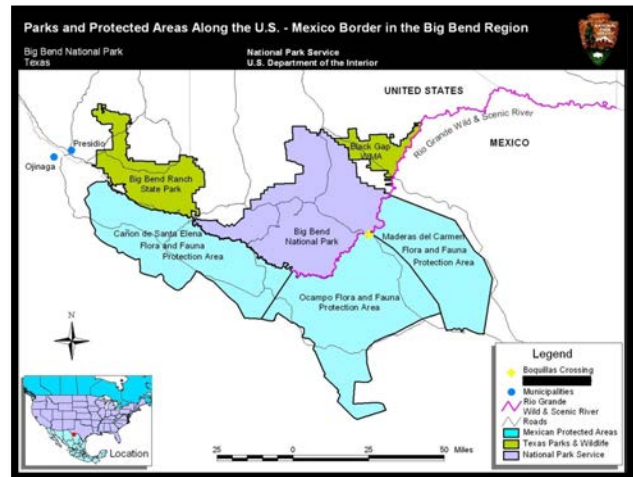
The first phase of the study focused on visitor experiences. The second phase will focus on guides. Social science efforts for the second phase to be conducted in 2018, are exploring emergent information needs and unanticipated results, evaluating specific management alternatives, examining potential conservation-related outcomes of polar bear viewing, extending social science to guides, community members, and other stakeholders, and informing development of an Environmental Assessment and management plan for 2019 implementation.

Price Rumbelow, Texas Parks and Wildlife

Presentation: Black Bears in Big Bend: A 30-Year Perspective

Big Bend National Park is located on the Mexico border in the Big Bend Region of West Texas. The Rio Grande makes up the southern boundary of the park. Big Bend National Park contains the only known breeding population of black bears in Texas.

In 1901, Vernon Bailey conducted a USGS biological survey of Texas. At that time, black bears were common in the upper Chisos, were abundant in the Davis Mountains, and reported in the Pecos Canyon of Val Verde County. The report stated, “Black bears are common in the upper Chisos; fresh tracks were frequently seen.” A National Park Service biological survey by Adrey Borrell in 1936 concluded that bears were still common in the higher parts of the Chisos and Chinati mountains and that three adults and two cubs were seen in Pine Canyon in July 1936.



The Chisos mountain range is 9,000 feet in elevation with 1500 acres of woodland habitat in Big Bend National Park. BBNP comprises over 800,000 acres and has a population of 40 bears or about 1 bear every half mile. The park was founded in 1945 and, at that time, bears had been extirpated from the state. Shooting and trapping by ranchers, federal predator control agents, recreational hunters, and loss of habitat due to settlement and development contributed to their decline. Individual bears occasionally wandered in and out of the park from Mexico, but only scattered sightings were reported from the 1940s through the 1980s. When they returned, they came from the Sierra del Carmon and Sierra del Burros mountains.

In 1988, a female black bear denned in the Chisos and was photographed with cubs in 1989. There has been steady bear movement and population increase since 1988. A mast failure in 2003 saw movement decline; however, 600 bear movements were recorded in 2016.

The first black bear management action-planning meeting was held in 1993 as a result of escalating human-bear conflicts in the park. The park began consideration of bear resistant food storage boxes, which were installed during late summer in each of the forty-three Chisos backcountry sites. A bumper piñon crop led to bear jams in the park.



By January 4, 1994, over thirty incidents were reported. In 1994, consultants and staff convened and developed *Recommendations for Bear Management at Big Bend National Park (Skiles, 1994)*.

The challenges for BBNP are managing the human-bear conflicts that arise as bears learn quickly and aggressively to seek human food, which has more caloric reward than natural foods found in the desert environment. Natural foods in this area are comprised mainly of acorns, piñon nuts, madrone, juniper and sumac berries, sotol hearts, persimmon and cactus fruits, and grasses.

The concentration of humans and bears in the Chisos Mountains is unique and is where most of the challenges are found. Big Bend NP is seizing the opportunity to institute effective programs before human-bear conflict is ingrained. From the recommendations, BBNP has built a management plan for increasing the bear population in Texas, education of visitors and staff, installation of bear resistant containers, regulations/enforcement, management ability, and research.

The following research has been conducted in Big Bend National Park:

- Conservation Ecology of an Isolated Black Bear Population, 1998 – 2002
- Wintering Ecology of Black Bears in Big Bend National Park, 2005
- Genetic Relatedness of Big Bend Bears to those of Mexico and New Mexico, 2006
- Humans, Mountain Lions, and Black Bears: A Compilation of Historic Reports from Big Bend National Park, 2017

Future goals of BBNP are to continue to improve/update facilities, use new technology to reach visitors, remain up-to-date on current research and techniques, and avoid complacency.



Jeffrey Hunter, National Parks Conservation Association

Presentation: "Wildlife Connectivity in the Pigeon River Gorge: A Proactive Approach to Mitigating Wildlife-vehicle Collisions"

The National Parks Conservation Association was founded in 1919 and advocates for the protection and enhancement of America's national parks for present and future generations.

Collisions with wildlife result in death, injury, and billions of dollars of property damage annually. There are four mitigation strategies: 1) change animal behavior, 2) change driver behavior, 3) separate drivers from animals, and 4) reduce wildlife populations. The most effective way to mitigate is to separate drivers from animals through fencing, wildlife underpasses, and wildlife overpasses.

The field of road ecology is a burgeoning field. The presenter referred to a meta-analysis research study regarding the effectiveness of road mitigation in reducing road-kill in which fencing and crossing structures were proven to reduce road kill of large mammals by 83%. (Rytwinski et al., 2016)

The project focuses on existing and potential wildlife corridors across Interstate 40 in the Pigeon River Gorge. With national and state forests to the east, the road creates wildlife issues for drivers and is a barrier to wildlife movement. The area is multi-jurisdictional and is comprised of two states, North Carolina and Tennessee, the National Park Service, the United States Forest Service, two state transportation departments, two state wildlife agencies, and the Eastern Band of Cherokee. The corridor is a hot spot for not only black bear mortality, but elk mortality as well in the area along US19. Elk and black bear are the focal species for the project.

Elk were reintroduced into the national park in 2001 and 2002. The herd is now estimated to be around 150. One of the catalysts is a twelve-mile project the USFS is focusing on to increase elk habitat, which will place them on both sides of the I40 corridor.

In July 2016, the USFS held their first twelve-mile project public meeting. Stakeholders convened in February 2017 to begin collaborating about the wildlife connectivity project. The double tunnel land bridge was scouted in September 2016 and camera trapping began on the double tunnel in March 2017. Additionally, camera trapping was implemented in the Stevens Creek tract and the GSMNP in June 2017. The Stevens Creek Tract is a 147-acre tract acquired by land trust and is a permanent conservation for elk habitat. This same month, the Wildlands Network initiated an elk collaring project. Tony Clevenger, road ecologist, met with stakeholders in the field in September 2017. Monitoring on the double tunnel resumed in November 2017 with the Federal Highway

Administration engaging in December 2017. In February 2018, the twelve-mile project monitoring began and in March 2018, the National Park Service began collaring elk near Interstate 40.

As I-40 enters North Carolina, it travels along the north banks of the Pigeon River, at the foot of Snowbird Mountain. Winding in parallel with the river, I-40 goes through double tunnels where the interstate passes through the mountain in both directions, effectively creating a wildlife overpass. Camera trapping, scat, and other signs revealed that black bear, deer, bobcats, elk, and other wildlife were using the overpass.



Elk collared in the area of the twelve-mile project have been documented on both sides of I-40. This corridor is an area of high black bear mortality. Tony Clevenger made some recommendations to the group regarding a bridge in the Harmon Den area, which will eventually need to be replaced and could potentially be developed as a wildlife over or underpass. Tony suggested camera trapping to determine if wildlife were using the existing box culverts in this area. Elk were documented in 2015 using the culverts to cross to the other side of the interstate. Another area of focus is an area where one side of the interstate contains a tunnel, but the other does not. This area is a mortality hot spot and was suggested for consideration of a wildlife overpass. Additional hotspots in travel corridors are being monitored with cameras to determine high mortality areas where wildlife crosses the interstate.

Future steps for the long-term project include formalizing the collaborative as a working group and continuing to build relationships with the Federal Highway Association and Departments of Transportation in both states. Camera trapping will continue, as will the GPS elk collaring projects and the collection of carcass data. The group will continue to engage all stakeholders, building capacity as needed, and engage the local citizenry.

David M. Kocka, Virginia Department of Game and Inland Fisheries
Presentation: "Massanutten Village: An Imperfect Success Story"

Rockingham County exists in the Shenandoah Valley of Virginia. Massanutten Mountain is a short, fifty-mile mountain range that extends from Front Royal to Massanutten Village. The US Forest Service with some private ownership owns a majority of the land. Rockingham County is the largest bear harvest county with 5-10% of the total statewide harvest coming from Rockingham. In 2017, 179 of the 2,860 (6.3%) were killed in Rockingham County.

Massanutten Village contains three entities: Massanutten Resort with over 2,200 condominiums, Mountainside Villas with 175 condominiums, and 2,300 Massanutten property owners. Massanutten Village currently consists of more than 9,000 acres of which 6,000 were developed for four-season recreation. Some hunting takes place on undeveloped acres. Massanutten Village had sixteen million visitors in 2016, which was an increase of 18% from 2015. This is an average of 300,000 visitors per week. Trash management is handled in a manner that does not prevent or deter bears from getting in to garbage.



In 2003, Massanutten Village contacted the Virginia Department of Game and Inland Fisheries (VDGIF) with bear issues. VDGIF passed a private lands feeding regulation. In 2006, a bear was visiting and defending a dumpster and was relocated. Changes were proposed to the community. In 2007, an education video was released, and the resort purchased three bear resistant dumpsters. In 2009, Massanutten Police Department officer killed a bear visiting a dumpster because he felt threatened. Another bear caught raiding a dumpster was relocated. VDGIF sent letters to all the condominium owners. A lawyer representing the owners responded promising dumpster changes at a cost of more than \$50,000. The Massanutten Property Owners Association wants bears moved.

In July 2016, the MPD called concerning a yearling bear visiting the go-karts. In August 2016, a yearling bear enters an ice cream shop during the day. In September 2016, a yearling bear visits the ski area and would not be chased away. The bear was caught and euthanized. The MPOA had the perception that VDGIF would continue to come trap and relocate bears each time they called, yet they did nothing to remove and secure attractants. Regulations were in place, but the MPD would not enforce the regulations. Feeding was a Class 3 misdemeanor, of which a conviction is \$100 plus court costs (\$500



max). VDGIF is continuing to educate and strongly mention potential liability of the homeowner's association. Potential liability was the stick that forced change.

Question and Answer Session

Question for Stewart: *Can you reiterate a bit more about your comment that we have a lot to learn from the park service?*

Stewart Breck: *The people on the front line are critical to listen to. Dave's story mirrors everything we experienced in Aspen. I was using the park service as a model. What I think is important is having a stable bear population, with the conflict and management low to de-couple the population with the conflict. De-couple so that you have bears, but you don't have the conflict and managers running around trying to solve the problems. What that means is that you have to address the food issues.*

Question: *Are you working on the whole social environment (authorities and decision makers)? What is your approach?*

David Kocka: *We're trying to work with all groups. The video not only focused on the dumpster, but also on what bears do. I've threatened that instead of taking the bear off and euthanizing it, to say, "Come see what you did," and let them see it. I push these buttons to try to get this job done because I'm the guy that has killed more bears than anyone else. That's what we struggle with.*

Statement: *We've talked a lot about trash and people, but we need to focus too on natural food management and lend support to state and federal agencies who are managing the wildlands for bear management. I think we lack in that sometimes. I would challenge us to be involved in urban sprawl and zoning management. Let's look at natural foods as well.*

Question: *How do we get more people (public agencies, politicians) to get comfortable that we do need to kill some bears? There are some bears that are not safe to be on the landscape.*

Answer: *The idea of changing social norms takes a lot of effort. In some of it, it's building partnerships and working with communities. The more we build collaboration at the front end, we'll have more long-term impact.*

BUILDING PARTNERSHIPS THAT WORK
Moderator, Bob Dvorak, Central Michigan University

Andrea Morehouse, Waterton Biosphere Reserve. Alberta, Canada
Presentation: "Sharing the Range"

The Waterton Biosphere Reserve is a non-profit organization working in southwestern Alberta, operating under the goal of trying to find a balance between people and nature. The WBR works in the southwestern corner of Alberta. Southwestern Alberta is a unique part of the province with an abrupt interface between forested mountainous public lands to the west, and private agricultural lands to the east. The landscape is multi-use with forestry, oil and gas activity, and recreation; however, the predominant land use is agriculture including both livestock and crop production. In addition to these varying land uses, all four native carnivore species inhabit these areas, including cougars, black bears, wolves, and grizzly bears. This area of Alberta has a high degree of overlap between carnivore home ranges and private agricultural lands, which makes it a hotspot for grizzly bear-agricultural conflicts.

The Waterton Biosphere Reserve's largest program is the Carnivores and Communities Program, which began in 2009 and works with landowners and partners to reduce conflicts people and large carnivores. The carnivore working group drives the CACP and encompasses fifteen people that are primarily landowners and producers from the area. The provincial government and the Nature Conservancy of Canada are also represented. Terms of reference for the carnivore working group include an understanding that people and large carnivores can both have a place on the landscape. The group works with landowners proactively to prevent problems through cooperative projects designed to reduce the economic impact of large carnivores, improve human safety, and prevent bears from becoming problem animals. Accurate bear and wolf numbers are determined and are instrumental in managing populations at appropriate levels.

There are three main components to the CACP with the first being attractant management. Many of the conflicts with bears are due to agricultural attractants, such as grain, silage, and deadstock. Currently, over seventy attractant management projects have been completed, cost-shared with landowners and producers. The group has discovered that there is no "one size fits all" solution to attractant management challenges. Each project is individualized in design with the individual landowner to ensure success. Examples of attractant management projects include bear-proof grain bin doors, grain bin modifications and replacements, such as a hopper bottom bin or seacans, and electric fencing projects.

The second major component of the CACP is the deadstock removal program. Dead stock or bone piles are a major attractant not just for bears, and all large carnivores. The group has reduced the prevalence of this attractant on the landscape by offering free pickup on more than 500,000 hectares. Required components of the program include bear-proof deadstock bins where the producer places a carcass and WBRA covers the cost of the bin being emptied by a rendering company. The central location for pickup has made them cost efficient. For animals that cannot be easily transported to one of the bins, WBRA covers the cost for on-site pickup. Furthermore, the group is working to re-open a compost facility in Cardston County that was in operation for sixteen months in 2013-2014 before the council voted to suspend the facility. Meetings with the new council have been fruitful and the facility is expected to be available soon. Bear safety workshops have been provided for ranch families. Since 2014, the workshops have been conducted and have been well-received by the local community.



In 2015, the group released the film, “Sharing the Range” after frustration from the community due to the media’s failure to provide accurate reporting. The fifteen-minute film has been a useful tool and has been well- received. The film is available online at www.sharingtherange.com.

The group is in the beginning stages of a formal program evaluation. Complaints have been tracked and data summarized from 1999-2016. The data will be used to compare spatial and temporal patterns of conflicts before and after the implementation of the CACP. In conjunction with a social scientist with the Alberta government, the group is developing a survey to be sent to landowners

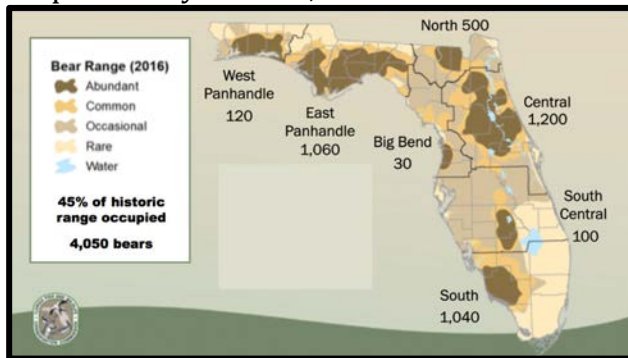
within the program area to gain insight on what is and is not working. Preliminary analysis of the data shows a steady decline of grizzly bear incidents since the program started in 2009.

Sarah Peltier, Bear Management Program, Florida Fish and Wildlife Conservation Commission

Presentation: Changing Bear Feeding Prohibitions in Florida: Education Through Notification

In 1974, the Florida Black Bear was listed as a state-threatened species. Hunting was closed in all, but three locations, which were closed in 1994. In 2010, the state adopted the IUCN Red Criteria List and conducted a biological status review of the Florida Black Bear and all sixty-one state-threatened species. Sixteen species were found not to be at

high risk of extinction, which included the black bear. In 2012, the Florida Black Bear was delisted. In 2016 the Florida Wildlife Commission estimated a population of over 4,000 bears, with seven unique sub-populations that occupy 45% of their historic range, which is a strong indication of successful recovery. The success; however, generates greater responsibility as the 4,000 bears interact with millions of residents and visitors.



Between 2000-2017, 64,355 bear calls were received statewide. The primary cause of human-bear conflicts in Florida (almost 70%) is a result of bears having access to human-provided foods like unsecured garbage, pet food, and birdseed. The FWC has addressed this issue by assessing rules related to feeding wildlife and their associated penalties. A

statewide prohibition (intentional or unintentional) against feeding foxes, raccoons, and bears became effective in May 2002 with penalties from a criminal misdemeanor charge to fines up to \$500 and sixty days in jail. Prior to July 2015, the prohibition stated:

“Intentionally placing food or garbage, allowing the placement of food or garbage, or offering food or garbage in such a manner that it attracts black bears, foxes, or raccoons, and in a manner that is likely to create or creates a public nuisance is prohibited.” The feeding prohibition was a steep slope for law enforcement and for the Assistant State Attorney.

Upon examination of bear and alligator feeding citations, and reviewing adjudications prior to July 2015, a pattern emerged. One-third of all cases were dismissed outright, one-third received a financial penalty, but criminal adjudication was withheld, and the remaining one-third received both the financial and criminal penalties. It was clear that changes needed to be made, which resulted in the feeding rule being changed to separate black bears out from the other species listed in the rules. In addition, the current bear feeding rules provides differentiation between intentional and unintentional feeding to provide further clarification. For unintentional feeding, a written notification or noncompliance letter must be issued prior to a warning or citation being issued.

A noncompliance letter, which is unique solely to bears, can only be issued by Florida Wildlife Commission Law Enforcement and is not considered a warning or citation. The rationale behind the noncompliance letter is that Law Enforcement informs an individual that their actions could be considered in violation of the rules and result in a warning or citation. The mere presence of unsecured trash or other attractants in an area known to have human-bear conflicts is enough for issuance of a noncompliance letter. The concept was difficult at first until officers began to feel more comfortable and recognized that the letter is a tool to educate people without penalizing them.

In addition to the language change specific to bears, in 2015, the Florida state legislature approved a tiered penalty structure for violations of all of the FWC’s wildlife feeding rules, with the exception of marine fish. There are ten species addressed specifically with feeding penalties ranging from noncriminal, \$100 fine for a first offense to a third degree felony, \$5,000 fine, and up to five years in jail for the fourth offense. The new structure

Feeding Rule Enforcement

Calendar Year	Total Calls	Potential Feeding-Related Calls	Number of Law Enforcement Issuances	Percentage of Potential Feeding-Related Calls with Law Enforcement Issuances
2017	6,184	3,449	256	7.4%
2016	5,127	2,793	209	7.5%
2015	6,070	3,401	144*	4.2%
2014	6,656	3,796	11	0.3%
2013	6,742	4,089	32	0.8%
2012	6,209	3,698	28	0.8%
2011	4,091	2,506	37	1.5%
2010	4,197	2,762	29	1.0%
2009	3,336	2,212	16	0.7%
2008	2,745	1,704	8	0.5%
2007	2,795	1,811	13	0.7%

*Noncompliance notices started being issued in August 2015

results in fewer criminal violations yet reserves severe penalties for those who continue to violate the rules despite receiving education, notification, and a civil penalty. For bears, alligators, and crocodile, the severity of penalties continued to increase as more offenses were committed.

The FWC generally receives over 6,000 bear-related calls annually. In analyzing the effectiveness of the bear feeding rule and corresponding penalties, bear-related calls were narrowed down to exclude calls not likely to be related to potential feeding violations, such as a bear hit by an automobile. The analysis of feeding rule enforcement revealed a major change between 2007-2014 and then, again in 2015-2017. Between 2007 and 2014, the FWC gave out an average of twenty-one issuances per year related to the bear feeding rules. In comparison, between 2015-2017, the FWC gave out an average of 203 issuances per year specifically related to the bear feeding rule. Of significance is that LE officers may issue noncompliance letters upon observing unsecured attractants, which would not be related to a bear call. The increase in percentage of potential feeding related calls that were issued either a noncompliance letter, warning, or citation is significant. The annual percentage of potential feeding related calls that received LE issuances between 2007-2014 increased from 1% to 6% in 2015-2017.

In summary, the changes to the bear feeding rules fostered two-way communication between the Division of Law Enforcement and biologists. Increased enforceability has been noted when a situation escalates from a noncompliance letter to a citation. Residents who receive noncompliance letters are seemingly proactive in remedying the situation without having further issuances.

Russ Talmo, Defenders of Wildlife

Presentation: "Working with Residents to Secure Attractants and Prevent Bear-human Conflict - Lessons from the Field"

Defenders of Wildlife is a national conservation organization dedicated to the protection of all native animals and plants in their natural communities. At the state and local level, they work to develop practical, innovative, programs that protect and restore key species and habitats and inform national policy work. More specifically, they work with threatened and endangered species to aid in recovery efforts. Since 1997, more than \$1,000,000 has been invested in over three hundred on-the-ground projects in Montana, Idaho, and Wyoming. Additionally, since 1997, Defenders has reimbursed livestock owners in Montana and Idaho more than \$423,000 for livestock losses due to grizzly bears and has played an important role in the recovery of grizzly bears in the northern Rockies. In recognition of the largest threat of human related mortalities plaguing grizzly bears, Defenders has focused heavily on minimizing conflicts between bears and people through their grizzly bear coexistence program. The implementation of a compensation program assisted in paving the way for both grizzly bear and wolf recovery as it aided in promoting goodwill and tolerance through offsetting the cost of impact.

Defenders partners with producers combining multiple tools for multiple species through livestock protection, range rider programs, turbo fladry, guard dogs, and scare devices. Their focus has largely been on addressing conflicts that are a major cause of mortality and that reduce tolerance for bears on the landscape and providing financial and technical assistance to landowners and producers to secure anthropogenic attractants on private lands.



Within the last decade grizzly bears have been expanding home ranges in to historical use areas, which makes the public uncomfortable as riparian corridors, urban wildland interfaces, and agricultural areas are now inhabited by bears. Electric fences systems have been installed to prevent grizzly and black bear conflicts through the electric fence incentive program. Reimbursement of 50% of the cost of an electric fence (up to \$500 maximum) is provided to secure attractants in portions of Montana, Idaho, Wyoming, and

Washington. Since 2010, this program has installed over 300 electric fences and continues to provide technical and financial assistance to participants. Half of the projects are a result of referrals from state, tribal, and federal agencies in response to conflicts. Over \$80,000 has been spent thus far on reimbursements. The electric fence is an adaptable solution for a wide range of conflict issues. Bee producers have been amenable to electric fence projects; however, convincing chicken owners to purchase a \$300 fence

has been challenging. Sheep and cattle electric fence projects require more partners and a higher level of commitment.

Defenders also partners with agencies, communities, and landowners to address attractant management through cost sharing on dumpsters, bear resistant containers and food storage containers. Landowner buy-in is crucial as failure is imminent if the landowner does not have some level of ownership in the fence. Collaboration with the agencies responding to conflicts is essential for conflict prevention. “Partnerships should seek an ongoing working relationship where risks and benefits are shared...that produces results. That no one partner working alone could achieve.”

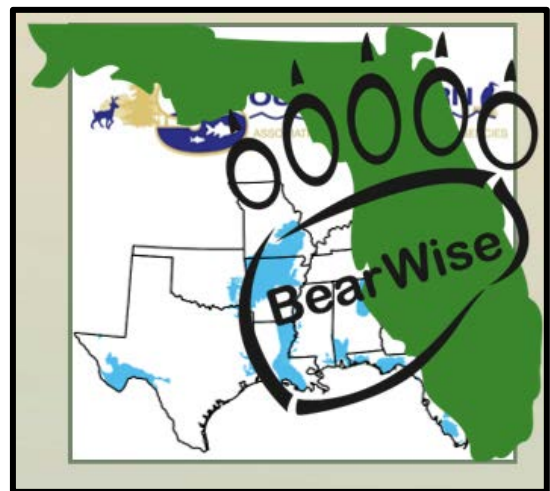
David Telesco, Bear management Program Coordinator, Florida Fish & Wildlife Conservation Commission

Presentation: Incentives for Local Governments to Be BearWise

Florida has 21,000,000 residents with 112,000,000 visitors annually. The black bear population is estimated at over 4,000 with bears occupying 45% of their historic range; a strong indication of recovery since 1970. Over 6,000 calls are received each year (90%) come from sixteen counties. One-third of the calls are reports of bears getting into garbage and another 38% report bears being drawn into an area, typically getting into bird seed, pet food, or other human-provided foods. Securing attractants to reduce conflicts guides the actions of the FWC.

The eastern black bear is found in all fifteen southeastern states, with each state focusing on similar issues regarding the reduction of human-bear conflicts. The Southeast Association of Fish and Wildlife Agencies collaborated to develop a uniform message entitled BearWise. Each state controls its own implementation of the program beyond the common outreach messaging.

Florida chose to implement certification of communities, businesses, schools, and other organizations as BearWise if four criteria were met: 1) secure all attractants, 2) enforce compliance measures, 3) inform residents and respond appropriately, and 4) report serious incidents. There is an expectation of awareness for those living in bear country in knowing what to do, and voluntarily take actions; however, the reality is that many do not know or know but refuse to accept responsibility for their actions. The FWC has strongly encouraged local governments to pass bylaws or ordinances that require the





entire community to secure trash to prevent bears from being drawn into their community. The local government is not required to specify the method of securing trash as long as there is community-wide compliance to the option chosen by that community. The guideline states: *“All garbage containers must be either bear-resistant or be securely stored until 6:00 a.m. or later on the morning of scheduled pick up.”* In 2017, the Florida Bar Journal published an article indicating that property owners and homeowner’s associations could be held liable for property damage or personal injury if the HOA knew there was a dangerous situation and did not take reasonable actions to prevent it.

Prior to encouraging ordinances to take part in the BearWise program, twenty-one BearWise communities were surveyed. In these local governments, keeping trash secured from bears was a requirement. The communities represented eight states (AK, CA, CO, FL, MT, PA, TN, WY), and one province. The oldest ordinance was passed in 1987 in Juneau, Alaska and the most recent were passed in 2014 in Wingfield North HOA Florida, and Boulder, Colorado. The smallest number of households within an ordinance was 115 (Wingfield), and the largest was 132,627 (Placer County, CA). The survey revealed that 76% of the communities did not require specific equipment or specify how people need to secure their trash and, in most cases, it was the resident or business that bore the cost of bear-resistant equipment, not the local government. Most importantly, 86% reported that the ordinances reduced human-bear conflicts.

Initially, residents were provided bear-resistant trashcans at no cost to them; however, aside from not being cost-effective (approximately \$200 per resident), giving cans away for free placed no responsibility on the resident or waste management company to use the cans appropriately, which resulted in damage or misuse. Another approach paid residents or business for the extra monthly service fees charged by waste management companies for limited use of bear-resistant cans, allowing residents to test the cans for free to gauge effectiveness. The project was successful but did not replicate well. Primarily, those who participated in this project did so for vacation properties and had more disposable income than residents in other projects.

The most successful approach involved purchasing materials and allowing the residents, businesses, or local governments to provide the labor to install or build structures to secure their trash. This approach provided the recipient a sense of ownership, which translated to personal responsibility for the use of the equipment. To date, 9,754 hardware kits have been provided at a low cost of approximately \$12 per person. It is important to note that hardware kits on existing trash cans may not keep out experienced or persistent bears and the waste service provider must agree to the alteration of their cans. The cans must be unlatched before they can be serviced. Materials were also purchased to construct ninety-two trashcan sheds and install five electric fences with the residents building the sheds and installing the fences themselves.



Additional projects involved the local government offering incentives where the first 100 people who sign up to purchase the \$200 bear-resistant trashcans received a \$40 credit, reflecting a 20% discount. The most common project involved the local government selling the cans to residents at a much larger discount. Grant funds were used to purchase cans for these projects.

In 2007, funding was offered to counties to increase the availability of bear-resistant equipment. Prior to 2016-2017, \$258,754 was provided incrementally at an average of \$2,875 per award, ranging from \$1,000 to \$29,000. The top fifteen counties with the highest number of bear conflicts were approached, yet some showed no interest. Some accepted funds, but were not open to the idea of a community-wide effort to keep trash secure, in the form of passing an ordinance; however between 2016-2018, an increase in overall and per project funding (\$3,000-\$209,000), coupled with a legislative provision that required 60% of the funding to go to local governments who had ordinances in place requiring trash be secured, was the impetus that brought about change. Four counties, one city, and several HOA's passed ordinances or bylaws to make them eligible to receive more funding. Overall, almost \$1.6 million in grant funds have been provided: \$680,181 from CWT grants, and \$911,337 in state appropriations, with \$375,000 coming from the 2015 bear hunt. At the time of this presentation, the Florida governor approved an additional \$500,000 for the program for the next fiscal year.

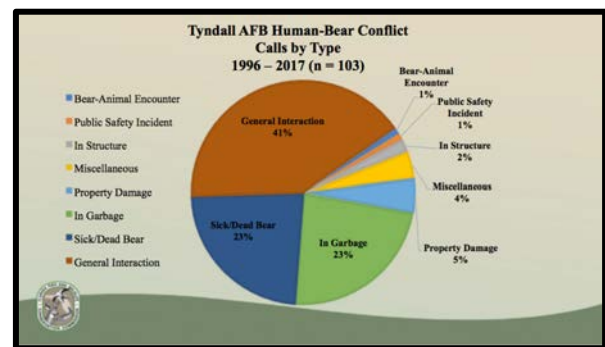
Conflict reduction efforts were focused on the sixteen counties that received the most conflict calls, yet funding was focused on the top four of those counties with the highest percentage of calls statewide. Interestingly, two of the top four counties dropped out, so the funding was focused on the remaining counties; however, some did not want to take advantage of the funding. For example, Santa Rosa County was approached and applied for \$150,000 with a proposal to match dollar for dollar, which meant \$300,000 would be available for bear-resistant cans. An ordinance was passed to increase their chance of receiving the funds; however, the county commissioners rejected the money saying, "Unless there are enough funds for everyone to get a can, we don't want any of your funds." Instead, a very large HOA in the ordinance zone stepped forward. They were willing to modify all their residents' cans with hardware, which was approved by the commissioners. Giving away money was not easy.

In summary, the provision of incentive funds proved to be successful in introducing the idea of bear-resistant cans to local governments. Furthermore, these incentives encouraged some local governments to pass ordinances resulting in reductions in human-bear conflicts in those communities. Flexibility and the offering of multiple options to local governments is recommended as incentives are not a "one size fits all." While incentives have been successful, at some point, incentives should end, and local governments take the responsibility for securing garbage from bears.

***Kaitlin Goode, Florida Fish and Wildlife Conservation Commission
Presentation: Building Partnerships: Tyndall Air Force Base becoming BearWise***

Tyndall AFB is located in the panhandle of Florida, just east of Panama City. The base is within the FWC's East Panhandle Bear Management Unit, and within the range of one of Florida's largest sub-populations of bears – the Apalachicola sub-population. Tyndall AFB comprises 28,473 acres in Bay County, Florida. The base is located on a peninsula that is parallel to a major city, which makes it a sink population for bears. Moving down the farthest point of the peninsula, they find themselves where base housing is located. The Balfour Beatty Housing section of Tyndall AFB contains 800 homes with most producing oak trees interspersed in the center.

Prior to 2010, Tyndall Natural Resource staff would call FWC to report human-bear conflicts and request assistance with trapping. In 2010, Tyndall requested permission to trap and relocate bears from housing areas on their own rather than through FWC. The permit was approved with two stipulations; base staff could not euthanize a bear without FWC authorization and bears could only be relocated on the base. The stipulation was put in place in order for staff and residents to understand that relocation was not a permanent solution as the bears would likely return. In addition, NR staff were required to keep track of the number of calls received, the data on bears trapped, and report that to FWC at the end of the year. Furthermore, Tyndall NR staff and military police were permitted to haze bears with paintball guns. Most importantly, the base invested in bear-resistant cans for all 800 homes.



Tyndall's independent bear management plan was successful until 2013 when military housing was privatized. Balfour Beatty Housing was awarded the contract. With the housing now being privatized, it was no longer considered part of the base meaning NR staff could not work in housing. Being a private industry wanting to make money, Balfour Beatty discovered it was cheaper to replace broken bear-resistant cans with regular cans. As trash cans became unsecured and education efforts waned, bear interactions began to increase and the bears became more comfortable in the housing portion of Tyndall AFB. The base commander contacted the FWC for help with the increasing number of conflicts. A female, yearling, and large male were trapped and removed. Tyndall's permit was updated to allow conflict bears to be killed with the stipulation that they followed FWC guidelines. In 2017, the new base commander wrote a letter to the governor for a Tyndall AFB only quota hunt.



The priority in high conflict situations is public safety. Trapping efforts on base were intensified with ten bears being removed in seven days from the housing area. Of significance was the Tyndall AFB Commander notification of residents that the base would be adopting the FWC feeding rules, which included the unintentional feeding of bears. To further education concerning the new policy, FWC biologists, bear contractors, Law Enforcement, and Natural Resource staff canvassed the 800 homes on Tyndall AFB. The next action step included the Natural Resources into the Wildlife Impact Management System. FWC would receive conflict calls, enter the data, provide technical assistance, and then, pass the report to NR staff if a field response was necessary. While NR continued to maintain responsibility for trapping, hazing, and conducting site visits, this change allowed FWC to stay abreast of call volume and conflict situations on Tyndall AFB. As a result, calls increased from nine human-bear conflict calls in 2016 to fifty-two in 2017.

FWC Law Enforcement began issuing letters of non-compliance after giving residents a two-week notice to fix their cans and secure their trash. Eleven non-compliance letters were written in the past ten months. Balfour Beatty recognized the need for commercially made bear resistant cans for the safety of their residents. The company amended their contract with their waste service provider to provide fully automated cans at no additional charge to the residents. By fall 2017, 75-85% of the cans were available. The BearWise funding made available by FWC created a high demand for bear-resistant cans, which created a delay; however, the waste service provider allowed residents to retrofit cans with gate hasps and clips until their new cans arrived.

The partnership with the NR staff was a lesson learned: communication is key when allowing other agencies to assist in bear management. Assumptions that everyone is working on the same level and same policies can be misleading. Having an agency partner in assisting with bear management has tremendous value, creates buy-in for effective waste management practices at the local level, and allows staff to own their bear management program. However, it remains the responsibility of the lead state agency to ensure consistency in management and compliance. In working with military installations, command staff buy-in is necessary for change to occur. There is often high turnover of command staff and residents, which mean education efforts must be ongoing. The partnerships and relationships built throughout this project will be important to maintain the success experienced in 2017.

Susanne Miller, U.S. Fish and Wildlife Service

Presentation: "Collaborative Conservation: Coping with Increasing Polar Bear Use of Alaska's Coastline"

Since the early 1900's, polar bear use of terrestrial areas along the Beaufort Sea coast has been increasing as a direct result of sea ice loss. This remote area, in northern Alaska, has a low human population density with several small rural Native communities and camps, in addition to oil and gas development areas (Prudhoe Bay) and military sites. An increased presence of polar bears in and around villages and industrial areas has been a cause of concern, not only for human safety, but also for bear welfare as well. Polar bears are a federally protected species having been listed as threatened under the ESA in 2008. The US Fish and Wildlife Service have the primary responsibility for the management for polar bears in the United States.

The highest bear densities occur near rural communities due to bowhead whale hunting. The local residents rely heavily on whale hunting to feed their families and discard the unused whale carcasses, which is an attractant for bears. This practice is especially true for Kaktovik, a small village of about 250 people, located on Barter Island within the Arctic NWR. The whale carcasses are deposited away from the community; however, the geographical limitations of the island being less and two kilometers from the village poses unique management challenges as polar bears have been aggregating there in the fall to feed on whale carcasses. The high predictability of polar bear presence has made Kaktovik a popular tourist destination. The combination of a high number of bears and visitors in close proximity to a subsistence-based community presents unique management challenges for both USFWS and the community residents.

The USFWS took a collaborative approach with Alaska Natives and industry to manage the increased presence of bears. Community-based conservation initiatives such as biological



monitoring, early detection and deterrence programs, attractant management, viewing (tourism) management, and outreach and education were implemented to reduce human-bear conflicts in Kaktovik. Emergency response management was also addressed to effectively manage oiled, injured, or

otherwise compromised polar bears. While most of the activities were implemented by USFWS, the success of initiatives was dependent upon collaboration.

Not being natives of that region, the USFWS staff, in order to fully understand the problem, made a conscious effort to be present when the bears were present. In 2001,

ground-based observations were initiated in order to collect data about bear abundance, age, sex, body condition, and activity patterns of polar bears using the area. With their staging area set in the village itself, interaction with the locals provided benefit from their knowledge and involved them directly in efforts to collect information. In conjunction with USGS, the local residents became involved in collecting hair samples from bears that use the bone piles in Kaktovik and is now being expanded to other villages in western Alaska. This information is vital to the collective understanding of how polar bears using terrestrial habitat fare as compared to those that remain on the ice.

Finding common ground with their stakeholders was an important component of their successful collaboration. The concern for human safety was a common concern. One of the most successful collaborative activities was the Polar Bear Patrol Program, which provided funding and training to hire locals to haze bears out of their communities. The patrols promoted polar bear conservation by providing non-lethal alternatives for bears that were drawn in to communities.

Furthermore, the interaction data collected by the hazers helped improved the knowledge base about what works and doesn't work with the bears. Additionally, the patrols provided opportunities for local employment as well as direct involvement in management of wildlife resources.



Managing community attractants was another important component with the initial focus on whale carcasses and determining if moving or removing them would reduce conflicts. Options for managing the bone pile and diversionary feeding were discussed with the



borough (municipal) government, as well as NGOs such as Defenders of Wildlife through the hosting of several meetings and workshops. To date, there is insufficient community support to change the status quo; however, a "common ground" was the management of attractants that occur in town. Historically, game meat was stored in ice cellars that, until recent years, have been rendered unusable due to permafrost melting and flooding. This method was possible as bears spent very little time on land. With the help of Defenders of Wildlife, community residents, and a steel fabricator out of Portland, Oregon, a project was implemented where by freezer sized, stainless steel, bear-resistant food storage lockers were designed and delivered to individual households.

With polar bear viewing growing in popularity in Kaktovik, a growing concern was the influx of visitors in a small, subsistence-based community, interacting with bears in an



inexperienced, unguided manner. USFWS recognized the need to ensure that viewing be done in a manner that does not result in disturbance or injury for bears while also keeping it safe for humans. As this was occurring in Kaktovik's "backyard," community involvement in determining the correct management approach was necessary. The feedback received from the local community was that polar bear viewing had both positive and negative impacts. While it provided employment opportunities for locals as bear guides and boat operators, the increased traffic was inconvenient because of limited seat availability on the small aircraft that provided the only way in and out of the community. There were also reports of visitors showing disrespect to local people, disrupting subsistence activities like whaling and fishing, especially by large scale commercial photographers and videographers.

To address this issue, the USFWS and local community jointly developed polar bear viewing guidelines. An ad hoc group was created to address safety issues as they emerged, such as putting up viewing barriers. Workshops were organized to teach local people the legal and safety requirements necessary for becoming a guide. As a result, there are now a half dozen professionally trained local guides and most of the viewing is guided and occurs from boats on Arctic Refuge. Due to rapid growth, the Arctic Refuge is now in the process of developing a long-term management strategy, which should be completed in 2019. The process will continue to be collaborative and involve tribal consultation, input from local residents, commercial guides, and other interested parties.

Outreach and education efforts have involved a physical presence in the management area, attending local events, hosting "Open House," working with local youth in school and field activities, and the Kaktovik Youth Ambassadors, which has been the most successful endeavor. Local high school students team up with USFWS staff to "meet and greet" visitors to share bear safety and community information during bear/tourist season.

The increased interest in off shore oil and gas development led to a collaboration with partners such as Alaska Clean Seas (an oil spill response organization), capture biologists, husbandry experts, veterinarians, and industry representatives to develop an oil spill response plan specific to polar bears. Again, an ad hoc team of stakeholders was formed and began meeting on a semi-annual basis to discuss emergency response for oil spills and compromised bears. In addition to meeting, experiments that advance the knowledge of removing oil from polar bear fur have been conducted, as well as field practice drills involving polar bear rescue components. The plan overlaps with response for orphaned, injured, or otherwise compromised bears. While an oiled bear rescue has not yet been actually implemented, there have been incidents involving capture and rescue of bears in an open water environment. As a result, rescue guidelines for open water capture, as well as a Decision Matrix, were developed to identify under what circumstances a rescue would be conducted given the amount of risk and resources required to conduct such an activity. Through collaboration with the Alaska Zoo and Defenders of Wildlife specialized



equipment for emergency response are in place

The success of the project is a direct result of face-to-face communication in order to build trusting relationships, identifying common ground, and involving stakeholders in management activities, all of which has resulted in a management strategy with long-term effectiveness.

***Carol A. Knox, Section Leader, Imperiled Species Management
Presentation: Florida's Bear Response Contractors***

Florida's Bear Response Contractor program was developed to provide a timely and cost-efficient response to meet the rising public demand for services. The program was modeled after FWC's successful Alligator Trapper Program, which involved residents notifying the FWC concerning alligators that pose a risk to humans. Upon receiving the call, the FWC would send out a private contractor to remove the alligator.

The objectives of the Bear Response Contractor program are to 1) increase the general knowledge about coexisting with bears, 2) decrease the number of conflicts involving bears, and 3) reduce FWC staff time spent in responding to conflicts.

Florida is the third most populous state in the United States with nearly twenty-one million people and a bear population of over 4,000, so human-bear interactions are inevitable. While many of the over 64,000 annual calls can be addressed with technical advice over the phone, others require follow up in the field. In the past, wildlife biologists in charge of wildlife management areas responded to human-bear conflicts; however, as the demand for assistance increased, the biologists found themselves pulled away from their regular job responsibilities.

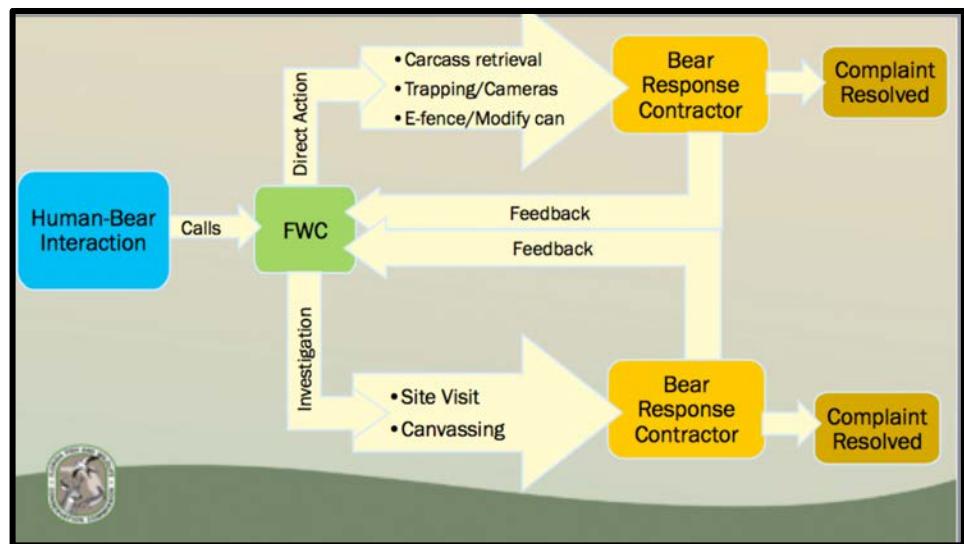
An average of 230 bears are killed annually on Florida's roads, which is the primary cause of bear mortality in the state. It is important to document where the accident occurs, collect information from the carcass, and dispose of it properly. In 2000, the FWC began a pilot project whereby private citizens were trained to act as contractors to act as first responders regarding bear issues. The FWC began their search for private citizens who lived in high conflict areas. Being a part of the community, they could be more easily accepted than staff from government agencies. The recruits needed a flexible schedule and another source of income, as the contractor pay was supplemental. People skills were a necessity, as the contractor would be required to visit people in their homes and de-escalate tense situations following a bear encounter. Every contractor is trained by the FWC in each of the tasks required of them.

The FWC has nine Bear Management Program staff members who are strategically located

throughout the state in areas with a high density of bear conflict calls. Bear Response Contractors are recruited in areas with the most need. Contractors are paid a flat fee per event rather than an hourly rate. The job consists of three core tasks: site visits, trapping assists, and carcass retrieval. On site visits, the contractors visit a resident who called and educate them in reducing conflicts. Contractors monitor trailer-mounted traps and remote cameras. If a bear is captured, it is delivered to a biologist for work-up. Contractors are also involved in carcass retrieval, disposing of them after data has been collected.

Contractors collect data on paper forms in the field, as well as biological material like teeth and hair, but are also responsible for entering the data into the online database.

Upon receiving a call about a human-bear conflict, a decision is made as to whether an investigation or direct action is needed. While



60% of calls are resolved over the phone, the remainder requires some type of direct action such as carcass retrieval or trapping. At this point, a bear response contractor is dispatched, initiates the required action, and reports back on the resolution. At times, a call does not yield enough information for direct action to be taken. In this situation, the contractor makes a site visit to investigation the cause of the conflict.

The program began as a pilot study with four contractors and a small budget of \$15,000, increasing over time. In 2007, the program was re-evaluated to determine the amount of time contractors spent on each activity. Site visits and carcass retrievals averaged about four hours each; however, capture assists averaged about twelve hours. While the program pays per event, not hourly, determining average times allowed the FWC to adjust the original pay amounts accordingly. In 2009, the contractor pay was increased to the equivalent of \$25 per hour based on average time spent on each activity. To date, there are twenty-seven contractors with an annual budget of \$175,000.

The Bear Response Contractor program was initially funded through grants or with



periodically available internal budgets until 2014 when the legislature approved and fully funded their budget request.

As human-bear interactions have increased, so has the need and use of bear response contractors. While capture assists and carcass retrieval activities have increased, the most dramatic increase has been for site visits. The total number of responses has more than tripled over time from 380 responses in 2011-2012 to 1,301 in 2016-2017.

The implementation of the Bear Response Contractor program has been an efficient and effective force multiplier in determining agency response to human-bear conflicts. The program has allowed the FWC to maintain public support for bear conservation efforts due to the quick response to issues. As demand for services continues to increase, decisions will be made on levels of service with the current budget for the programs.

Jay Honeyman, Alberta Environment and Parks

Presentation: "Building Partnerships to Reduce Grizzly Bear Conflict in the Bow Valley, Alberta, Canada"

The Bow Valley of Alberta has been described as one of the busiest landscapes in North America that continues to share that landscape with grizzly bears. The Bow Valley incorporates multiple jurisdictions and stakeholders including Canada's first National Park - Banff National Park, Kananaskis Country – a 4,000 km² provincial multiuse recreation area, the Town of Canmore (population 17,000) and multiple Hamlets. The valley also borders the Stoney First Nation Indian Reserve. The valley is bisected by the four-lane Trans-Canada Highway and an east/west continental twin track rail line. There have been multiple examples of how the various stakeholders in this busy, multi-jurisdictional landscape have worked to live with wildlife over the last twenty years. These include: Garbage-the region is recognized as a world leader in bear proof waste management systems; Aversive Conditioning-the longest running Aversive Conditioning Program for grizzly bears in North America; Crossing Structures-the Region has become the model for highway crossing structure mitigation around the world; Wildlife Corridors: the first formal wildlife corridor guidelines in North America that are now a legal requirement in the local development approval process; Bow Valley WildSmart: Long Running , nationally recognized Wildlife Education Program. This story has been told through the creation of the film 'Living with Wildlife' <https://vimeo.com/214597705> . The film was recently selected to be shown at the 2017 International Banff Mountain Film Festival.

BUILDING PARTNERSHIPS THAT WORK
PANEL DISCUSSION
Moderator, Russ Talmo, Defenders of Wildlife

Question: *We've talked a lot about bears getting in garbage and issues with waste streams in general, so I'm wondering if anyone on the panel or in the room is working on reducing the waste stream, recycling, and from a bear's perspective, garbage wouldn't even be attractive to a bear if there wasn't food in it. I heard Andrea mention composting efforts and pulling the food out of the trash to make it less attractive.*

Andrea Morehouse: *The composting facility was modeled after one in Montana and was a way to address the disposal of deadstock. So, the facility has strictly dead livestock. We have been discussing opening that up to the possibility of roadkill as well. There are a lot of rules around deadstock in Canada because of the detection of BSE that happened in 2003.*

Jay Honeyman: *There is composting of wet garbage in the community of Banff and Canmore will soon follow. The composting goes in to the garbage bin that you saw in the film. Just a couple of years ago, Canmore added bear-proof recycling bins that are blue in color.*

Answer from panel member: *I could add that our regional district is looking at all those waste streams and diverting waste through community composting of household waste. The region is already ahead of the game in planning for electric fencing all the way along that line.*

Question: *Russ, I heard you mention compensation if bears kill livestock. I've always had this idea that compensation should go in to tools to prevent further conflicts rather than paying people out. Does that exist in any of the states or provinces in the room?*

Russ Talmo: *In Montana, we have the livestock loss board and they runs the compensation program. At one point, Defenders did that on a private scale and then, it got transferred over to the state for wolves and bears, but within the loss board there is a grants program that goes out for exactly that kind of stuff, which is underfunded for the demand, but having both is a reasonable approach.*

Andrea Morehouse: *That comes up a fair amount. We have a livestock predator compensation program in Alberta, but right now, there is no requirement that there needs to be some sort of preventative action. Historically, there was a clause that allowed a claim to be denied if somebody wasn't addressing the problem. That clause is no longer in there. I will add that the cost that you're getting from the compensation program, it doesn't address the livestock degradation...not even close, so I really don't think that there are a lot of people taking advantage of the program. It doesn't address the root issue, but it does address the impact of livestock degradation.*

Question: *For Russ, can you tell me which works better – electric fencing or the dogs?*

Russ Talmo: *I can tell you that I am up here to preach the gospel about electric fencing. That's where I spend all my time. Guard dogs are a fantastic tool, but like a lot of things, you want multiple tools in the toolbox. There are places where guard dogs alone are a benefit and places where guard dogs and electric fencing is a benefit, and there are places where the guard dogs serve no additional value. It's not a one or the other scenario. Also, guard dogs are harder to fund in terms of NGO support.*

Question: *Two questions: Are the compensation programs tied in to the rancher having preventative measures? Also, I follow Bear Smart Durango on Facebook and they post negative problem areas all the time on Facebook, like shaming your neighbors in to doing something. Is that how that works?*

Russ Talmo: *Based on what I know, the livestock loss board compensates based on, for grizzly bears, joint investigation based on MOUs with wildlife services and Montana Fish and Wildlife and parks. It doesn't require preventative measures being taken. It just requires a verification by one of those two agencies. Beyond that, I know of some wildlife officers who say, "Here's what you can do to prevent this from happening next time." If it happens again, they remind them that they gave them other options and will not return again unless there is action on their part.*

Andrea Morehouse: *The same thing in Alberta, there is no requirement at this time that there needs to be preventative measures in place for producers to receive compensation. When the Fish and Wildlife Officer investigates that kill, there are often recommendations made as to how they can prevent that in the future. For people experiencing chronic depredation, even though there isn't that requirement, that compensation doesn't cover the entire cost associated with livestock depredation, so there is motivation to try and prevent it from occurring in the future.*

Question: *One topic I haven't heard anything about, and I have not been able to solve, is the issue of large, agricultural crops, like a big corn field. Anyone been able to solve that problem?*

Greg Grieco: *I know someone who put electric fencing around massive corn fields in Wisconsin experimentally and he said that it did not work.*

Audience member: *We have been dealing with this since 2000 with both grizzly and black bears. We've electric fenced hundreds of acres, initially with NCRS and Keystone Conservation; seven wire/hot ground fence, but we had to maintain it. It was effective while we maintained it, but then the producer got a new line and moved his pivot, so then, we were fencing alfalfa. Recently, an experimental three-wire fence was installed in a new cornfield and we had problems with bears, so where the pivot crossed into the alfalfa, we put stall mats down (rubber stall mats) and the bears figured out that if they were standing on the stall mats, they could climb over the fence and not get shocked. We fixed that and trapped bears in the corn field. They were in there for a couple of months until the corn got chopped. This past year, we maintained (weed eating under the fence perimeter), and the fence was 16,000 and we trapped nine bears. I don't know what the solution is for corn.*

Stewart Breck: *That tase conditioning/aversion, that might be a place to try that out.*

Question: *I have a question about compensation for livestock. Who is funding that and why?*

Andrea Morehouse: *Up until the 2014-15 fiscal year in Alberta, all of the funding for out compensation program came from a levy based on the sale of hunting and fishing licenses. That didn't go over too well with the hunting and fishing community, and now, there is a split where half still comes from the levy and the other half comes through a federal grant called Growing Forward in Canada. That's how Alberta works.*

Question: *We didn't talk too much about bears and dogs, dogs off leash, and compliance. Do folks have any novel strategies for new types of messaging or strategies that might work? We struggle with that at Shenandoah. It's not our biggest problem, but it sometimes leads to some serious issues. We had an issue in 2016, I'm curious to see what you are doing that works better.*

Jay Honeyman: *Dogs in the Bow Valley area are the bane of...they're my chickens. They're a pain in the butt and it's about a 50/50 split of dog owners and people that don't have dogs. It is probably the number one political issue we have in Canmore. The whole dog thing is really difficult, and we've been spinning our wheels for 20 years on the dog issue.*

Dave Telesco: *We actually teamed up with the Florida Veterinary Association to do a brochure that was placed in every veterinarian's office. It was an interesting way to get the information out there. While we're all bear people, there's a coyote program that is putting silhouettes of coyotes in pet stores to inform the public. Most of our situations where people get hurt involves a dog.*

Audience member: *Dog owners often only see from their own dog's perspective and not from the understanding of the impact of all dogs. That makes them quite difficult to work with. Secondly, we have lots of dogs in some places in my country, but very few places where owners can go with their dogs. You have to find places where they can go and do things. In Munich, they tried to introduce something like a license for dog owners with allowance in certain zones for being off leash. There has to be an incentive for them to behave.*

Question: *With the contractors, who makes the determination when a capture effort is justified? Are they able to provide other services, such as putting up fences, protecting trash?*

Dave Telesco: *FWC is the feedback loop. The contractors explain what they are seeing on the ground and the biologist makes the determination if trapping is justified. That takes the pressure off the contractor if a resident is mad that they are not trapping. They do put up electric fences. We loan screw top cans, critter-getters, and things like that. They also retrofit cans, but we do not involve them in the sale of cans. Contractors can also haze.*

Linda Masterson: *Regarding the issue with dogs, you may not be aware of a paper by Steve Herrero and Hank Hristienko on non-fatal black bear attacks between 2010 and 2014. In that paper, dogs were involved in 53% of attacks. They are both interested in that issue.*

Also, there are places that have established open-spaced dog parks, and in Florida, open-spaced dog beaches, where dog owners can let their dogs run off leash and they feel like they have their own space. That seems to work pretty well. It's something that someone with a lot of open space might think about. Second comment is for Stewart regarding the scale of cost for bear-resistant trash cans in areas that are not affluent. There are areas where they were billed on their garbage bill for the cost of the can. Perhaps that is something worth considering.

Stewart Breck: *We were so excited about how Durango embraced the results. It is a tax that each resident pays each month for three or four years. It is about \$3 or \$4 per month.*

Jay Honeyman: *We're all talking about garbage, which is foremost, one of our biggest problems, but it seems that one of the biggest issues is not that bear proofing communities is time we need to continue to spend. It seems one of the big stumbling blocks is how to get the bear proofing in to the communities. It isn't making a case for bear proof garbage bins; we've known that for a long, long time. It seems what everyone is struggling with is how to implement and how to get the bins into the system. We need to see some more ideas on how we might get those bins into the community. What model can we use? It is a big cash outlay and we know that. Because of that, we need to keep working on that.*

Stewart Breck: *What we heard in Aspen was, "Show us the data." We spent four or five years showing them the data and they rejected it. In Durango, it was the same way. It is very apparent to use because we've dealt with this problem for so long, but for the city managers and communities, it is not so clear what needs to be done. That was part of the impetus of doing the study – to go to them and prove that this can help. If you can link efforts with research, it is helpful.*

Jay Honeyman: *There's a whole bunch of data out there from a lot of communities. There's nothing like being able to pitch it in a way that directly relates to them. I'm just not sure that every community needs to do their own research to make the case that garbage bins are a good thing for their community. We have good research to make that case, so maybe we need to start piggybacking for other communities.*

Ryan Williamson: *Gatlinburg has seen some of that data, but now, as a citizen having just recently moved here, I'm trying to figure out how to go to the city and get the ordinance expanded. As a citizen, I'm tired of having bear problems. The \$300 trash can – how do I implement that on the ground...as a citizen. It is much more apparent to me now having moved into a bear problem situation. It is a daunting endeavor.*

Audience member: *I have found that finding that particular county commissioner who has the worst problem, fixing it, and them seeing the results, gets buy-in from the people writing the checks. Getting buy-in from the people having the worst bear problems seems to change some people's minds.*

Dave Telesco: *In reference to Stewart's study, Aspen showed him that sometimes they just don't care. I'd rather put that money into assisting a community. There are lots of studies now that say the attractant is garbage and we need to secure the attractants. Some cities want their own study, but I'd be concerned if that data was going to turn around and not get used.*



Stewart Breck: *Yes, there are times I'll go into an area and spend more than \$100,000 doing research and leave it and end up with a paper, realizing that money could have been better spent in management. Getting data doesn't have to be to the extent of what we did in Durango and the expense of the collars. You don't have to spend that much money or go to that extent. Use what you already have and take graphs and charts and show them in a way they can understand. Data is vitally important. I highly recommend you have some type of system to demonstrate what is happening in that community.*

Russ Talmo: *The gist of it is, local data that can put the local situation into local context, so people understand what is going on, is critical. "Canned" bear messages that we are all put out there fall on deaf ears after a while. An example is a community in Alaska that blamed their bear issues on tourists, but when shown the data, realized they were responsible for 80% of the issues. We showed them lots of charts and graphs that resonated with them and they went from killing 10-12 bears to 2-3 and they maintain that still. They bought in to that understanding. For Gatlinburg, I might consider having a workshop with local decision makers with the main purpose of communicating to the community what specifically is going on in their local context and engage in that conversation.*

Stewart Breck: *I collaborated with Defenders of Wildlife on a wolf project. We worked together and published a paper on this project. My job was to analyze the data. There were some benefits to his organization for having that kind of research.*

Russ Talmo: *There is real tangible benefit when you have people from both sides of the coin. You have a federal agency coming at it from this way and non-animal rights NGO group coming from the other way coming to conclusions and that lends more support to the argument rather than who the messenger is, so if you can get the message across there is real benefit.*



POSTER SESSION ABSTRACTS

1. Habitat Use by Sloth Bear (*Melursus ursinus*) in Human-dominated Areas of Jessore Wildlife Sanctuary, Gujarat, India **Rahul Pandya¹ and Nishith Dharaiya²**

¹ 56 Grande Paseo, San Rafael, CA 94903, USA

² Wildlife and Conservation Biology Lab, Department of Life Sciences, HNG University, Patan (Gujarat) India 384265

Abstract: Jessore Wildlife Sanctuary is known for its high density of sloth bears (*Melursus ursinus*). Although it is a protected environment, the area is subjected to anthropogenic activities, which influence the movement and habitat use of the sloth bears. Our study was conducted to understand the habitat use of the sloth bear in the human-dominated landscape of Jessore and to form the basis for further research on the sloth bear habitat. A study area of 14 km² was surveyed by conducting strip transects survey to search for indirect evidence indicating sloth bear presence. The signs of indirect evidences observed were scats, dig sites, claw marks on trees, and paw prints. The locations of each sign observed were recorded. The bear presence data were studied using geo-spatial analysis. The spatial distribution of bear presence near and around the human-dominated area was studied by subjecting evidence data to cluster analysis and proximity analysis using geographic information systems. The proximity analysis showed that the number of signs of bear presence increased as the distance from the human-dominated area increased. Similarly, the cluster analysis indicated where the evidence of the bear presence is most concentrated. The results of these geo-spatial analysis indicated that sloth bears avoid getting closer to human-dominated areas.

2. Andean Bear-Human Conflicts: Identification of Socio-economic Triggers of Conflicts in Rural Communities in the East Range of Colombia.

I. Mauricio Vela-Vargas^{1,2}, José F. González-Maya², and John Koprowski¹

¹ *School of Natural Resources and the Environment. The University of Arizona, Tucson, AZ*

² *Proyecto de Conservación de Aguas y Tierras, ProCAT – Colombia. Bogota, Colombia*

Abstract: Habitat loss due to anthropogenic encroachment is a major threat to Andean bears (*Tremarctos ornatus*) in the Andean region of Colombia. Resulting habitat loss in this region has escalated negative interactions between human communities and wildlife, especially carnivores. Livestock predation and scavenging by bears are considered as negative interactions. These conflicts directly affect local rural economies, and farmers are prone to invest in poor conflict management misguided by anecdotal knowledge such as illegal hunting. Our objectives were to identify human perceptions of native wildlife and the causal factors of Andean bear-human conflicts to inform the best management actions and identify conflict social dynamics in the Chingaza Massif, Colombia. We conducted 64 questionnaire surveys in high-risk conflict areas identified through geographical modelling in the Calvario municipality (Colombia). Given the voluntary willingness of local participants, they answered a questionnaire about general knowledge of biodiversity, productive practices, conflict losses, and identification of wild predators in the area. Roughly 35% of people declined to participate because they did not trust due to past experiences in government agencies and other organizations that performed previous projects. On average, farmers maintain 16 cows and 29 sheep across an average of 18 hectares by farm. In this area of the Chingaza Massif, the main domestic species attacked by wildlife are sheep, with economic losses between \$600 and \$5,000 USD. We found that, that 99% of the times, people do not take management actions in the breeding season for domestic animals, and normally domestic animals are unsupervised between 3 and 45 days, depending of the distance of each farm to urban centers. Thirty-four percent of local ranchers have negative attitudes about Andean bears and believe species occupancy near their lands is a threat to them and domestic species, and these is highly correlated with the bad status of the fences in each farm. One of the key problems identified was the absence of technical assistance by governmental agencies to ranchers, and the lack of responses during negative human-bear interactions. People broadly tended to blame Andean bears for conflicts, yet only in few instances were Andean bears positively identified attacking domestic stock. In the majority of cases, ranchers found Andean bears scavenging dead carcasses. Due to the misguided management livestock practices in the Andean region of Colombia, domestic animal losses are also likely attributed to accidents (steep cliff falls),

illness, or other causes. There is a great need to bring tools to local farmers for identifying attacks from different species such: Pumas, Andean bears and feral dogs, that are an active threat to

domestic and wildlife at the Chingaza Massif. Our results can be applied to inform more accurate Andean bear-human conflict evaluation, mitigation, and resolution management plans in the east range of Colombia.

3. PepperBall Launcher as an Effective Tool for Deterring Grizzly and Polar Bears

Christina Pohl¹ and Jim Hibpshman²

¹ *BP Exploration (Alaska), Inc.*

² *Nana Management Services, Security*

Abstract: Protocols for deterring polar bear and grizzly bears with a PepperBall Launcher were developed to mitigate human-bear conflicts in the BP oilfields on the North Slope of Alaska. With an average of 415 bears sighted and reported per year, and 67 deterrence events per year, BP Alaska identified the need for an alternative advanced deterrence method that Security Officers would use, and that would be effective and safe for wildlife. Following an incident where polar bear deterrence with a cracker shell led to the fatality of the bear, BP gained approval to test a pilot deterrence method known as the PepperBall Custom Carbine Launcher. The launcher allows for projecting a variety of less-lethal rounds from a specialized device, and is more powerful and accurate than recreational paintball guns. Less-lethal trial rounds included inert (talcum powder), water, and two types of PAVA or capsicum (pepper) rounds. Four seasons of field trials indicate that the Launcher provides a combined sight, sound, physical contact and olfactory deterrence capability. The user does not have to reload between each firing and the device may be fired from within a vehicle, placing an additional barrier of protection between the animal and hazer, compared to shotgun-based hazing methods. The ability to haze via direct (aiming at the bear) or indirect (at the ground or a wall behind the bear) contact provides more possibilities and control when moving a bear out of an area. The device can safely be used near pipelines, process equipment, or housing areas. The team has defined effective operating parameters for Launcher use, and made improvements to the device and deterrence methods. The Launcher has been met with resounding success. It is an effective and versatile tool for both polar bear and grizzly bear deterrence with decreased risk to the animal, and is currently an authorized deterrence method in BP Alaska's hazing authorizations with the regulatory agencies.

4. Survival, Movements, and Conflict Incidences of Rehabilitated Black Bear Cubs Released in North Carolina **C. G. Dukes¹ and C. Olfenbittel²**

¹ North Carolina Wildlife Resources Commission, NCSU Centennial Campus, 1751 Varsity Drive, Raleigh, NC 27606, Ph: (919) 609-7226. E-mail: casey.dukes@ncwildlife.org

² North Carolina Wildlife Resources Commission, NCSU Centennial Campus, 1751 Varsity Drive, Raleigh, NC 27606, Ph: (919) 920-6302. E-mail: colleen.olfenbittel@ncwildlife.org

Abstract: Throughout North America, orphaned black bear cubs are rehabilitated and released back into the wild. Initially released to supplement recovering black bear populations, now cubs are often rehabilitated to fulfill the public's expectation on how this public trust resource should be managed. Historically, rehabilitated cubs were not monitored post-release due to limitations of technology. Consequently, little is known about survivorship rates, movement patterns, mortality factors, and whether these bears are more prone to cause nuisance issues. Since 1976, the North Carolina Wildlife Resources Commission (NCWRC) has rehabilitated and released 121 black bear cubs back into the wild. Starting in July 2015, the NCWRC fitted all rehabilitated bears with Vectronics GPS collars (n=19) and released these bears on state managed lands in both the mountain and coastal plain regions of North Carolina. For 2015 and 2016 releases, the mean survival rate of rehabilitated cubs in the first 7 months after release was $.456 \pm 0.1(\text{SE})$. Eight of eleven mortalities were caused by legal hunter harvest. Although the estimated survival rate is lower than other reported studies, high hunter mortality may reflect higher harvest pressure than other areas. Maximum dispersal was 43.9 km from release site and minimum dispersal was 5.6 km. In 2015 and 2016, we did not find a difference in average daily movements between weeks during the 13 weeks after release ($F_{(12,117)} = 0.592, p = 0.845$). The NCWRC Wildlife Helpline received 3 calls concerning released yearlings, but only 2 bears displayed nuisance behaviors. Management response was education and hazing for these two bears. In June 2018, 9 more bears will be released and monitored. We will continue to evaluate post-release movements, mortality factors, survivorship, and the influence of environmental factors (e.g., release site) on results. Through collaboration with other researchers, combined with our data, we hope to gain better insight on the fate of rehabilitated bears that will aide in making management decisions based on sound science.

5. Application of Hand-held Infrared Camera Systems for Detecting Bear Dens Craig Perham¹ and Richard Shideler²

¹ *U.S. Bureau of Ocean and Energy Management*

² *Alaska Department of Fish and Game*

Abstract: Protocols for detecting maternal polar bear (*Ursus maritimus*) and grizzly bear (*Ursus arctos*) dens using a hand-held infrared (IR), thermal imagery camera system were developed to avoid and mitigate disturbance impacts to denned animals from industrial activities on the North Slope of Alaska. These procedures were created in conjunction with the testing of aerial IR platforms (i.e., helicopter and aircraft) to detect bear dens. We documented factors to consider when using a hand-held IR system to increase the success of identifying a bear den, such as environmental conditions, system limitations and advantages, ease of operation, and its use for various types of industrial activities. Hand-held infrared camera systems can be used for initial den detection as well as assessing current den occupancy and regularly monitoring den sites. Hand-held IR camera systems are inexpensive, readily available, and easy to use. These systems also allow operators to use them from multiple platforms. Hand-held IR camera systems also have the potential for detecting denned bears in temperate habitats as well.

6. Human Food KILLS Wildlife: A New Messaging Campaign to Increase Awareness and Reduce Human-wildlife Conflict in Banff National Park Susan Staple¹, Steve Michel², and David Gummer³

¹ *Interpretation Coordinator, Banff National Park, Parks Canada Agency, susan.staple@pc.gc.ca*

² *National Human-Wildlife Conflict Management Officer, Natural Resource Conservation Branch, Parks Canada Agency, steve.michel@pc.gc.ca*

³ *Ecological Restoration Specialist, Natural Resource Conservation Branch, Parks Canada Agency, david.gummer@pc.gc.ca*

Abstract: Banff National Park (BNP) is Canada's first and busiest national park with over four million visitors per year and two residential communities that coexist with the full complement of native carnivores, including grizzly and black bears. In 2016, there were numerous incidents of wolves that accessed human food and garbage in campgrounds and day-use areas, culminating in destruction of two food-conditioned wolves and the collapse of their prominent wolf pack in the Bow Valley. Instances of visitors feeding black and grizzly bears have also been documented in recent years.

As a result of these challenges, Parks Canada developed a wildlife messaging campaign to provide clear and captivating messaging to park visitors, residents, and businesses. We assembled a small, multi-disciplinary team that included interpretation, media relations, and wildlife specialists, to collaborate on the following objectives:

- 1) Increase awareness regarding the negative impacts of human food on wildlife (e.g. feeding, garbage, littering, unattended food), and
- 2) Increase awareness of the need to give wildlife space, to help ensure safety of both people and wildlife (e.g. when viewing roadside, within the town site area and on trails, and the importance of respecting speed limits).

Our goal was to provide consistent and coordinated communications both within and outside BNP using personal and non-personal communications tactics. We created a messaging toolkit for all park staff to ensure consistent understanding and delivery of messages. Our approach was to use powerful images and bold messaging to capture attention in hopes of eliciting an emotional response to influence and motivate positive behaviors. We launched a wide range of communication products, including rack cards, posters, stickers, magnets, and prominent signage. We also delivered the messages through in-park interpretation programs, media interviews, social media and other communication channels. Preliminary evaluation of these products and their effectiveness was conducted in 2017 and will be used to guide the growth of the wildlife messaging campaign in BNP and expansion to include other national parks across

Canada in 2018. Our focus will be on engaging key partners and stakeholders, offering encouragement to incorporate the wildlife messaging into their publications and programming, to amplify key wildlife messages in national parks and greater park ecosystems.

7. Incentive Solutions to Remove Anthropogenic Bear Attractants in Communities - Voluntary Fruit Tree Replacement Programs **Steve Michel¹, Chad Townsend², and Lori Rissling Wynn³**

¹National Human-Wildlife Conflict Management Officer, Natural Resource Conservation Branch, Parks Canada Agency, steve.michel@pc.gc.ca

²Environmental Manager, Town of Banff, chad.townsend@banff.ca

³Sustainability Coordinator, Town of Canmore, lrisslingwynn@canmore.ca

Abstract: As with many communities across North America, the Canadian mountain towns of Banff and Canmore, Alberta are frequented by black and grizzly bears. Although both towns introduced community-wide bear resistant garbage storage and accompanying bylaws in earlier decades, ripe fruit on ornamental trees such as

crabapple and chokecherry still present a powerful seasonal attractant. This has resulted in food conditioning and bear habituation to humans and infrastructure - numerous black and grizzly bears have been translocated or destroyed as a result of concerns for public safety within the communities. In 2015, the Town of Banff, located within Banff National Park, undertook an incentive program to encourage residents to voluntarily replace their existing fruit trees with non-fruit bearing species. This cost-shared program between the municipality and the Parks Canada Agency, allowed residential property owners to have their crabapple trees replaced with an approved alternative at no cost. In 2016, the Town of Canmore followed with a similar initiative that targeted additional tree species of concern, and expanded the replacement options to increase interest in the program. Since the two programs were established, 79 problem fruit trees have been removed from the two communities, greatly reducing bear-human conflicts in those particular neighborhoods. Although programs such as these can be challenging to fund on an ongoing basis, they have significant value in raising public awareness about managing attractants and wildlife conflict reduction being a shared responsibility between residents and agencies. In the near future, community managers will explore more robust bylaw and enforcement mechanisms, in addition to ongoing public education and volunteer fruit gleaning, to complement the voluntary tree replacement programs.

8. Banff National Park's Wildlife Guardian and Picnic Patrol Programs - Delivering Effective Wildlife Messaging with Visitors Where They Are in the Park

Susan Staple¹

¹ *Interpretation Coordinator, Banff National Park, Parks Canada Agency, susan.staple@pc.gc.ca*

Abstract: Banff National Park welcomes over four million visitors per year and has a small vulnerable grizzly bear population estimated at approximately 60 individuals. During the summer months, the majority of visitation is day-users who visit from one of Canada's fastest growing urban centers located less than 1.5 hours from the park. Members of Banff National Park's Wildlife Guardian and Picnic Patrol interpretation team are out in the park providing safe wildlife viewing messaging and the importance of keeping clean picnic sites to visitors to help ensure the long-term survival of Banff grizzly bears. From mid-May to early September, the Wildlife Guardians assist Human-Wildlife Conflict staff with grizzly bear monitoring and grizzly bear jam management, in addition to sharing information about Banff's grizzly bears with visitors along secondary roads, at popular day-use areas, and in

campgrounds. They participate in special events and community engagement activities throughout the season, sharing messaging about how to be prepared and act responsibly in areas where grizzly bears are present. Picnic Patrollers have a daily presence at popular day-use areas sharing best practices for keeping a clean picnic site, disposing of food and garbage appropriately, not leaving any food or scented items unattended, and the importance of not feeding any wildlife. This poster will share examples of the team's activities, communication tactics and successes, which have been achieved through having a strong Parks Canada presence on the ground, out in the park where the visitors are.

9. The Effect of Visiting a Wildlife Park on Knowledge and Perception towards the Brown Bear

Stefanie Franke¹, Sven Brunberg², Andreas Zedrosser^{1,2,3}

¹University of Natural Resources and Life Sciences, Vienna, Austria

²Orsa Predator Park, Orsa, Sweden

³University College of Southeast Norway, Bø, Norway

Abstract: Zoos and wildlife parks play an important role in conservation and education of the general public about wildlife. Educational materials and guided tours are commonly offered in wildlife parks. We carried out a questionnaire amongst visitors about their knowledge, perceptions, and the learning outcome of a wildlife park visit, as well as the efficacy of interpretive activities and their influence on perceptions regarding the brown bear in a wildlife park in Sweden. Randomly chosen visitors were asked questions about their knowledge and perception of brown bears as well as the information tools used during their visit. We further analyzed how a fatal bear accident influenced the perception of brown bears by visitors.

We surveyed 321 visitors before entering and 291 visitors upon exiting the wildlife park between July and September 2017. The results showed that visitors performed significantly better in the knowledge questions upon exiting the park. This knowledge gain was higher in repeat visitors and prevalent both in local/national as well as in international visitors. The knowledge gain was higher when interactive interpretational activities, such as guided tours or commented feedings, were visited. Unexpectedly, we did not find a change in the perception of local/national visitors towards bears even after the occurrence of a fatal accident inside the wildlife park during the study period (a bear mauled a park employee, who subsequently died from the injuries). Our findings underscore the importance of educational materials and interactive educational experiences in improving learning

outcomes in wildlife parks as well as the important role of wildlife parks for education of the general public in conservation topics.

10. Actions to Help Reduce Human-bear Conflicts in Glacier National Park of Canada 2016-2017

Tawnya Hewitt¹, Sarah Boyle¹, Ray Schmidt¹

¹Glacier National Park, PO Box 350, Revelstoke, BC V0e 2S0

Abstract: Encounters between people and grizzly bears have been increasing over the last decade in Glacier National Park (GNP) of Canada. In 2016, there were 79 human-bear encounters; over 75% of encounters involved sibling four-year-old grizzly bears. To reduce the risk of conflict and conserve these bears, we adapted traditional and modern approaches to alter the behavior of visitors and the bears. These included the following: legal group size hiking restrictions for visitors to hike in groups of 4 or more, in areas where grizzly bear encounters are common; improved signage by replacing outdated signs which utilized universal symbols and provided a white space for custom messaging; Bear Ambassadors and an information tent operated at the trailhead to provide personal messaging on bear safety; and distributing five road-killed animal carcasses in secure habitat to provide scavenging opportunities for the bears away from the campground. We found that the Bear Ambassadors and Bear Tent, combined with new signage, together helped achieve over 90% compliance with the group size restriction. Having GPS collared one female bear, we were able to monitor her behavior and location, conduct hazing, and assess her responses to hazing efforts. The GPS collar provided valuable, precise information on her home range and activity patterns in areas of high human use, and the date that she moved into the alpine in preparation for denning. By conducting remote camera monitoring of our diversionary feeding site, we confirmed that at least six different bears scavenged at this site, including our target grizzly bears. There were no reported bear sightings or encounters in the campground during this time. We anticipate that increasing visitation will continue to pose significant challenges in preventing human-bear conflicts. Therefore, we recommend expanding these activities in future years to help ensure safe experiences for visitors and enable grizzly bears to use important habitat in GNP.

11. Putting the Sun Bear Out of the Shade: A Preliminary Survey to Appraise Myanmar People's Perception of *Helarctos malayanus* in Rakhine

G. Cremonesi^{1,4}, L. Gaffi², L. Gueli², Win Lin Aung², Than Tun Win², Maung Phyu², Naing Lin So², Zin Mar Hein², F. Bisi¹, A. Gagliardi¹, L. A. Wauters¹, D. Preatoni¹, F. Zibordi³, and A. Martinoli¹

¹ *Environment Analysis and Management Unit, Guido Tosi Research Group, Dept. of Theoretical and Applied Sciences, Univ. of Insubria, Via J. H. Dunant, 3 - I-21100 Varese, Italy*

² *Istituto OIKOS Myanmar, 35 Shan Konest, Sanchaung Township, Yangon*

³ *Istituto OIKOS Italia Via Crescenzago 1, 20134 Milano* ⁴gcremonesi@uninsubria.it

Abstract: Myanmar is part of *Helarctos malayanus* native range in coexistence with another bear species, the Asian black bear (*Ursus thibetanus*). Human-bear competition for space and resources in rural areas is a cause of conflict and casualties in a large part of the country and is also one of the least studied of any form of human-bear conflict. In the Rakhine region crop raiding and sporadic bear attacks are known to happen but there are no data on frequency and causes of the accidents. The purpose of our work was to assess sun bear perceptions by local people as well as their attitudes towards the species, as understanding the nature of these conflicts may be important in reducing them and to design future strategies to increase protection of farmers' livelihoods. A structured questionnaire was prepared, with the aim of interviewing people who had at least one encounter with a bear or suffered from crop raiding events. The questionnaire, specifically simplified and administered with the help of local translators, was constructed with 27 questions divided into two parts; the first focused on crop raiding information (number of events, season, tolerance towards bears and reaction of people) and the second on the characteristics of the encounters (distance, bear's behavior, attitude). The survey was conducted in 2017 among 157 people in 28 villages within Kyeintali and Thandwe townships near the Rakhine Yoma Elephant Range Wildlife Reserve. The survey results pointed out that the Sun bear is actually the most frequently encountered bear in the study area in contrast to the Asian black bear, and that it is the bear species responsible for most crop raiding (almost half of the interviewed). An interesting result is that more than 45% of interviewed people do not consider the Sun bear as a threat to farming activity and that people's general attitude toward bears is positive; indeed, 80% of interviewed people said that they like to have Sun bears in the forest. In more than 50% of the cases, no action was taken against crop raiding bears, and in only a few cases, actively capturing the responsible bear was attempted. As for bear attitude, questions related to human-bear encounters indicated that

the most frequent bear reaction consists in running away (more than 65 people) and aggressions are very rare (only one person said he was attacked). These data will provide baseline information for future research on sun bear-human interactions and in particular to accidents and casualties, aiming at the mitigation of the human-bear conflict.

12. Using GPS/VHF Radio-Collars to Determine Nuisance Black Bear (*Ursus americanus*) Relocation Success Rates in Great Smoky Mountains National Park.

Gregory R. Grieco^{1,2}, Ryan H. Williamson¹, Joseph D. Yarkovich¹, and William H. Stiver¹

¹*Great Smoky Mountains National Park, 107 Park Headquarters Road, Gatlinburg, Tennessee 37738, USA*

²*gregory_grieco@nps.gov*

Abstract: From 1990-2015, Great Smoky Mountains National Park (GRSM) captured and relocated 213 American black bears (*Ursus Americanus*) for management reasons. Bear behaviors warranting relocation consisted of food conditioning, property damage, and severe human habituation. Relocated bears were ear tagged and released in remote areas within GRSM or transferred to Tennessee or North Carolina state wildlife agencies and released in state managed lands. Park wildlife managers regarded these relocations as successful based on low rates of recapture for repeat nuisance behavior. However, other than a small percentage (18%) that were legally harvested, reported road-killed, or euthanized, the fates of the majority of these bears (82%) are unknown. Since November 2015, GRSM staff fitted six relocated bears (5 male, 1 female) with Vectronic GPS/VHF collars to determine their movements and fates. Five bears (83.3%) have been legally harvested in TN or NC, and one (16.7%) was killed in a car accident. All six bears were killed during the same year of their relocation. These preliminary results demonstrate how GPS radio-collars can provide accurate data on the movements and final outcomes of relocated bears. GRSM managers will continue to fit GPS radio-collars on relocated nuisance bears. Future results will allow managers to determine relocation success rates and reevaluate whether or not it is viable management alternative to euthanasia or labor-intensive hazing.

13. Comparison of Ketamine-Xylazine and Butorphanol-Azaperone-Medetomidine to Immobilize American Black Bears (*Ursus americanus*)
Ryan H. Williamson^{1,4}, Lisa L. Muller², and Coy Blair³

¹ Great Smoky Mountains National Park, 107 Park Headquarters Road, Gatlinburg, Tennessee 37738, USA

² 274 Ellington Hall, Department of Forestry, Wildlife and Fisheries, University of Tennessee, Knoxville, Tennessee 37892, USA

³ Appalachian Black Bear Rescue, 121 Painted Trillium Way, Townsend, Tennessee 37882, USA

⁴ Corresponding author: (email: ryan_williamson@nps.gov)

ABSTRACT: Wildlife anesthetic protocols must offer rapid inductions and recoveries, be physiologically safe, and be minimally regulated. With this in mind, we evaluated differences in induction and recovery times and physiological parameters in 33 American black bears (*Ursus americanus*) anesthetized with ketamine-xylazine (KX) or immobilized with a commercial drug combination of butorphanol, azaperone, and medetomidine (BAM). Dose was based on mass estimated from field observations. Bears were housed at Appalachian Bear Rescue, Townsend, Tennessee or free-ranging within the Great Smoky Mountains National Park (Tennessee and North Carolina) and chemically immobilized for management purposes. From 11 April–29 June 2016, we immobilized bears with injection via pole syringe or disposable dart projected from an air-powered dart rifle. Once immobilized, we measured each bear's temperature, respiration (breaths/min), heart rate (beats/min), hemoglobin oxygen saturation (via pulse oximetry), arterial blood gases, and mass (kg). We found no differences in the induction parameters, partial pressures of CO₂, and rectal temperatures. The BAM-treated bears had lower heart and respiratory rates that lead to lower hemoglobin oxygen saturation levels (from blood gas analysis, SaO₂). The SaO₂ after treatment with BAM (91.1±0.8%) was lower than with KX (93.4±0.9%). After handling, we reversed KX-treated bears with a \bar{x} =0.2±0.02 mg/kg yohimbine and BAM-treated bears with \bar{x} =1.5±0.1 mg/kg atipamezole and 0.8±0.1 mg/kg naltrexone. We found no differences in the recovery times to increased respiration, and to the bear assuming a head-up position. The BAM-treated bears stood and recovered quicker than did KX-treated animals. Based on our observations, BAM appears to offer safe, predictable immobilizations with fewer drawbacks and faster recovery times than KX-treated bears.



14. Tennessee Cooperative Black Bear Management Agreement

William H. Stiver¹, Mary C. Miller², and Dan Gibbs³

¹Supervisory Wildlife Biologist, Great Smoky Mountains National Park, 107 Park Headquarters Road, Gatlinburg, TN 37738

²Forest Wildlife Biologist, USDA Forest Service, Cherokee National Forest, 2800 North Ocoee Street, Cleveland, TN 37312

³Black Bear Program Leader, Tennessee Wildlife Resources Agency, Region IV, 3030 Wildlife Way, Morristown, TN 37814.

Abstract: Combined, the Cherokee National Forest (CNF) and Great Smoky Mountains National Park (GRSM) provide in excess of 1.1 million acres of black bear habitat in east Tennessee. Black bears within the CNF are managed by the Tennessee Wildlife Resources Agency (TWRA), whereas bears in the GRSM are managed by the National Park Service. Recognizing that black bear management issues regularly cross jurisdictional boundaries, the three agencies have a long history of working together through a formal cooperative bear management agreement. The primary objective of the agreement is to successfully manage black bears while enhancing public safety in the GRSM and on TWRA/CNF managed lands. The agreement identifies the responsibilities and cooperative actions the three agencies deem necessary to accomplish this objective. Establishment of this agreement has resulted in bears being managed on a regional scale rather than an agency scale, which benefits all parties, including the public. Other benefits include frequent communication between agencies on bear management issues in Tennessee, as well as the ability to build strong relationships with employees within agencies by working together on common projects/goals.

15. Development of Technology to Help Reduce Human-Polar Bear Conflicts
Femke Hilderink¹, Melanie Lancaster¹, Sybille Klenzendorf¹, Elisabeth Kruger¹, Pete Ewins¹, Gert Polet¹, Kaare Hanssen¹, Ivan Mizin¹, Alasdair Davies², and Stephanie O'Donnell³, Geoff York⁴, BJ Kirschhoffer⁴

¹World Wide Fund for Nature (Netherlands, Canada, USA, Denmark, Russia)

²Arribada Initiative

³WILDLABS/ Flora & Fauna International

⁴Polar Bears International

Abstract: Human-bear conflict demands new and innovative solutions. Although there are measures and tools in place to prevent it from electric fencing, light and sound deterrence to active aversion techniques. WWF (World Wide Fund for Nature) and PBI (Polar Bears International) support various technology and approaches to help reduce conflicts between people living and working in the Arctic and polar bears. However, these methods have proven inadequate in fully preventing interactions between humans and bears. In response, WWF and WILDLABS harnessed the combined skills and knowledge of engineers, designers, and nature lovers from around the world to help solve this pressing conservation issue. WWF's first international Human Wildlife Conflict Tech Challenge sought innovative solutions to detect wildlife in an early stage to prevent conflict. PBI is testing the use of Compact Surveillance Radar in the community of Churchill, Manitoba, to detect approaching bears. We discuss the experiences gained with a Human Wildlife Conflict Tech Challenge, the CSR, and other field-tested technology, challenges and recommendations.

16. The Unique Challenges of Managing Human-bear Interactions in the Adirondack Park, New York
Ben Simpson¹

¹New York State Department of Environmental Conservation, Division of Fish, Wildlife and Marine Resources, 1115 State Route 86, Ray Brook, New York

Abstract: As biologists, we face the challenge of managing human-bear conflicts and interactions in a unique area of the country. The state of New York's wildlife is managed by the New York State Department of Environmental Conservation. The state is broken up into 9 regions with Region 5 containing the majority of the Adirondack Park. The Adirondack park covers over 5.8 million acres of land in the northern half of New York State. The park consists of 2.9 (50%) million acres of private land and 2.6 (44%) millions acres of public. The mix of public and private land and a bear population over 4,500 has led to serious conflicts year after year. In Region 5, we receive between 150-200 phone call complaints per year, mostly regarding bird feeder and residential trash. The Adirondack Park is a destination for hikers and backcountry enthusiasts, with the High-Peaks Wilderness being the most popular destination. In the last 5 years (2013-2017) the high-peaks have seen, on average, 120,879 trail visitors per year. These visitors include day users and overnight campers. A state law requiring the use of bear canisters has curbed some conflict issues but the sheer number of visitors across a huge landscape continues to have its problems. Along with requiring bear canisters for overnight stays in the High-Peaks Wilderness, we have used other means of managing bear-human conflicts throughout the region. We have utilized electric fencing, electric backpacks, trapping, removal, hazing, and public education. I present some of the means we use to deal with these conflicts as well as show some of the unique challenges we face as managers.

17. Characteristics of Black Bears Euthanized for Management Reasons in Great Smoky Mountains National Park

J. Parker White¹, William H. Stiver², and Michael K. Steinberg¹

¹*University of Alabama Department of Geography, Box 870322, Tuscaloosa, Alabama, john.parker.white@gmail.com*

²*Great Smoky Mountains National Park*

Abstract: Great Smoky Mountains National Park (GRSM) is the most visited national park in the United States with more than 11 million visits annually. It also has the highest estimated density of American black bears (*Ursus americanus*) in North America, with approximately 1,800 bears or nearly one per square kilometer. As a result, human-bear conflicts are common, particularly during summer months. GRSM managers use a variety of techniques to mitigate human-bear conflicts; however, when a bear exhibits behavior that poses a threat to visitor safety, it is often euthanized. We collected records of bears euthanized for management reasons from 1990-2016 and examined sex, age, capture location, and behavioral history of bears to determine demographic and behavioral trends. We did not include bears euthanized due to illness or injuries (e.g., vehicle collisions). A total of 55 black bears were euthanized in this study period. We summarized these results and provide bear managers with useful data that can aid in the development or revision of bear management protocols.

18. Historic Human and Black Bear Encounters in Big Bend National Park

David Price Rumbelow¹

¹*Biological Technician, Big Bend National Park, David.Rumbelow@nps.gov*

Abstract: Encounters between National Park visitors and large carnivores can result in positive or negative experiences. Big Bend National Park (BIBE) considers an encounter to be any interaction with wildlife experienced by a person (track, auditory, sighting, and physical contact); an incident is an encounter involving contact with human property, aggressive behavior, or attack on a person. The goal of this study was to examine historic interactions between humans and black bears in BIBE with the use of natural history field observation cards. Observations from 1950-2016 were ranked and categorized spatially and temporally. Of the 7,226 black bear encounters with ranking recorded, only 167 (2.31%) were ranked as incidents by BIBE. Most black bear encounters occurred while hiking and negative

incidents occurred most often at backcountry campsites, mainly in the Chisos Mountains. Long-term visitor observation data provides park managers at BIBE with unique information to aide in the conservation of the black bear population while addressing human safety concerns.

19. Minimizing bear-human conflicts in Nunavut

Mike Harte¹

¹Wildlife Deterrent Specialist, Department of the Environment, Government of Nunavut, Box 209, Igloolik, Nunavut

Abstract: The Wildlife Deterrence Program helps mitigate human-wildlife conflict in Nunavut. Human-wildlife conflicts have negative social and economic impacts. Between 2000 and 2017, hundreds of defense of life or property kills occurred in Nunavut in order to protect people and their property. Wildlife patrols are primarily carried out by Conservation Officers, with support from the Hunters and Trappers Organization, Municipalities, and NGOs. Polar Bear Guard (PBG) training provides exposure to deterrence equipment and safe practices that can build capacity to mitigate human-wildlife conflict in communities and provide employment in the tourism and mining sectors. Experimental conflict mitigation measures discussed in the presentation include electric fencing, live traps and luring stations. The Wildlife Damage Compensation Program issues direct compensation to property owners whose property has been damaged by wildlife. The Wildlife Damage Prevention Program provides funding to individuals and non-profit organizations to take steps to prevent property damage by wildlife. Community-based bear-human conflict mitigation plans encourage key stakeholders within communities to collaborate and develop community specific mitigation efforts.

ABSTRACTS

1. Measuring Public Attitudes toward Bears

Mark Damian Duda, Responsive Management

Abstract

An important aspect of bear management is being aware of public knowledge of and attitudes toward bears. In general, wildlife management plans built upon not only understanding wildlife but also understanding people are more effective. Human dimensions research is the scientific examination of social attitudes, opinions, behaviors, values, and activities that can be used to better understand how public knowledge and opinion relates to wildlife, wildlife management, and wildlife policy. In this presentation, Mark Damian Duda, executive director of research firm Responsive Management, will provide an overview of human dimensions research methodology, share lessons learned from implementing human dimensions research, and discuss public attitudes toward bears based on the research his firm has conducted over the years.

The overview of human dimensions research methodology will cover both qualitative and quantitative methods. Qualitative methods discussed will include focus groups, public meetings, and online public forums. Quantitative methods discussed will include scientific surveys by telephone, mail, and online. The various methodologies each have advantages and disadvantages to consider when designing a human dimensions study.

Duda will also review the major lessons learned from years of implementing human dimensions research for fish and wildlife agencies. Some of these lessons are cautionary in nature, such as recognizing that the loudest constituents may not reflect the opinions or values of the majority of constituents. Other lessons emphasize beneficial strategies. For example, state fish and wildlife agencies typically hold high credibility with the public and should use it accordingly. Understanding public knowledge of and attitudes toward bears is an important component of developing a successful bear management plan. Responsive Management's human dimensions research on attitudes toward bears will be discussed, focusing on studies conducted in multiple states that examine such areas as knowledge of bears, opinions on the size and location of bear populations, experiences and conflicts with bears, opinions on bear management strategies, willingness to take precautionary actions to prevent human-bear conflicts, and more.

2. Wildlife in the Cloud: Using Technology to Enhance Human-wildlife Conflict Management

Sarah Barrett, Florida Fish and Wildlife Conservation Commission

Abstract

The Florida Fish and Wildlife Conservation Commission (FWC) has experienced an increase in the number of human-wildlife conflict calls from the public over the last few decades. Several species programs adopted individual electronic databases to better track the increasing reports. As technology quickly advanced over the last several years and human-wildlife call volume continued to increase, the programs outgrew their existing individual databases. Therefore, in 2015 the FWC adopted a new, multi-species Wildlife Incident Management System (WIMS) that uses an out-of-the-box, cloud-based solution, Salesforce, which was modified to the FWC's requirements using outside vendors. This solution has allowed programs to combine resources to obtain a superior single product that also incorporates many species that were not previously being tracked. This database allows the FWC's Office of Information Technology to focus its resources on a single program versus numerous database that used different programming. The new system has many features that have streamlined staffs' duties. WIMS maintains caller contact information in one place, allowing staff to see all related interactions with the resident, regardless of why the person called the FWC. Built in mapping allows staff to see emerging trends and visualize events over defined distances or time. Previously manual tasks are now automated, allowing staff to identify appropriate contracted trappers and electronically assign and pay out work orders. Trappers can update results from the field through a 'self-service portal' feature. The system is flexible and can grow as new species programs (or other agency areas like derelict vessels or permitting) are incorporated. WIMS is an efficient and comprehensive approach to collecting, managing, and analyzing human-wildlife conflict information, while providing excellent customer service.

3. A Qualitative Assessment of the Polar Bear-viewing Experience: A Tool for Identifying Experience Indicators in the Arctic National Wildlife Refuge

Jessica Fefer, Clemson University

Jeffrey Hallo, Clemson University

Robert Dvorak, Central Michigan University

Jennifer Reed, Arctic National Wildlife Refuge

Abstract

The purpose of this research is to help inform visitor-use management decisions in the Arctic National Wildlife Refuge off the shore of Barter Island in Kaktovik, Alaska. Using the Interagency Visitor-Use Management Council (IVUMC) Framework, the Arctic National Wildlife Refuge is working to manage boat-based polar bear viewing activities. The IVUMC framework uses an indicators and thresholds-based approach, which has been applied extensively in public recreation sites (Manning, 2011), but is relatively new for managing human-wildlife interactions. Indicators are observable variables that are measurable and manageable (e.g., people at one time in an area). Thresholds refer to the resource or experiential condition that represents the level where an indicator reaches an unacceptable level (e.g., when the number of people at one time becomes too many). Due to the novelty of the approach in wildlife refuges, and how variable indicators can be based on context, it is crucial that the development of indicators is systematic and scientifically based. This research uses a qualitative approach to understand indicator variables for managing the polar-bear viewing experience on Arctic Refuge waters. Semi-structured interviews were used to solicit responses from visitors who viewed polar bears on the refuge waters. Photo-elicitation was used to compliment the interviews, where visitors were asked to share photographs that represented the most important, unique, and/or negative aspects of their experience. Other questions asked respondents to reflect on anything that might have detracted from their experience. Semi-structured interviews were transcribed, and open-coding was used to highlight emergent themes and unique responses. Photos were also analyzed and thematically organized to highlight potential measurable indicators of the visitor experience. Preliminary results suggest that the distance to bears, the behavioral responses of the bears being viewed, and crowding of boats around polar bears are important to the visitor experience. Visitors also signified that the information provided about bears and the local community impacted their experience. Personal safety was of concern to fewer visitors than expected. Results will be used to inform a second phase of research, which will determine acceptability thresholds for selected indicator variables.

4. Assessing Survival and Spatial Ecology of American Black Bears Released from the Appalachian Bear Rescue

Coy Blair, University of Tennessee

Joseph D. Clark, U.S. Geological Survey, Southern Appalachian Research Branch,
University of Tennessee

Dr. Lisa Muller, University of Tennessee

Abstract

Prior to making any decisions regarding orphaned and/or injured American black bear (*Ursus americanus*) cubs and yearlings, wildlife managers need more information about their options. Current options include not intervening, humane euthanasia, attempting to reunite bears with their biological mothers, fostering bears to wild, adoptive females, transporting bears to a permanent captive facility, or transporting bears to a rehabilitation facility for eventual release back into the wild. The optimal solution would be placing bears back with their biological mothers, but this is usually not feasible. For cubs-of-the-year, fostering would be a great alternative if possible. Euthanasia may be the only option for bears that are severely ill or injured, but there are more alternatives to leaving young, orphaned and ill bears alone by choosing not to intervene. Placing bears in permanent captive facilities or sanctuaries is not ideal for wild bears, but placing them in temporary, rehabilitation facilities with the goal of releasing them back into the wild would be. This type of individually-focused care will not only aid the bear and wildlife manager but help foster relationships between resource management agencies and the public as well. Well-established bear rehabilitation programs such as the Appalachian Bear Rescue (ABR) offer all of these resources to managers. As with the majority of animals released from other rehabilitation centers, however, little is known about the post-release success of bears released from ABR. Out of 214 bears released to the wild from ABR between 1996 and 2017, post-release information is only known for 12 bears (<6%). During 2015 and 2016, ABR received 56 bears for rehabilitation. Forty-two of these bears were released with Global Positioning System (GPS) wildlife tracking collars during this same time period to Great Smoky Mountains National Park (GSMNP) or Cherokee National Forest (CNF) lands. Collar fix rates were set for every 3 hours and programmed to release on their own after 60 weeks. All location data was analyzed to assess survival and spatial ecology including movements, space use, and denning preferences of bears.

5. Use of Gps-Radio collared Bears to Identify and Delineate a Community “Bearwise” Zone

Jessica Giacomini, Department of Forestry, Wildlife and Fisheries, University of Tennessee

Joseph D. Clark, U.S. Geological Survey, Southern Appalachian Research Branch, University of Tennessee

William H. Stiver, Great Smoky Mountains National Park

Dan Gibbs, Tennessee Wildlife Resources Agency

Abstract

Great Smoky Mountains National Park (GRSM) straddles the border Tennessee and North Carolina and has an estimated population of 1,600 American black bears (*Ursus americanus*). The park is adjacent to several cities and communities including the popular tourist city of Gatlinburg, Tennessee. Many of these areas likely offer novel anthropogenic food sources interspersed within suitable bear habitat which may facilitate human-bear interactions. In 2000, the city of Gatlinburg enacted City Ordinance 2188 to reduce human-bear conflicts, requiring that all dumpsters or equipment used to store garbage be animal resistant or enclosed within a fence or other structure preventing animal access to garbage. The ordinance zone includes the entire area within Gatlinburg city limits on the west side of Foothills Parkway, encompassing an approximate area of 6.32 km² (2.44 mi²). From 2015 through 2017, a total of 51 black bears were captured on the Tennessee-side of GRSM and were equipped with GPS radio-collars as part of a conflict bear study being conducted by the University of Tennessee in partnership with Tennessee Wildlife Resources Agency and the National Park Service. Approximately 71% (n=36) of the radio-collared bears left GRSM boundaries and accessed private land surrounding the park. While 28 of the 36 bears that exited GRSM entered the city of Gatlinburg where animal resistant garbage containers are required, only 7 of these bears’ movements were limited to Gatlinburg exclusively. A total of 29 bears accessed private land outside of Gatlinburg city limits, and these areas do not currently require the use of animal resistant garbage containers. The movement patterns of these radio-collared bears suggest that the current area covered by City Ordinance 2188 may need to be increased and that other communities bordering GRSM should consider passing similar ordinances in order to reduce human-bear conflicts region-wide.

6. Efficacy of Bear Spray versus Polar Bears

James Wilder, U.S. Fish and Wildlife Service

Abstract

Little scientifically-validated information exists on effective deterrents for use against polar bears (*Ursus maritimus*). An objective understanding of the effectiveness of different deterrents in mitigating human-polar bear conflicts is critical to ensuring both human safety and polar bear conservation. Although considerable attention has been focused on understanding black (*U. americanus*) and grizzly (*U. Arctos*) bear conflicts with humans, there have been few attempts to systematically collect, analyze, and interpret available information on human-polar bear conflicts across their range. To help fill this knowledge gap, a database was developed (the Polar Bear-Human Information Management System, PBHIMS), to facilitate the range-wide collection and analysis of human-polar bear conflict data. We populated the PBHIMS with data collected throughout the polar bear range, analyzed the use of bear spray versus polar bears, and found that it is an effective deterrent. We analyzed 17 uses of bear spray versus wild polar bears between 2000-2016 distributed among 3 of the polar bear Range States (Canada, Russia, and the United States) that resulted in zero human or polar bear fatalities or injuries. Bear spray stopped polar bears' undesirable behavior 94% of the time. The available data indicates that bear spray is an effective alternative to lethal force and should be considered as an option for personal safety for those recreating and working in polar bear country. This work represents an important step towards improving our understanding of an effective deterrent for polar bear conflict mitigation. Continued collection and analysis of range-wide data on polar bear interactions and conflicts will help increase human safety and ensure the conservation of polar bears for future generations.

7. Evaluating Conducted Electrical Weapons as an Aversive Conditioning Tool for Nuisance Black Bears in Great Smoky Mountains National Park

Ryan H. Williamson, Great Smoky Mountains National Park

Joseph G. Yarkovich, Great Smoky Mountains National Park

William H. Stiver, Great Smoky Mountains National Park

Abstract:

Conducted Electrical Weapons (CEWs), such as Tasers, are being used by some state and federal wildlife agencies throughout the country as a form of aversive

conditioning to mitigate human-bear conflicts. Evaluating the effectiveness of CEW's is difficult without the ability to monitor post-exposure movements and identify unique individuals. However, GPS collar technology can be used to provide a measure of results over time and space. Since 2016, Great Smoky Mountains National Park (GRSM) has been using CEW's as an aversive conditioning tool for severe offensive black bear (*Ursus americanus*) incidents such as entering a building/shelter, tearing into a vehicle or tent, flipping dumpsters, area persistence and severe human habituation. The objectives of this study were to determine practical field application, develop standardized methodology, and evaluate the effectiveness of CEW's as an aversive conditioning tool for black bears. From June 2016 to August 2017, we deployed CEWs on 11 black bears (4 females and 7 males) a total of 14 times. Nine of these individuals were equipped with GPS collars that have collected >35,517 locations post deployment. Of the 11 research bears, 5 remained a persistent problem in the same area and 1 had to be recaptured after a one-year interval. Four bears never returned to the site of capture. A more detailed spatial analysis which accounts for factors such as age, sex, degree of habituation/food conditioning, and degree of neuromuscular incapacitation received will provide measurable results of CEW effectiveness as an aversive conditioning tool.

8. Conducted Electrical Weapon Use for Wildlife Management in Alaska – Adapting Law Enforcement Tools and Technology to Natural Resource Conservation

Larry L. Lewis, Alaska Department of Fish and Game, Division of Wildlife Conservation

Abstract

Wildlife management and public safety officials routinely respond to reports of wild animals posing public safety risk, causing property damage or are entangled, entrapped, sick or injured. During an agency response, immediate physical restraint or alteration of an animal's behavior may need to be achieved in order to help safely and effectively resolve a situation. Agency response is typically conducted utilizing a force-continuum of available tools and techniques that may range in effect and severity from human presence and vocalization, up to lethal force removal of the animal. Due to the increased risk of injury or death to both the human respondent and subject animal during any close-quarters investigation and subsequent action; continually evolving methods, tools and technology are adapted and adopted by field staff in order to help insure safer, more efficient and humane interventions.

The use of incapacitating drugs, pyrotechnical devices, less-lethal to lethal projectiles and the myriad of other tools and techniques commonly used by trained professionals for the restraint and/or behavioral modification of wildlife can, at times, be controversial, but most are generally accepted in practice. Conducted Electrical Weapons (CEW's) have been used by law-enforcement agencies for the restraint and behavioral modification of humans for over 40 years, although this use is not without some controversy of its own. In July of 2005, the Alaska Department of Fish and Game's (ADF&G) Division of Wildlife Conservation began studying and adopting the use of hand-held CEW's for the purposes of field staff personal safety; short-term restraint, hazing and aversive conditioning of wildlife. We collected information on the post-CEW exposure behavior and survivability of Alaskan Brown Bears (*Ursus Arctos*), Moose (*Alces alces*), Wood Bison (*Bison athabascae*), Black Bear (*Ursus americanus*), Muskox (*Ovibos moschatus*) and Reindeer/Caribou (*Rangifer tarandus*) subjected to CEW exposure, as well as other animal species in other states. While we conducted research on the overall efficacy and physiological effects of CEW exposure, we also developed codified regulatory language, Standard Operating Procedures, field-use recommendations, as well as training and record keeping standards. We developed a CEW program based on scientific research that will help our trained personnel fulfill their management mission and also allow a staff instructor to train other agency's personnel and public and private sector entities to incorporate CEW into special use hazing permits issued by ADF&G. CEW's are a safe and effective "tool on the tool belt" for authorized personnel to use as a compliment or alternative to the use of other traditional mitigation and safety tools.

9. Coexisting with Grizzly Bears

Gillian Sanders, Grizzly Bear Solutions, Kaslo, BC

Abstract

Reducing human-bear conflict is becoming increasingly important as human populations expand, especially with increased interest in raising local eggs, meat, and crops in semi-rural areas and backyards. The Kootenay Region of British Columbia, Canada, has high densities of black bears and southern grizzly bear populations are slowly recovering from formerly threatened status. Grizzly Bear Coexistence Solutions aims to improve human-grizzly bear coexistence through education, collaboration, and use of practical tools. To assist with grizzly bear population recovery, my work is focused in linkage areas between core grizzly bear populations to improve connectivity through low elevation human dominated habitats, but also serves to reduce black bear conflicts. From 2013-2017 I installed

200 electric fences to protect chickens, beehives, livestock, fruit trees, crops, and other attractants from bears. Electric fencing is known to be an effective tool to deter bears but needs to be properly installed and maintained to be successful. The project provided advice, a 50% cost share on fencing supplies, and help with installation when needed, but fence maintenance was solely resident's responsibility. I tracked the success of fences installed through ongoing communication and outreach with residents. I found that a variety of fence designs were effective and was able to deter individual bears from remaining livestock after predation occurred by these individuals before the fencing was installed. I found that tolerance for grizzly bears improved when livestock predation and associated property damage was reduced, and some formerly intolerant residents became promoters of project goals. I also found the ability to collaborate with a wide spectrum of worldviews was important, along with providing options for attractant management without giving unsolicited advice about private property management. This work may be a useful study for other communities in linkage areas between core populations of bears or areas of high human-bear conflicts.

10. Brute Force: Reducing Food Attractants through Modification of Trash Containers

Mike Orlando, Florida Fish and Wildlife Conservation Commission

Abstract

The Florida Fish and Wildlife Conservation Commission (FWC) has experienced an increase in the number of human-wildlife conflict calls from the public over the last few decades. Approximately 1/3 of bear related calls that are received by the FWC involve bears accessing unsecured garbage. In 2017, FWC awarded \$825,000 in cost-share grants to 11 counties, 3 cities, and 2 homeowner's associations (HOAs) to offset the costs for residents and/or businesses to buy bear-resistant containers or modify regular containers to make them bear-resistant. One challenge was presented by multiple counties in areas with high levels of human-bear conflicts, because their residential waste was collected solely by fully-automated waste service systems. Traditional bear-resistant trashcans require a person to unlock the can before it can be serviced, which would make them incompatible with fully-automated waste service systems. The FWC reached out to local government staff and trashcan manufactures to pre-test prototypes of new bear-resistant trashcans that were designed to be compatible with fully-automated waste collection systems. Once cans were pre-tested with bears, waste collection trucks, and residents, the can manufacturers submitted their designs to be tested and certified by [the Interagency Grizzly Bear Committee](#). In addition to commercially-manufactured

bear-resistant trashcans, the FWC also tested a new experimental method developed by a member of the public to make regular trashcans bear-resistant. The new method adds another option to what the FWC already advocates for modifying trashcans. The FWC also works with local welding companies to modify regular commercial dumpsters to make them bear-resistant. The FWC's involvement in the development of new and modified bear-resistant containers increased availability of this equipment to Floridians and will ultimately help reduce human-bear conflicts over the long term.

11. Grizzly Bear Recovery and Delisting: Progress Report

Hilary S Cooley, USFWS Grizzly Bear Recovery Program

Abstract

The grizzly bear was listed as a threatened species in the lower 48 states in 1975. Accordingly, The U.S. Fish and Wildlife Service (Service) developed a Grizzly Bear Recovery Plan and updated that plan as necessary. The Greater Yellowstone Ecosystem was the first population to achieve recovery and on June 30, 2017, the Service issued a final rule delisting the Greater Yellowstone Ecosystem Distinct Population Segment. The Service is now reviewing recovery of grizzly bears in the Northern Continental Divide Ecosystem. We review progress toward grizzly bear recovery and delisting in the six grizzly bear recovery zones, including litigation challenges and future management once delisting has been achieved.

12. Hikers vs. Bears – Management Challenges on a Long-Distance Trail

Morgan Sommerville, Appalachian Trail Conservancy

Abstract

The 2190-mile-long Appalachian National Scenic Trail, administered by the National Park Service, traverses 14 states, six other national parks, eight national forests, two TVA reservations, 67 state owned parks, 287 local planning jurisdictions and private lands. In other words, management of A.T. lands, resources and visitors vary considerably from place to place. One thing in common to virtually all of these locations is campers with food and bears. Adding to the management challenge is increasing day and overnight use of the A.T., with long-distance hiking along the A.T. increasing at about 14% per year to record levels. At the same time, black bear populations appear to be increasing and bears may be found along all of the A.T.,

from Georgia to Maine. Increased use by inexperienced or naïve A.T. campers along with increasing association by bears of humans with food has led to increasing numbers of bear/human incidents along the A.T. with related A.T. facility and Trail segment closures and food storage regulations. The Appalachian Trail Conservancy, the non-profit that coordinates management of the whole A.T., has recently begun a formal visitor use management program, using the Interagency Visitor Use Management Council framework. One key priority of our VUM work is to avoid injuries from human/bear interactions along the A.T. We would like to prevent euthanized bears and injured campers and are actively seeking optimal solutions to food storage and hiker education, in hopes of diminishing the frequency and severity of human/bear incidents along the A.T., and by extension, other long-distance trails and trail systems.

13. Managing Bear across Jurisdictional Landscapes in Canada

Jay Honeyman, Alberta Environment and Parks

Steve Michel, Natural Resource Conservation Branch, Parks Canada Agency

Abstract

Grizzly bears occupy large home ranges in the Canadian Central Rockies Ecosystem that often span several different agency jurisdictions (National & Provincial Protected Areas, Municipal & Provincial Crown Lands, First Nation Reserve Lands) during their seasonal (and occasionally, daily) movements. Inevitably, bear management takes place at a jurisdictional scale, creating inconsistencies and challenges as bears move across their home ranges. Within the highly developed Bow Valley region of Alberta these various jurisdictions have individual agency management priorities, varying levels of risk tolerance, distinct land use complexities and divergent expectations of stakeholders and residents. Agencies may have different techniques, tools and staff capacity for managing both people and bears within their boundaries. Challenges can occur both at the field level with operational bear management staff as well as with senior agency management. We will discuss these challenges through actual case studies of how grizzly bears are being managed as they move between National Park and Alberta Provincial lands.

14. *Human-Sloth Bear Conflicts: A Significant Challenge to Conserve the Real Baloo of India*

Nishith Dharaiya, Wildlife and Conservation Biology Lab, HNG University, Patan (Gujarat) India

Arzoo Malik, Wildlife and Conservation Biology Lab, HNG University, Patan (Gujarat) India

Abstract

Sloth bears (*Melursus ursinus*) are confined to the Indian sub-continent and distributed in highly fragmented habitats which are very close to the human settlements. Frequent visits of sloth bear in to the villages as well as human use of forest resources are being one of the main reasons for human-sloth bear conflicts in almost all the sloth bear distribution range. More than 60% of human-sloth bear conflicts are bear attacks on human, the rest of the conflict issues are crop damage, damage to the infrastructure. The sloth bear attacks on human are increasing since last decade in the central part of India. As per our recent study, more than 200 cases of sloth bear attacks are recorded per year in India and out of which most attacks occurred in the non-protected areas or close to the villages. This situation has increased the hostility of people towards sloth bears which apparently resulted in killing of sloth bear either by the people or the forest managers. India is holding more than 85% of the sloth bear population and hence have more responsibility to save this real 'Baloo'. Our study revealed that alleviating sloth bear attack in order to save the sloth bears, it is very important to train the forest staff, especially to rescue the sloth bear, monitoring of sloth bear population and its associated habitat. Recent issues of sloth bear killing also urge that there is an urgent need to formulate the guidelines to deal with the sloth bear straying in human habitat.

15. *The Savage Bear: A Case Study of Individual Bear Management in Denali National Park and Preserve*

Patricia A Owen, Denali National Park and Preserve

Abstract

Most of Denali National Park and Preserve's 6 million acres is accessed by a single 90-mile road. Private vehicle access is allowed only in the first 12 miles. Opportunity to experience the park for most visitors is provided by a bus system beyond that point. The furthest extent of the unrestricted section of the road is the Savage River. This popular destination, especially for independent travelers,

includes parking/rest areas, picnic areas, a campground, and hiking trails. It is in this area that for a good portion of the summer of 2016, a young male bear exhibited particularly bold and aggressive behavior toward people and came to be known as the Savage Bear. This bear was identified as habituated and food conditioned, charged people repeatedly and caused minor injury to one person. The behavior of this bear escalated over a number of weeks and necessitated management actions on the part of the wildlife team that included hazing, aversive conditioning, trapping attempts, and area and trail closures. Staff involvement from all work groups across the park was extensive and posed greater management challenges than typical bear-human conflicts in Denali. This case study will chronicle the drawn-out saga of human conflict with one bear and show how management decisions and actions were adjusted frequently to adapt to constantly changing circumstances. It will discuss education efforts, providing social media content, and dealing with the press. The situation revealed gaps in the current Bear-Human Conflict Management Plan where guidance on management actions is missing or unclear. After action review provided valuable lessons learned that may prove valuable to others in similar situations.

16. *Human-Asiatic Black Bear (Ursus Thibetanus) Interactions in the Kaghan Valley, Pakistan*

Ashfaq Ali, Huazhong Agricultural University, Wuhan PR China

Zhixiang Zhou, Huazhong Agricultural University, Wuhan PR China

Muhammad Waseem, Ayubia National Park, Abbottabad, Pakistan

Mingjun Teng, Huazhong Agricultural University, Wuhan PR China

Saquib Ali, Huazhong Agricultural University, Wuhan, PR China

Muhammad Ishaq, Huazhong Agricultural University, Wuhan PR China

Abdul Haseeb, School of Forest Sciences, University of Eastern Finland

Achyut Aryal, School of Life and Environmental Sciences, University of Sydney

Abstract

Few studies have reported on the distribution, food choices, general behavior, and interactions of the Asiatic black bear (*Ursus thibetanus*) with humans. We explored the conservation status of the species and its conflicts with humans in the Kaghan Valley, northwest Pakistan. From September 2013 to December 2015, residents from 24 villages in three major regions of the Kaghan Valley were interviewed about human-bear conflicts. In parallel, a survey for signs of bear presence was conducted to assess bear presence, including bear attacks and crop damage that occurred during the survey period. Most interviewees (70%) confirmed that human-bear conflicts exist, and that they arise primarily from crop raiding (n = 40), followed by

attacks on livestock (n = 32) and humans (n = 15). Most interviewees stated that they actively disliked bears (47.3%) or had a generally negative perception of bears (63.3%). Such responses were strongly associated with living close to or within bear habitat. Bears raided approximately 3.8 ha of maize per year, mainly from July to September. Our survey revealed that bears used habitats ranging from dense forest to scrub lands, but preferred steep, high-altitude habitats with dense tree cover. Anthropogenic activities (such as hunting, clear-cutting, expansion of infrastructure, and conversion of forest to agricultural land) were the main causes of conflict between humans and bears. Future studies should collect data on the movement and habitat use of individual bears to facilitate the development of appropriate management strategies to conserve this species effectively. We also recommend training Wildlife Department employees to interact with the local communities to implement acceptable mitigation measures to reduce the currently high conflict levels and thus improve acceptance for bear presence and conservation.

17. Understanding Sloth Bear Attacks in Gujarat for Formulating Future Conservation Strategies

Arzoo Malik, Wildlife and Conservation Biology Lab, HNG University, Patan (Gujarat) India

Nishith Dharaiya, Wildlife and Conservation Biology Lab, HNG University, Patan (Gujarat) India

Abstract

The sloth bear habitats in Gujarat consist of forests that are fragmented and degraded providing poor habitat conditions for bears and increasing the potential for human-bear encounters. Frequent bear attacks on human and crop damage turn the local people hostile toward bears. Such hostility of local villagers may become an obstacle to efforts to conserve sloth bears in its remaining habitats. Optimizing human-bear coexistence in the area may be one of the sustainable ways out to promote bear conservation. In order to understand the characteristics and probable reasons for bear attacks, we studied more than 600 cases of sloth bear attacks taken place in past ten years. We also visited the villages and interviewed the sloth bear victims to achieve our objectives. Our study revealed that majority of the sloth bear attacks are occurred close to the human settlements and more than 80% of attacks were accidental when the female bear encountered with cubs. We found that most attacks were happened during the winter or pre-summer season and during the crepuscular time. It can be said that the sharing of resources between human and bear can be one of the major drivers leading to conflicts. We overlaid the sloth bear attack locations on the land use land cover layer to identify the potential zones of

human and sloth bear encounters using Geo-spatial techniques. Moreover, the information collected from the bear victims and locals along with the potential conflict zone map can be utilized for formulating the future conservation strategies and to prepare a conflict mitigation plan for the state of Gujarat.

18. Is it Addiction? Food-Conditioning in Grizzly Bears of Alaska's North Slope

Dick Shideler, Alaska Department of Fish & Game

Abstract

The effects of food-conditioning on grizzly bears in Alaska's North Slope oilfield region will be discussed in the context of demographic characteristics, selection of den locations, and individual characteristics such as body size. The potential role of genetic influences will also be presented. These will be compared with bears that reside in the same area but feed only on natural foods. Data from this long-term study suggest that for at least some bears there are physiological requirements that facilitate or even mandate their tendency toward food-conditioning. However, these are also flexible in that these bears never completely rely on anthropogenic food and some may revert to a natural food diet entirely. This has implications for management of individual bears, especially if bears can be deterred from anthropogenic sources early in the process of food-conditioning. These results also can inform decisions about whether an individual conflict bear should be lethally removed.

19. Research, Conflict Management, and a Network of Organizations Reduces Conflict Mortality of Grizzly Bears to Reverse Conservation Decline of Threatened Populations in the Trans-border Region of Canada and USA

Michael Proctor, British Columbia Ministry of Kaslo, BC

Wayne Kasworm, US Fish and Wildlife Service

Grant MacHutchon, Trans-border Grizzly Bear Project

Gillian Sanders, Grizzly Bear Solutions

James Barber, British Columbia Conservation Officer Service

Clayton Lamb, University of Alberta

Nancy Newhouse, Nature Conservancy Canada

Harvey Locke, Yellowstone to Yukon Conservation Initiative

Chris Servheen, US Fish and Wildlife Service

Abstract

We have been researching conservation issues and implementing a multi-faceted comprehensive program to reduce human bear conflicts (HBC) for over a decade in the trans-border region of southern Canada and NW USA across several small fragmented threatened populations. We found that HBC patterns significantly contributed to these populations' threatened status by causing population declines, fragmentation, and isolation, and decreasing habitat effectiveness. Our population monitoring has found clear evidence that our efforts to reduce HBCs have resulted in reduced human-caused mortality, increased inter-population connectivity with larger healthy populations, and improved habitat effectiveness resulting in increased reproduction, survival, and fitness. The composite effect of our programs across several population processes has resulted in an improvement in conservation status. Our program includes strategic private land purchases to reduce human densities in valley bottom connectivity zones, a farmer, rancher, and rural landowner program to secure bear attractants where human settlement and agriculture exists. Attractant management includes a cost-share electric fencing or other securement techniques, bear resistant garbage container program for home sites, and deadstock containment techniques. We also teach bear safety courses and bear spray training to increase tolerance and give residents, recreationists, and hunters tools to avoid potentially dangerous encounters with bears. We use non-lethal management methods on potential conflict bears and radio collar all managed bears. We have a ~90% success rate on females. We have identified the most important backcountry foraging habitats for protection with access controls to reduce backcountry conflicts and mortality to provide security to reproductive females. The composite effects of working across these conservation arenas and habitat types, (front country valley bottoms and backcountry foraging habitats) has resulted in a significant reduction in human-caused mortality, increased connectivity, increased habitat effectiveness, increased reproduction and improved

conservations status of several otherwise threatened populations. Several challenges remain including a plethora of offspring from productive female bears living adjacent to agricultural areas. We discuss strategies to incorporate a vision for success into conflict reduction programs, something we have yet to complete. What to do with all the bears?

20. Challenges to Becoming a BearWise or Bear-Smart Community: Tourists and Hikers

Joel G. Zachry, Smoky Mountain Field School

Abstract

Human-bear close encounters can pose serious threats to each other. Tourists and hikers alike often engage bears in unfavorable circumstances due to a lack of awareness, education, and recognition that bears are wild animals capable of inflicting personal injury or even death if surprised or provoked. Tourists visiting bear habitat often do so with little useful knowledge of bear behavior and often react out of fear rather than prudence when traveling in bear country. Managers must often react to circumstances where unsuspecting tourists place themselves in harm's way with a bear, and more so with a female bear and her cubs. This can result in both serious injury or death of the visitor and the necessary decision to euthanize the animal. Many tourists travel into bear country without receiving so much as a warning pamphlet advising them of the dangers of co-mixing with wild animals. Day hikers and backpackers exploring lands where bears dwell is all too often naïve and unassuming of the dangers that might lurk ahead. Like tourists, they fail to make a proper amount of noise as they advance through the woodlands and to show calmness and withdrawal when an encounter is evident. Both visitor types often are not astute in managing their food, especially those camping overnight in the wilderness. Sometimes there is an assumption that "It won't happen to me". If we as humans are to co-exist with large iconic mammals, such as the bear, as our population increases, and habitat shrinks, we must do a better job of instilling awareness of potential threats and their successful outcomes. We must make greater strides about potential conflicts in educating those who visit wild areas. Managers interacting with the public must work to convince the public, that while wild animals may sometimes appear docile and approachable, the wild, unpredictable element of behavior has prevailed in their genes for thousands of years.

21. WildSafeBC: Current and Future Outlook

Mike Badry, Ministry of Environment, BC Parks and Conservation Officer Service Division

Abstract

Human-wildlife conflicts have been a growing issue over the last decade in both urban and rural environments in British Columbia. Over the last 5 years the BC Conservation Officer Service has received almost 30,000 conflict calls/year. Managing these conflicts for the benefit of both people and animals requires the development of effective and sustainable solutions. In May 2013, the Ministry of Environment, in partnership with the BC Conservation Foundation, launched WildSafeBC, an expansion of the highly successful Bear Aware program. The mission of the WildSafeBC program is to reduce the number of human-wildlife conflicts in communities through education, innovation and cooperation. Key to the success of the WildSafeBC Program is the focus placed on resolving the root causes of human-wildlife conflict and changing people's perceptions and attitudes concerning their own behaviors. The WildSafeBC Program hires, trains and deploys community coordinators who lead wildlife conflict reduction education at the community level. In the past 3 years the program was delivered in more communities, to more people and addressed human-wildlife conflicts with more species than in any year previously. This, however, has resulted in major challenges with meeting the demand of new communities applying for programs, and with pursuing further innovative conflict reduction initiatives. WildSafeBC is striving to: ensure the program has the security and resources to better plan activities for each season; provide a WildSafeBC program in all communities throughout the province that have requested one; deliver programs in high priority grizzly bear conflict management areas; purchase and deploy effective wildlife conflict deterrents such as electric fencing and bear-resistant containers; and, increase their engagement with First Nations and the agricultural community.

22. A Stakeholder's Perspective of Successes and Challenges with the BC Bear Smart Communities Program

Mike Badry, Ministry of Environment, BC Parks and Conservation Officer Service Division

Abstract

The Bear Smart Communities Program was introduced by the Province of BC in 2004 to assist communities and wildlife management agencies in reducing conflicts with bears. The program has evolved over the years and is providing guidance and

best practices, combined with incentives for communities to participate in the Program. The program has achieved or contributed to some substantial successes including over 20 communities in BC that are actively working to achieve provincial “Bear Smart” Community Program criteria and eight communities (Kamloops, Squamish, Lions Bay, Whistler, Port Alberni, Naramata, New Denver and Coquitlam) that have successfully attained official “Bear Smart” Community status. Over the last 10 years there has been a decline in the number of bears killed annually in response to conflicts from approximately 1000 to 650 bears. However, despite high levels of human-bear conflict many communities are still not engaged in, or aware of, the program. Although extensive resources (staff time, volunteer time, educational material, etc.) have been put toward bear conflict reduction by the province, as well as by municipalities, organizations and individuals, many people still do not take responsibility for proper management of bear attractants (garbage, bird feeders, fruit trees, compost, barbeques, outdoor freezers, pet food, etc.). We invited Mayor, Council, and Regional Government Representatives of all eight designated Bear Smart Communities in the province to participate in an interview process to discuss the successes and challenges with receiving and implementing the BC Bear Smart Community Program. The goal of the review process was to provide specific recommendations to further improve program efficacy in reducing human-bear conflict through revised structure, delivery, funding and/or content of the Bear Smart Communities Program. Common themes identified included leadership, communication, effective behavior change, and design and planning.

23. Management Techniques to Minimize Backcountry and Front country Bear-Human Conflicts in Glacier Bay National Park, Alaska

Tania Lewis, Glacier Bay National Park and Preserve
Ashley Stanek, Glacier Bay National Park and Preserve

Abstract

Managers and biologists at Glacier Bay National Park and Preserve have tracked black and brown bear-human conflicts since 1959. There were few conflicts through the 1960s, but two bear-caused human fatalities and a rapid increase in the number of conflicts from the late 1970’s through late 1980s inspired the park to implement new food storage regulations which led to an immediate decrease in bear-human conflicts. Conflicts increased again as backcountry visitation rose in the late 1990s, so the park implemented an educational campaign in 2003 encouraging people to stand their ground with approaching bears. This action, possibly in addition to a slight decline in backcountry visitation, led to another decrease in bear-human conflicts. Additionally, new fishing regulations in 2011 led to a

decrease in fishing related conflicts. Between 2011 and 2017, backcountry conflicts have fluctuated relative to the number of backcountry visitors but remain relatively low (range: 1-7 per year). Bear-human conflicts in the front country, however, appear to fluctuate depending on female and sub-adult bear presence more than numbers of visitors. Food and other attractants are largely secured from bears, so most front country bear management efforts are directed at monitoring habituated bears and hazing them from heavy human-use areas such as roads, trails and buildings. Over the past 12 years, park biologists have experimented with several novel non-lethal hazing techniques that have proven effective in moving black bears from designated no-bear zone. We have found yelling and cracking a 10-foot bullwhip to be an extremely effective hazing technique for subadult black bears, whereas gentle arm gestures and soft voices are a much more effective technique for moving family groups. We have also used several other techniques with varying success, including super soaker squirt guns and slingshots as well as more traditional methods such as non-lethal beanbag rounds fired from shotguns. We will further discuss and demonstrate the novel techniques that have proven effective in managing bears in Glacier Bay National Park.

***24. Addressing Human-Bear Conflicts in the Cabinet-Yaak Ecosystem:
Montana's "Other" Grizzly Bear Population***

Kimberly M. Annis, **Montana** Department of Fish, Wildlife & Parks

Abstract

In 1975, the US Fish & Wildlife Service listed the grizzly bear as a threatened species in the lower 48 states under the Endangered Species Act. The Cabinet-Yaak Ecosystem (CYE), with a population estimated around 50 bears, is one of 5 designated recovery zones where grizzly bears currently exist. Located in northwest Montana, several challenges towards population recovery efforts exist, primarily local feelings towards grizzly bears, human-caused grizzly bear mortality, and human-bear conflicts. Perhaps the greatest success towards recovery efforts for the grizzly bear in the state of Montana has been Montana Department of Fish, Wildlife & Parks (MFWP) development of grizzly bear specialist positions, which foster public awareness, tolerance, and support for grizzly bear management and conservation. In response to a growing need for on-the-ground assistance and public outreach, MFWP created a grizzly bear specialist position for the CYE in 2007. The CYE bear specialist 1) focuses on attractants as the root cause of human-bear conflicts, 2) provides proactive solutions for those attractants, 3) provides effective tools for when conflicts occur, while 4) not overly burdening residents, and 5)

maintaining support for grizzly bear recovery efforts. The results of the first 10 years of managing human-bear conflicts in the CYE are discussed, including the effectiveness of the electric fencing loan program and the public land sanitation program.

25. Polar Bear Attacks on Humans: Implications of a Changing Climate

James Wilder, U.S. Fish and Wildlife Service

Abstract

Understanding causes of polar bear (*Ursus maritimus*) attacks on humans is critical to ensuring both human safety and polar bear conservation. Although considerable attention has been focused on understanding black (*U. americanus*) and grizzly (*U. Arctos*) bear conflicts with humans, there have been few attempts to systematically collect, analyze, and interpret available information on human-polar bear conflicts across their range. To help fill this knowledge gap, a database was developed (Polar Bear-Human Information Management System [PBHIMS]) to facilitate the range-wide collection and analysis of human-polar bear conflict data. We populated the PBHIMS with data collected throughout the polar bear range, analyzed polar bear attacks on people, and found that reported attacks have been extremely rare. From 1870–2014, we documented 73 attacks by wild polar bears, distributed among the 5 polar bear Range States (Canada, Greenland, Norway, Russia, and United States), which resulted in 20 human fatalities and 63 human injuries. We found that nutritionally stressed adult male polar bears were the most likely to pose threats to human safety. Attacks by adult females were rare, and most were attributed to defense of cubs. We judged that bears acted as a predator in most attacks, and that nearly all attacks involved ≤ 2 people. Increased concern for both human and bear safety is warranted in light of predictions of increased numbers of nutritionally stressed bears spending longer amounts of time on land near people because of the loss of their sea ice habitat. Improved conflict investigation is needed to collect accurate and relevant data and communicate accurate bear safety messages and mitigation strategies to the public. With better information, people can take proactive measures in polar bear habitat to ensure their safety and prevent conflicts with polar bears. This work represents an important first step towards improving our understanding of factors influencing human-polar bear conflicts. Continued collection and analysis of range-wide data on interactions and conflicts will help increase human safety and ensure the conservation of polar bears for future generations.

26. *Non-Fatal Black Bear Attack Associations, Manager Perceptions of Risk Management and Litigation*

Janel Scharhag, University of Wisconsin Stevens Point
Dr. Cady Sartini, University of Wisconsin Stevens Point

Abstract

Injuries to humans by black (*Ursus americanus*) and grizzly bear species (*Ursus Arctos*) is increasing in the United States. State and federal agencies that are responsible for bear management are required to make decisions that mitigate public risk. To both reduce risk to the public and better protect agencies from litigation, there has been a call for a more refined management model to assess attack risk by bear species. There is information and statistics regarding fatal attacks of both black and grizzly bears, and non-fatal attacks by grizzlies. There is little valid research on purely non-fatal black bear attacks. Our study will address this information gap and provide additional insight on litigation and risk management by: 1) analyzing 17 metrics involved in confirmed non-fatal black bear attacks in the United States 2) survey perceptions of bear managers regarding risk management and assess their likelihood of using a risk management model 3) review the history of the law and litigation against agencies involving cases of bear attacks. Our project results will provide meaningful statistics that will assist in the evaluation of attack risk, reveal important manager attitudes, and expose the legal issues surrounding bear attacks.

27. *Human-Black Bear Conflict in Urban Environments of Colorado: Results of 11 Years of Research Investigating the Impacts of Human Development on Black Bears and Strategies for Reducing Conflict.*

Stewart W. Breck, USDA-Wildlife Services-National Wildlife Research Center
Heather E. Johnson, Colorado Parks and Wildlife
David L. Lewis, Colorado Parks and Wildlife and Colorado State University
Sharon Baruch-Mordo, Colorado State University
Jared Laufenberg, Colorado State University

Abstract

Human-black bear conflicts within urban environments have been increasing throughout North America, becoming a high priority management concern. In response to this issue, we conducted 11 years of research in 2 towns in Colorado (Aspen and Durango) experiencing high levels of conflict with specific focus on

understanding the influence of urban environments on bear behavior and demography, and the effectiveness of 'bear-proofing' for reducing conflicts. We will present relevant details of our research findings, share lessons learned, and end by posing questions to stimulate discussion. **Influence of human development on bear behavior:** From a multisite analysis, we found that bear use of development is dynamic and highly influenced by natural food shortages; challenging the assumption that bears will consistently rely on human food subsidies ("a fed bear is a dead bear"). When bears did come to town, we found that they overwhelmingly foraged on garbage; justifying a focus on urban bear-proofing as an important line of defense. We also demonstrated that warmer weather and use of anthropogenic food subsidies reduced the length of hibernation; suggesting that climate and land-use change will lengthen the active period and likely result in increases in human-black bear conflicts and human-caused black bear mortalities. **Influence of development on bear demography:** In Durango, we simultaneously collected genetic mark-recapture, individual vital rate, and telemetry data to evaluate the impact of human development on black bear abundance, population growth rate, fitness traits, and the spatial distribution of female black bears. Using an integrated telemetry-mark-recapture analysis, we quantified a 57% decline in female bear abundance over a 1-year period immediately following the natural food shortage. The decline coincided with increased bear use of development, and subsequent increases in human-caused bear mortality (e.g., vehicle collisions, harvest and lethal removals), which resulted in a significant shift in the bear distribution. Known-fate vital rate analyses revealed that increased bear use of development was associated with reduced adult and cub survival, but increased fecundity. Although development influenced vital rates differently, population models showed that collective costs of development outweigh any benefits for bear populations. **Bear-proofing for reducing conflicts:** From Aspen, theoretical modeling indicated that reducing the availability of human foods to bears by 55–70% would significantly reduce bear use of urban development. In Durango, we purchased and deployed ~1,200 bear resistant garbage containers in a large-scale garbage reduction experiment conducted from 2013–2016. We found that trash-related conflicts were 60% lower in treatment areas than control areas, resident compliance with local wildlife ordinances (properly locking away trash) was 39% higher in treatment areas than control areas, and the effectiveness of the new containers was immediate. Importantly, and matching theoretical predictions from Aspen, we found conflicts dramatically declined as resident *compliance* with wildlife ordinances increased to ~60% (by either using a bear-resistant container or just locking trash in a secure location). Our results indicate that changes in waste management can reduce conflicts, bear use of development, and presumably other consequences on bears and people. Our work adds to the body of literature finding that the greatest reductions in conflicts are associated with changes in the availability of

anthropogenic foods, thus we end by asking what barriers preclude management agencies from successfully implementing such strategies.

28. *Visitor Management of Commercially-Guided Polar Bear Viewing: A Collaborative Strategy for the Arctic National Wildlife Refuge*

Robert Dvorak, Central Michigan University

Jeffrey Hallo, Clemson University

Jessica Fefer, Clemson University

Jennifer Reed, Arctic National Wildlife Refuge

Abstract

The Arctic National Wildlife Refuge contains and showcases some of the nation's most pristine and important natural resources. One such resource is the polar bear (*Ursus maritimus*). Given the significance of the polar bear as a threatened species and iconic symbol of the Arctic ecosystem, it is not surprising that there is a demand to see and experience these unique creatures. Over the past several years, commercially-guided, water-based polar bear viewing has rapidly increased at the Refuge as it offers one of the most consistent and reliable ecotourism opportunities in the world. Viewing occurs in the context of the Inupiat village of Kaktovik, AK, where Alaska Natives continue rich cultural traditions and subsistence hunting practices. However, viewing also occurs in a multi-jurisdictional context where numerous stakeholders are asked to cooperate and negotiate in achieving very diverse goals. The purpose of this presentation is to describe how a collaborative strategy has been developed in the Arctic National Wildlife Refuge to manage polar bear viewing. It will examine the various partners and stakeholders vested in the management of polar bear viewing. It also investigates the establishment of a multidisciplinary team tasked to determine the best management practices and strategies needed to operate a successful and sustainable polar bear viewing program. Finally, it will address both the competing and shared values amongst federal agencies, commercial guides, local communities, and tribal governments that must be negotiated to operate a polar bear viewing program that is safe for the bears, community, and visitors.

29. The 'Endangered' Polar Bear Viewing at the Arctic National Wildlife Refuge: Inputs to Science-Based Visitor Management and Experiential Capacities

Jeffrey Hallo, Clemson University

Robert Dvorak, Central Michigan University

Jessica Fefer, Clemson University

Jennifer Reed, Arctic National Wildlife Refuge

Lauren Miller, Clemson University

Abstract

The waters in the Arctic National Wildlife Refuge near the Inupiat Eskimo village of Kaktovik, AK are the premier (and only) place in the U.S. to reliably view polar bears. Given the significance and notoriety of the polar bear, it is not surprising that there is a demand to see and experience this unique creature in the wild. The listing of the polar bear in the U.S. as a threatened species and the well-publicized influence of climate change on it seem to be markedly increasing demand by the public to view the polar bear. The popularity of polar bear viewing is reassuring because it suggests growing public interest in the species' conservation, but it also presents substantial management challenges. Too many visitors may cause unacceptable impacts to fragile arctic resources, change the rich Inupiat culture of Kaktovik, and degrade the quality of the polar bear viewing experience itself and its potential conservation outcomes. While the polar bear is strictly protected and managed, the opportunity to enjoy and learn from the experience of seeing polar bears in the Arctic Refuge is endangered by an absence of a formal visitor use management plan, including limits on the number, types, and activities of polar bear viewers or their commercial guides. The authors present and discuss the process and outcomes of social science efforts to help provide science-based information to inform such a plan, which is now being formulated. Results from visitor surveys employing normative methods and photo simulations are used to suggest experiential thresholds for 1) proximity to a polar bear and 2) number of boats gathered around a polar bear. Survey results are shared that help understand visitors and their attitudes towards a range of management alternatives being considered for implementation. Lastly, results from a social media assessment of broader public sentiment towards polar bears at the Arctic Refuge are presented. As a whole, these social science data provide a strong, defensible empirical basis to aid planning and management actions intended to ensure that opportunities to view polar bears at the Arctic Refuge are as well protected as the animals themselves.

30. *Black Bear Management at Big Bend National Park: A 25 Year Perspective*

Raymond Skiles, Big Bend National Park

Price Rumbelow, Big Bend National Park

Abstract

By 1944, when Big Bend National Park (BIBE) was founded, black bear (*Ursus americanus*) were nearly extirpated in the state of Texas. However, black bears persisted in the mountains of adjacent Northern Mexico and observations in the park continued sporadically. In 1988, females with cubs were observed and black bears began a successful recolonization of the Chisos Mountains. Between 1988 and 1993 black bear encounters increased to a threshold that required a major response program. Park managers designed a strategy to ensure success of the population and minimize bear-human conflict. The program included education, compatible facilities, regulations/enforcement, management ability, and research. This resource protection strategy was initially expensive and time consuming but has resulted in removal of only a single black bear from BIBE in the past 25 years. As black bears expand to reoccupy their historic range, Big Bend can provide a model for successful reintegration.

31. *Wildlife Connectivity in the Pigeon River Gorge: A Proactive Approach to Mitigating Wildlife-Vehicle Collisions*

Jeff Hunter, National Parks Conservation Association

Abstract

In February 2017, NPCA convened a gathering of stakeholders including federal land management agencies, state wildlife agencies, representatives from a number of NGOs and the Eastern Band of Cherokee Indians. The group discussed issues related to wildlife-vehicle collisions (WVCs) surrounding Great Smoky Mountains NP. With a black bear population growing at an estimated 6% annually, and a growing herd of elk expanding beyond the borders of the park, this collaborative group is looking at a number of issues including mortality data, and how wildlife is interacting with Interstate 40. The group is customizing the ArcGIS Survey123 App and is camera trapping in the corridor. In addition, a number of agencies have fitted elk, bear and hogs with GPS collars to look at their movements across the landscape. Hunter will discuss the group's efforts to improve functionality of existing wildlife passage structures and explore the potential for new wildlife overpasses in this heavily trafficked interstate corridor.

32. Massanutten Village: An Imperfect Success Story

David M. Kocka, Virginia Department of Game and Inland Fisheries

Glenn Mitchell, Virginia Department of Game and Inland Fisheries

Abstract

Massanutten Village is a four-season resort located at the southern-most tip of Massanutten Mountain, in Virginia's Shenandoah Valley. Approximately 6,000 acres have been developed into three ownerships; Massanutten Resort with over 2,000 condominiums and various recreational pursuits; Mountainside Villas with 175 condominiums; and Massanutten Property Owners Association with approximately 2,300 private homes. Annual visitation to the area exceeded 16 million persons in 2016, which was an increase of 18% over the previous year. An abundant bear population exists in this county which produces between 5-10% of Virginia's statewide bear harvest annually. Prior to 2009 black bear issues were a significant drain on DGIF resources. Massanutten Resort maintains 200 dumpsters and provides trash service for the entire village. In 2010, dumpsters in areas visited by bears were replaced with bear resistant models fabricated locally. "Success" was reflected in a reduction of bear related calls by Massanutten Resort and Mountainside Villas. Despite some improvements, the property owner association has been reluctant to require homeowners to take similar steps to manage potential bear food sources. Examples of successes and failures will be shared.

33. Sharing the Range

Andrea Morehouse, Waterton Biosphere Reserve

Abstract

Southwestern Alberta is where the mountains meet the prairies. Strong winds shape the landscape, and the Rocky Mountains transition rapidly to agricultural lands. The area is part of the Crown of the Continent, home to the Waterton Biosphere Reserve, and arguably one of the most beautiful places in Alberta. Unlike other regions of the province, however, there is little public land in this area and the home ranges of large carnivores including grizzly bears (*Ursus Arctos*), black bears (*Ursus americanus*), wolves (*Canis lupus*), and cougars (*Puma concolor*) overlap substantially with agricultural land uses. This high degree of overlap means that there is the propensity for conflict. *Sharing the Range* is a short film about the challenges that can arise when people and large carnivores share the landscape. In the film, we attempt to tell a small part of the story about people and large carnivores in the Waterton Biosphere Reserve, and detail some of the work that is



currently underway through our Carnivores and Communities Program. Waterton Biosphere Reserve's Carnivores and Communities Program works with landowners and producers to help mitigate large carnivore-agricultural conflicts. Some of our initiatives include electric fencing projects, grain bin retrofits, a deadstock removal program, and bear safety workshops. Through the efforts of many dedicated farmers, ranchers, biologists, and land managers, we are working to find ways to maintain both sustainable populations of carnivores and economically viable rural communities. The film, *Sharing the Range*, is a small piece of that story. For further information on the film, please visit: www.sharingtherange.com . For further information on Waterton Biosphere's Carnivores and Communities Program, please visit: <http://www.watertonbiosphere.com/projects/carnivores-communities/>

34. Changing Bear Feeding Prohibitions in Florida: Education through Notification

Sarah Peltier, Florida Fish and Wildlife Conservation Commission

Abstract

Access to human-provided foods like unsecured garbage, pet food, and bird seed is the primary cause of human-bear conflicts in Florida. The Florida Fish and Wildlife Conservation Commission (FWC) has been addressing this issue in a number of ways, including changes to rules related to feeding wildlife and their associated penalties. In July 2015, a species-specific feeding prohibition for black bears was added to the Florida Administrative Code (FAC) 68A-4.001, as well as a new subsection that differentiates intentional and unintentional feeding of black bears to make the rule more effective and enforceable. In addition to rule language changes, the 2015 Florida Legislature approved the creation of a tiered penalty structure that goes from a civil penalty and fine to a criminal penalty, fine, and potential jail time, for violations of all of the FWC's wildlife feeding rules, with the exception of marine fish. The FWC compared law enforcement activities related to the feeding rule before changes went into effect and after. Between 2007 and 2014, the FWC issued an average of 17 warnings and 5 citations per year related to the bear feeding rule. Between July 2015 and June 2017, the FWC issued 250 notices of non-compliance (i.e., unofficial warnings) related to the new bear rule (116 in fiscal year 15-16 and 134 in fiscal year 16-17). The FWC feels that the new rule has allowed for increased enforceability of the feeding prohibitions. Because the notice of non-compliance is not an official law enforcement action, residents who receive the notices seem to be taking actions to remedy the situation without having to receive an official penalty such as a warning or citation.

35. Human Conflict – Lessons from the Field

Erin Edge, Defenders of Wildlife

Russ Talmo, Defenders of Wildlife

Abstract

For over 20 years Defenders of Wildlife staff has worked directly with residents, livestock producers and state, federal and tribal agencies on the ground helping to prevent and mitigate bear-human conflict, investing over \$600,000 on such projects. Our discussion will feature two programs that use different approaches at mitigating human-bear conflicts, with the potential for replication elsewhere or on a broader level. Missoula Bears is an outreach tool designed to improve communication between agencies and the public while Defenders of Wildlife's Electric Fence Incentive program, is a practical approach at making bear-resistant electric fencing an affordable and flexible solution to preventing conflicts. **Missoula Bears** – Missoula Bears is an informational resource for residents living with wildlife in the valleys around Missoula including the Bitterroot, Blackfoot, upper Clark Fork, lower Clark Fork and Mission valleys. This website is a result of years of working to minimize human-bear conflicts, beginning with Missoula residents in one neighborhood in 2004. In 2009 we expanded our efforts to include all of Missoula County and now, due to increased interest and an expanding Northern Continental Divide (NCDE) grizzly bear population, we are covering the five valleys around Missoula. The goal for Missoula Bears is to help minimize conflicts with wildlife, particularly bears and mountain lions while also: improving communication between residents and wildlife management agencies; increasing human safety; minimizing bear mortalities; improving sanitation in our neighborhoods and reducing the amount of time Montana Fish, Wildlife and Parks (MTFWP) spends addressing bear conflicts each year, allowing MTFWP to use their time more effectively in other areas of concern. On the website, residents can report bear and mountain sightings as well as potential bear attractants. This has allowed MTFWP to respond efficiently to reports and minimize rumors. In addition, Missoula Animal Control can respond to reports of garbage left out and accessible by bears and issue tickets for violations of city code. The website also provides general outreach and resource information. In response to public demand we have included a Facebook page which quickly became popular. Social media has created challenges but has also increased the speed at which we can reach people and the demographic of residents that are engaged. **Electric Fencing Incentive Program** - A primary cause of human-related grizzly bear mortality is anthropogenic attractants. Conflicts not only result in bear mortality but can also reduce human tolerance for species' presence. Defenders initiated the Electric Fencing Incentive Program in 2010, in response to rapidly increasing conflicts between bears and backyard chickens. The Program provides financial and technical assistance to help landowners secure

anthropogenic attractants such as small livestock, apiaries, gardens and other bear attractants on private lands. Defenders works directly with individuals, landowners, non-profit organizations, small businesses and government agencies on a wide variety of electric fence projects, primarily on private lands. The Program provides the financial support, technical expertise and guidance necessary to build electric fence systems that effectively deter grizzly bears and other carnivores from accessing anthropogenic attractants. This program is designed to be proactive in preventing conflicts, though priority is given to landowners with past bear conflicts. We are seeing a direct reduction in human-bear conflicts and other wildlife conflicts at these sites where fences are completed and maintained. Prior to the program, Defenders tried various iterations of outright purchasing and installation of electric fences but found that a “cost-share” approach is far more effective for long term success of electric fencing projects. Initially, this program reimbursed landowners \$100 towards an electric fence around an identified grizzly bear attractant. In 2012, we improved the program to reimburse residents within priority counties in Montana, Idaho, Wyoming and eastern Washington, 50 percent of the cost of electric fencing around any grizzly bear attractant, up to a maximum incentive of \$500 per landowner, while providing direction on design and materials aspects. The Program has completed more than 292 fencing projects to date and the popularity and familiarity of the program continues to grow each year.

36. Incentives for Local Governments to Become BearWise

David Telesco, Florida Fish and Wildlife Conservation Commission

Abstract

Unsecured trash is the primary reason that bears linger in neighborhoods and come into conflict with people in Florida. In 2017, the Florida Fish and Wildlife Conservation Commission (FWC) received a total of \$825,000 to share the cost of bear-resistant equipment with local governments. At least 60% of the funding was required by the state legislature to go to local governments who implemented BearWise ordinances that required trash be kept secure from bears. A panel of FWC staff evaluated the 19 grant applications, and awarded funding to 11 counties, 3 cities, and 2 homeowner’s associations (HOAs), who in turn provided a total of \$429,000 in matching funds and in-kind services, resulting in an overall 34% match to grant funds. The projects ultimately resulted in 5,200 bear-resistant trashcans, 3,800 sets of hardware that can be added to regular trashcans to make them bear-resistant, and 3 bear-resistant dumpsters. In addition to providing over 9,000 residents with bear-resistant equipment, the funding also provided incentives to local governments to pass ordinances requiring trash be kept secure from bears. After the funding was announced, three counties (Lake, Orange, and Santa Rosa),

one city (Fort Walton Beach), and several HOAs passed ordinances requiring trash be kept secure, which will result in community-wide reductions in human-bear conflicts. The funding also precipitated needed technological advances from bear-resistant trashcan manufacturers. Several counties in high human-bear conflict areas have fully-automated waste collection systems, and so had concerns about using traditional bear-resistant trashcans that need a person to unlock them before servicing. Before announcing the funding, only one company (Northland Products) offered bear-resistant trashcans that were compatible with fully-automated waste service systems. After the announcement, the FWC worked with two additional companies (Rehrig Pacific and Toter), and now all three companies are offering this advanced technology. In addition to meeting the needs of more advanced waste collection systems, the increase in the number of companies offering this product helps bring down the cost of these cans, and therefore increases their use, among residents and businesses. Between 2007 and 2017, the FWC will have provided a total of over \$1 million in incentive funds to local governments, private businesses, and Florida residents to assist them in securing garbage and other attractants to reduce human-bear conflicts.

37. Partnering with the Air Force to Reduce Human-Bear Conflicts

Kaitlin Goode, Florida Fish and Wildlife Conservation Commission

Abstract

In 2009, Tyndall Air Force Base (TAFB) in Bay County, Florida requested a permit that would allow their Natural Resource staff to manage human-bear conflicts on the installation, including trapping, relocation and euthanasia. The Florida Fish and Wildlife Conservation Commission (FWC) approved the permit, which is the only one of its kind in the State. This permit reduced the workload for local FWC wildlife management area staff and empowered TAFB to address and prevent conflicts. Subsequently, TAFB outfitted most housing with bear-resistant trash cans. However, in 2013 housing was privatized on the installation and Balfour Beatty Communities was awarded the housing contract for TAFB. As bear-resistant trash cans were damaged, Balfour Beatty replaced them with regular trash cans. A combination of a growing bear population, an increase in unsecured garbage and the abundance of oak trees in housing areas lead to a gradual increase in human-bear conflicts. In spring 2017, several high-profile human-bear conflict incidents occurred in just a few months, leading the Base Commander to ask for State assistance. FWC staff met with TAFB Natural Resource staff, Wing Command staff and Balfour Beatty Communities staff over several months to identify problem areas, specific bears that presented a public safety risk, opportunities for outreach and education, and enforcement of Florida's rule that prohibits feeding bears. All parties agreed to

allow FWC Division of Law Enforcement to begin to enforce the FWC's feeding rule on the installation. In addition, all human-bear conflict calls were routed to the FWC Regional Office to allow the agency to track bear activity and ensure appropriate levels of response to human-bear conflicts. FWC and TAFB Natural Resource staff canvassed all 800 residences on the installation to educate people on bear behavior, Florida's bear feeding rule, and asked residents to call the FWC's Regional Office to report human-bear conflicts. Intense trapping efforts were initiated to decrease the risk to public safety posed by several habituated and food-conditioned bears. Over a 30-day period, 10 bears (8 adults, 2 cubs) were removed from housing areas. All adult bears were euthanized, and cubs were placed in a rehabilitation facility to be released in late Fall 2017. Since enforcement efforts began, FWC has issued 8 letters of non-compliance with the feeding rule, a required first step in the process of citing residents who are unintentionally feeding bears, e.g., not securing their garbage. In August 2017, Balfour Beatty Communities announced they would exchange all regular trash cans in housing areas for bear-resistant trash cans that are compatible with fully-automated waste service systems. By working closely with TAFB administration, Balfour Beatty Communities, and people who live and work on the installation, the FWC has built a model for cooperative relationships resulting in a reduction in human-bear conflicts and increased public safety.

38. Collaborative Conservation: Coping with Increasing Polar Bear Use of Alaska's Coastline

Susanne Miller, U.S. Fish and Wildlife Service, Marine Mammals Management
Jennifer Reed, U.S. Fish and Wildlife Service, Arctic National Wildlife Refuge
Todd Atwood, U.S. Geological Survey, Alaska Science Center

Abstract

As sea ice diminishes, polar bears are increasing their use of terrestrial habitat along the northern coast of Alaska during summer and fall months, raising concerns for public safety in rural villages and industrial work areas, as well as for the welfare of polar bears. Recent studies indicate that the proportion of polar bears using the Beaufort Sea coast has increased, and that trends of earlier arrival, increased length of stay, and later departure back to sea ice are occurring. The highest density of polar bears along the Beaufort Sea coast of Alaska occurs at Barter Island, home to the small Inupiat community of Kaktovik, whose residents rely on the annual fall harvest of bowhead whales for food sustenance. The un-salvaged remains from this harvest are deposited in a "bone pile" that attracts a large aggregation of polar bears annually. Over the last decade, the predictable presence of polar bears around Kaktovik has also led to an increase in polar bear tourism and commercial filming.

This increase of both polar bears and humans along the coast, particularly around Kaktovik, presents unique management challenges and a collaborative approach during a time of rapidly changing environmental conditions. This presentation provides an overview of actions being taken by federal managers and researchers to cope with the increased presence of bears along Alaska's Beaufort Sea coast, as well as the human visitors who wish to view them. Specific actions include: 1) conducting biological monitoring and research on coastal use by polar bears; 2) improving emergency response capabilities involving oiled, injured or sick polar bears; 3) implementing deterrence programs in villages and industrial areas; 4) managing polar bear viewing, tourism, and commercial filming around Kaktovik; 5) managing food attractants around Kaktovik; and 6) developing outreach and education materials.

39. Private Contractors Extend Agency Reach in Resolving Human-Bear Conflicts

Alyssa Simmons, Florida Fish and Wildlife Conservation Commission

Abstract

The Florida Fish and Wildlife Conservation Commission (FWC) is responsible for managing human-bear conflicts in Florida. The number of human-bear conflicts has increased dramatically over the last few decades. In 2002, the FWC created the Bear Response Contractor Program (BRCP), which is composed of private individuals located in areas with high levels of human-bear conflicts who are trained by the FWC on how to assist agency staff with certain tasks associated with human-bear conflicts. The BRCP started as a pilot project with a few individuals in the FWC's Northeast Region. The FWC trained individuals how to collect data from and properly dispose of bear carcasses, set and monitor trailer-mounted bear traps, and provide residents and businesses with technical assistance on how to avoid conflicts with bears. Individuals in the BRCP are paid a flat fee per task and are only contacted on an 'as needed' basis. Between fiscal years 2011-2012 and 2016-2017, the BRCP responded 242% more requests for assistance from the public. The FWC has expanded the BRCP to include 24 individuals statewide covering all five of the FWC's regions. The BRCP tasks have also been expanded to include canvassing entire neighborhoods to pass out literature and meet with multiple residents, scaring bears with paintball guns, performing outreach at festivals, schools, and civic group meetings, transporting equipment and/or bears, constructing electric fencing systems as loaner equipment for residents, and repairing bear management equipment. Education and outreach-oriented tasks of the BRCP are used most often (60%), followed by more 'hands-on' bear-related activities like capture assists and carcass retrievals. The BRCP is almost entirely responsible for documenting the over 200 bears that are killed by vehicles annually, which accounts for over 80% of the

known cause of death for bears in Florida. The BRCP has allowed the FWC to not only keep up with the increasing demand for assistance with human-bear conflicts, but also to maintain support for bear conservation efforts by providing the public with a face-to-face response in situations where technical assistance over the phone is not enough. The BRCP has decreased the response time and increased the efficiency of human-bear conflict resolution in Florida.

40. Building Partnerships to Reduce Grizzly Bear Conflict in the Bow Valley, Alberta, Canada

Jay Honeyman, Alberta Environment and Parks

Abstract

The Bow Valley of Alberta has been described as one of the busiest landscapes in North America that continues to share that landscape with grizzly bears. The Bow Valley incorporates multiple jurisdictions and stakeholders including Canadas first National Park - Banff National Park, Kananaskis Country - a 4,000 km² provincial multiuse recreation area, the Town of Canmore (population 17,000) and multiple Hamlets. The valley also borders the Stoney First Nation Indian Reserve. The valley is bisected by the 4 lane Trans-Canada Highway and an east / west continental twin track rail line. There have been multiple examples of how the various stakeholders in this busy, multi-jurisdictional landscape have worked to live with wildlife over the last 20 years. These include: Garbage-the region is recognized as a world leader in bear proof waste management systems; Aversive Conditioning-the longest running Aversive Conditioning Program for grizzly bears in North America; Crossing Structures-the Region has become the model for highway crossing structure mitigation around the world; Wildlife Corridors: the first formal wildlife corridor guidelines in North America that are now a legal requirement in the local development approval process; Bow Valley WildSmart: Long Running , nationally recognized Wildlife Education Program. This story has been told through the creation of the film 'Living with Wildlife' <https://vimeo.com/214597705> . The film was recently selected to be shown at the 2017 International Banff Mountain Film Festival.



5TH INTERNATIONAL
HUMAN-BEAR CONFLICTS
WORKSHOP

March 26-28, 2018 | Gatlinburg, Tennessee

Organizing Committee

Rich Beausoleil	Washington Department of Fish and Wildlife	Wenatchee, WA
Dana Dodd	Appalachian Bear Rescue	Townsend, TN
Dan Gibbs	Tennessee Wildlife Resources Agency	Morristown, TN
Jay Honeyman	Alberta Environment and Parks	Canmore, Alberta
David Kocka	Virginia Department of Game and Inland Fisheries	Verona, VA
Linda Masterson	Author-Living with Bears Handbook	Englewood, FL
Colleen Matt	C.A. Matt	Missoula, MT
Craig Perham	Bureau of Ocean Energy Management	Anchorage AK
Chris Servheen	University of Montana	Missoula, MT
Kate Smith	U.S.F.W.S - University of Montana	Missoula, MT
Patti Sowka	Sowka Enterprises	Arlee, MT
Bill Stiver	Great Smoky Mountains National Park	Gatlinburg, TN
Frank van Manen	U.S.G.S - Interagency Grizzly Bear Study Team	Bozeman, MT
Jim Wilder	U.S. Fish and Wildlife Service, Polar Bear Team	Anchorage, AK

Local Planning Committee

Matt Cameron	Tennessee Wildlife Resources Agency
Joe Clark	U.S.G.S. - University of Tennessee
Sterling Daniels	Tennessee Wildlife Resources Agency
Dana Dodd	Appalachian Bear Rescue
Dan Gibbs	Tennessee Wildlife Resources Agency
Jason Harmon	Tennessee Wildlife Resources Agency
Becky Hensley	Tennessee Wildlife Resources Agency
Lisa Muller	University of Tennessee
Lisa Philippen	Appalachian Bear Rescue
Bill Stiver	Great Smoky Mountains National Park