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BEFORE THE U.S. SENATE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

Technologies for Reducing Human/Wildlife Conflicts

Good afternoon Chairman Barrasso, Ranking Member Carper and members of the Committee. I am Brad Hovinga, Jackson Regional Wildlife Supervisor for the Wyoming Game and Fish Department (WGFD). I appreciate the opportunity to be here today to provide my perspectives on technologies and practices for reducing human/wildlife conflicts. My testimony is based on 27+ years as a game warden and Regional Wildlife Supervisor dealing with human/wildlife conflicts in Wyoming. I have considerable field experience investigating human/wildlife conflicts involving large carnivores (grizzly bears, black bears, mountain lions and wolves) and large ungulates, particularly moose.

Wyoming is home to a tremendous wildlife resource that is valued by a constituency that is passionate about their wildlife. The state's wildlife habitats continue to provide remote and wide-open spaces for western iconic species like grizzly bears, wolves, moose and elk. The management of all wildlife species in Wyoming requires striking a delicate balance between the components of the state's economy that includes agriculture, tourism, hunting and mineral extraction. At the same time, we share management responsibility of these wildlife populations that know no boundaries with our surrounding states, as well as Yellowstone and Grand Teton National Parks. Consequently, we must all work together to manage, through communication and information sharing, these species and be the best stewards of the wildlife resource in the long run. This particularly holds true in the management of human/wildlife conflicts. State and federal agencies must communicate and collaborate in order for managers to ensure the most effective techniques and technologies are implemented to reduce conflicts between people and wildlife. In Wyoming, as populations of large carnivores such as grizzly bears continue to expand into human dominated landscapes, conflicts between humans and bears will likely increase.

Today I intend to highlight some important innovations and technologies currently employed by western wildlife management agencies to reduce human/wildlife conflicts, as well as present some ideas that have potential for the future. I am hopeful Committee Members will come to understand the value of commitment to research and collaboration with regard to new and

innovative technologies that aid in reducing human/wildlife conflicts. I offer my testimony from the perspective of a Wyoming wildlife manager that works closely with local game wardens and wildlife biologists, as well as other state and federal agencies, and a vast array of publics. While I tend to convey my experiences based on my work in the state of Wyoming, I will also offer thoughts based on my collaboration with and knowledge of other wildlife management agencies.

## **Background**

In Wyoming, when discussing human wildlife conflicts, the discussion typically revolves around grizzly bears. Although Wyoming has a host of other large carnivores, conflicts between humans and black bears, mountain lions and wolves are significantly lower than with grizzly bears. Throughout my testimony I will tend focus on grizzly bears, however techniques and technologies for reducing human/grizzly bear conflicts generally apply to other large carnivores and ungulates.

### Distribution and Abundance of Grizzly Bears

From 1990 through 2018, the area of occupied Greater Yellowstone Ecosystem (GYE) grizzly bear range has increased steadily at a rate of 4% per year from just over 23,000 km<sup>2</sup> to over 68,000 km<sup>2</sup>. Grizzly bear occupied range now includes 97.5% of the Demographic Monitoring Area (DMA), and has expanded 20–30 km beyond the DMA boundary to the east and west and by nearly 60 km to the south. By 2018, nearly 30% of GYE grizzly bear range was outside the DMA boundary.

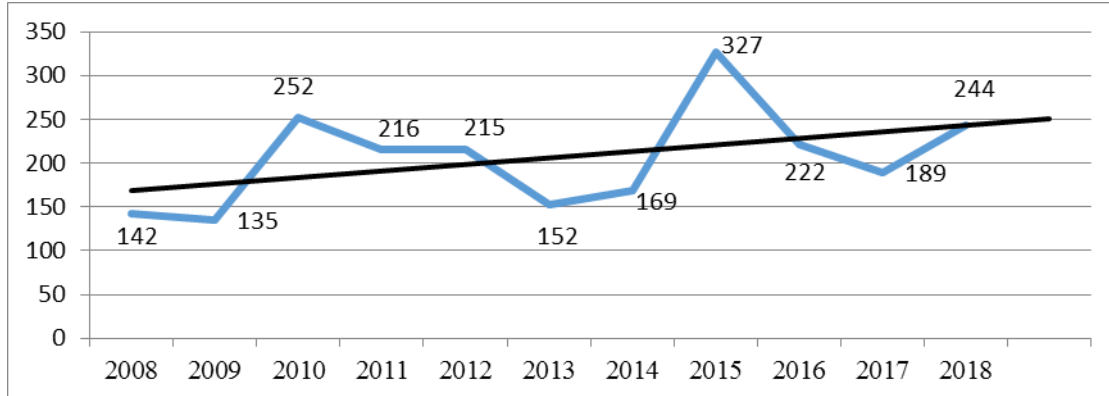
In 1990, just over 600 km<sup>2</sup> of private lands were encompassed within GYE grizzly bear occupied range, an area just half the size of Grand Teton National Park. By 2018, nearly 12,000 km<sup>2</sup> of private lands occurred within occupied range, an area larger than Yellowstone and Grand Teton National Parks combined. As grizzly bears advance into more human-dominated areas, they are also encountering an ever-larger human presence. The human population in the GYE has doubled since 1970 and is projected to double again by 2050 (Hansen and Phillips 2018). Visitation to Yellowstone National Park topped 4 million visitors each year since 2015. A consequence of this increased human population and range-wide grizzly bear expansion is the increased potential for human-bear conflicts, which has been shown to increase with increasing road density and human development (Schwartz et al. 2010).

### Conflict Types and History

Human-bear interactions and conflicts in Wyoming are typically a result of bears seeking unnatural foods in association with people and property, close encounters with humans, property damage or when bears depredate livestock. The number and location of human-bear conflicts is influenced by unsecured unnatural attractants (e.g., human foods, garbage), natural food

distribution and abundance, bear density and distribution, and human and livestock use patterns on the landscape. The preferred resolution to minimize human-bear conflicts in Wyoming is through preventative measures or to secure the bear attractant. In addition, the WGFD manages grizzly bears in accordance with state and federal law, regulation, and policy. Capturing bears in areas where they may come into conflict with people and relocating them to remote locations is a common practice throughout the world. Relocating bears achieves several social and conservation functions: 1) reduces the possibility of property damage, livestock damage, or human interactions in areas where the potential for conflict is high; 2) reduces the potential for bears to become food conditioned or human habituated, which often results in destructive and dangerous behaviors; 3) allows bears the opportunity to forage on natural foods and remain wary of people; and 4) may prevent removing bears from the population, which may be beneficial in meeting population management objectives. The practice of relocation has served as an integral conservation tool to provide for recovery for GYE grizzly bears for multiple decades. Removal refers to lethal or live removal (e.g., placement with a zoo or other captive bear facility) from the population.

As a result of numerous and diligent education and conflict prevention efforts, the general pattern of conflicts is relatively steady to increasing within suitable grizzly bear habitat. However, as occupied grizzly bear range has expanded, conflicts continue to occur in areas further from the Primary Conservation Area and outside the DMA, often on private lands. Bears are increasingly coming into conflict with people in areas where grizzly bears have not been present in recent history. Although the joint efforts of the WGFD, U.S. Forest Service, non-governmental organizations, and particularly the public have resulted in reducing conflicts through education and attractant storage in many areas, the number of grizzly bear conflicts in Wyoming was high in 2018. Grizzly bears frequent lower elevations and developed areas regularly during the non-denning period. Grizzly bear-cattle depredation was the most frequent type of conflict documented in 2018. The annual variation in livestock depredation incidents is not easily explained. Although most human-grizzly bear conflicts are correlated with natural food abundance, the number of cattle and sheep killed annually do not follow the same pattern. As grizzly bears expand further into human-dominated landscapes outside the DMA, the potential for conflict between grizzly bears and humans increases, resulting in negative outcomes for both grizzly bears and people. The WGFD continues to explore and enable multiple options to reduce grizzly bear-livestock conflicts.



*Fig. 1. Number of human-grizzly bear conflicts in Wyoming portion of the Greater Yellowstone Ecosystem, 2008-2018.*

In recent years, the majority of conflicts in Wyoming occurred on public lands outside of the Primary Conservation Area. The increasing distribution of grizzly bears is reflected in the annual documentation of conflicts further from this area and continued expansion outside the DMA. As bears expand and occupy habitats commonly used by humans, there is a greater potential for conflicts to occur. Education and conflict-prevention efforts are used anywhere bears and people coexist, and management actions will be a function of human values and effects on the grizzly bear population in those areas.

Long-term trends in the number of conflicts is likely a result of grizzly bears increasing in numbers and distribution and expanding into areas used by humans, including livestock production, on public and private lands. As the GYE grizzly bear population continues to grow and expand into less suitable habitat, bears are more likely to encounter food sources such as garbage, pet food, livestock and livestock feed, and myriad other attractants, resulting in increased property damage and threats to human safety. Conflict prevention measures such as attractant storage, deterrence, and education are the highest priority for the WGFD. In general, there is an inverse relationship between social tolerance and biological suitability for bear occupancy in areas further from the Primary Conservation Area due to development, land use patterns, and various forms of recreation. Although prevention is the preferred option to reduce conflicts, each situation is managed on a case-by-case basis with education, securing of attractants, relocation or removal of individual grizzly bears, or a combination of methods are used for both short and long-term conflict resolution.

Throughout Wyoming and the GYE we have documented an increase in the number and distribution of conflicts as well as a shift in the primary types of conflicts (see associated figures and tables below). Through collaborative efforts instances related to securing of attractants, conflicts such as property damage have decreased, whereas as grizzly bears have expanded outside of the recovery zone and other suitable habitats within the DMA we have documented increases in livestock depredation and other site-specific conflicts. In more recent years we have

documented multiple instances of human injuries and some examples of human fatalities. When looking at where conflicts occur spatially, we note that approximately 1/3 of all verified grizzly bear conflicts in Wyoming are occurring outside of the DMA in less suitable habitats where we do not manage for grizzly bears (see figure 2).

<u>Conflict Type (5 yr. average)</u>	<u>2009-2013</u>	<u>2014-2018</u>
Property Damage	25	14
Livestock Conflict	97	143
Garbage	23	29
Self Defense/Other GB Deaths	6	6
Human Injury/Death	3	4

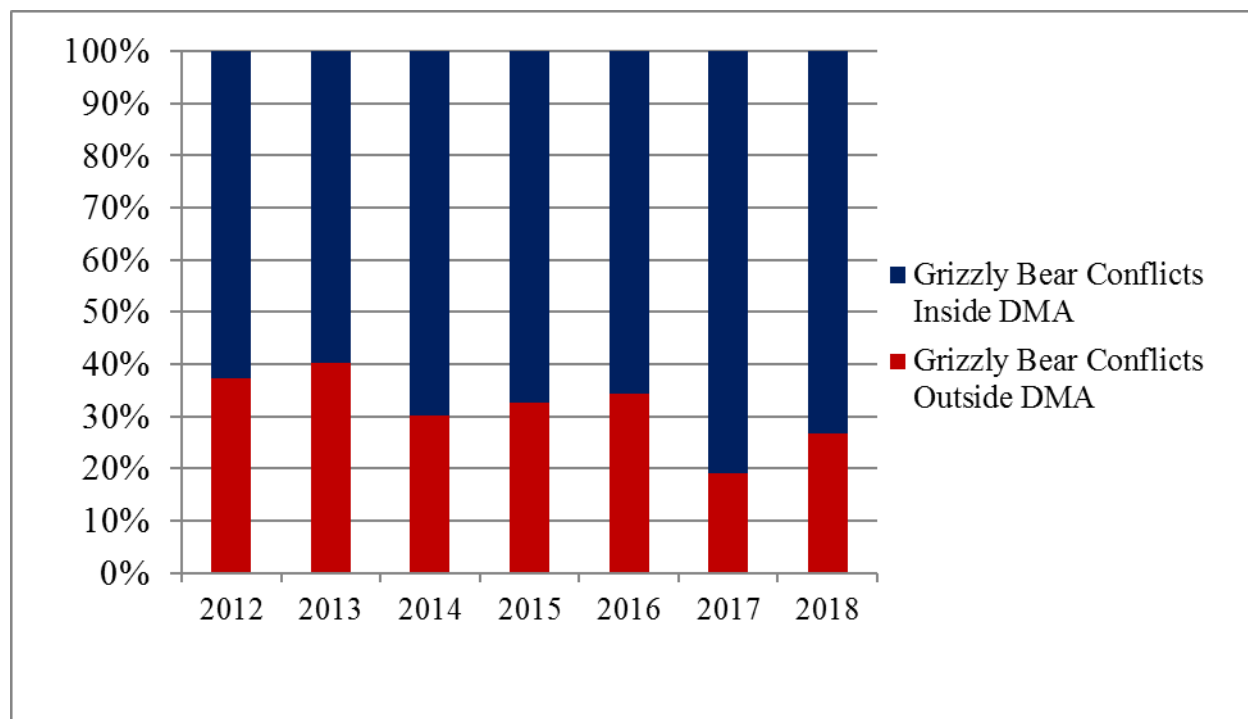


Figure 2. Comparison of verified grizzly bear conflicts in Wyoming inside and outside suitable habitats within the Demographic Monitoring Area.

## **Human/wildlife Conflict Technology and Practices**

### WHART/PAT team

WGFD has trained professionals throughout the state that function as a Predator Attack Team (PAT). These individuals annually conduct and attend training to efficiently and expertly deal with situations involving human injury or death caused by wildlife, in this case grizzly bears. The WGFD revised their PAT guidelines in 2016 and continues to evaluate their guidelines and infrastructure to respond to human injuries and fatalities in a professional and efficacious manner. In addition to internal training, Department personnel annually attend Wildlife Human Attack Response Team (WHART) training exercises throughout North America to learn from other agencies and provide insight to how human injuries and fatalities are dealt with by the WGFD. The Large Carnivore Conflict Coordinator serves as the WGFD PAT lead and is the representative to other agencies, This position is annually is invited to provide training and symposia on our program.

### Bear Wise Program (Education and Outreach)

The Bear Wise Program is a proactive initiative that seeks to minimize human-bear (black and grizzly) conflicts, minimize management-related bear mortalities associated with preventable conflicts, and to safeguard human communities in northwest Wyoming. The overall objective of Bear Wise is to promote individual and community ownership of ever-increasing human-bear conflict issues, moving toward creating a social conscience regarding responsible attractant management and behavior in bear habitat. This project seeks to raise awareness and proactively influence local waste management infrastructures with the specific intent of preventing conflicts from recurring. Strategies used to meet the campaign's objectives are: 1) minimize accessibility of unnatural attractants to bears in developed areas; 2) employ a public outreach and education campaign to reduce knowledge gaps about bears and the causes of conflicts; and 3) employ a bear resistant waste management system and promote bear-resistant waste management infrastructure.

In 2004, a subcommittee of the Interagency Grizzly Bear Study Team (IGBST) conducted an analysis of causes and spatial distribution of grizzly bear mortalities and conflicts in the Greater Yellowstone Area (GYA) for the period of 1994–2003. The analysis identified that the majority of known, human-caused grizzly bear mortalities occurred due to agency management actions in response to conflicts (34%), self-defense killings, primarily by big game hunters (20%), and vandal killings (11%). The report made 33 recommendations to reduce human-grizzly bear conflicts and mortalities with focus on 3 actions that could be positively influenced by agency resources and personnel: 1) reduce conflicts at developed sites; 2) reduce self-defense killings; and 3) reduce vandal killings.

To address action number 1, the subcommittee recommended that a demonstration area be established to focus proactive, innovative, and enhanced management strategies where developed site conflicts and agency management actions resulting in relocation or removal of grizzly bears had historically been high. Spatial examination of conflicts identified the Wapiti area in northwest Wyoming as having one of the highest concentrations of black bear and grizzly bear conflicts in the GYA. The North Fork of the Shoshone River west of Cody was then chosen as the first area composed primarily of private land to have a multi-agency/public approach to reducing conflicts at developed sites.

In 2005, the WGFD began implementation of the Bear Wise Community Program. Although the program's efforts were focused primarily in the Wapiti area, the Department initiated a smaller scale project in Teton County to address the increasing number of black and grizzly bear conflicts in the Jackson, Wyoming area. For the last 12 years, the Bear Wise Community Programs in Northwest Wyoming have deployed a multi-faceted education and outreach campaign in an effort to minimize human-bear conflicts and promote proper attractant management. Although a wide array of challenges remains and vary between communities, many accomplishments have been made and progress is expected to continue as Bear Wise efforts gain momentum. In an effort to broaden the scope of the program, this work was rebranded as the Bear Wise Wyoming Program.

### Human Wildlife Conflict Techniques

The Department employs a wide array of techniques to reduce, prevent, and resolve conflicts. As mentioned earlier, the outreach and education serves as the proactive foundation to reduce conflict potential before a situation occurs. A great deal of effort by our personnel is devoted to working with the public to secure attractants; attractants range from garbage and livestock feed, to apple trees and bee apiaries, requiring a multi-faceted approach to how attractants are secured. We work closely with local communities to provide bear proof infrastructure for garbage as well as a great deal of electric fencing around larger attractants (i.e., chicken coops, cornfields, apiaries, fruit trees). These proactive measures have reduced instances of property damage and other conflicts, but as bears expand their distribution the footprint of action is harder to maintain.

WGFD personnel also use varying methods of non-lethal aversive conditioning with bears in an attempt to deter behavior such as habituation to residential or roadside areas. Aversive conditioning can come in the form of air horns and horn honking to that of chalk/pepper balls, bean bags, cracker shells and other similar devices. Other agencies have initiated program using conducted electrical weapons (CEW, Taser™) as an aversive condition tool with positive results in Colorado and Alaska. WGFD personnel have received training and are in the process of adding this as another conflict prevention tool. Other technological advances in the form of drones and communicable cameras (via text/email) are facilitating more expeditious reconnaissance of potential conflict situations and aiding in human safety situations for the general public and our personnel.

The WGFD, through trained personnel in the Large Carnivore Section also employ the use of standard management strategies aimed at reducing/resolving conflicts through capture and monitoring efforts. Throughout occupied grizzly bear range, the WGFD staffs personnel devoted to dealing with human/grizzly bear conflicts and using aforementioned techniques to deal with any/all forms of conflict. Despite all proactive efforts, there are situations that require management attention through attempted capture and handling of grizzly bears. Dependent on multiple factors (and after consultation with the US Fish and Wildlife Service) decisions are made as to whether the animal is released, relocated, or removed from the population through placement into a live facility or euthanasia. The WGFD is constantly evaluating all of the combined techniques as to their efficacy toward reducing conflicts and conflict potential.

### **Future Technological and Conservation Needs**

Many of the technologies used today to reduce or prevent human/wildlife conflicts have limitations or inadequacies that have the potential to be addressed to improve their effectiveness. Improving these technologies and minimizing their pitfalls helps to ensure the safety of both humans and wildlife. The technologies that I speak of now are either currently in use and in my view, have the potential to be improved, or technologies that I envision having a fundamental impact on the future of reducing human/wildlife conflicts.

#### Bear Spray – Improving effectiveness

Bear spray is often the “go to” tool in close quarters or immediate pending human-bear conflict situations and often does an excellent job deterring animals in close contact scenarios when used correctly. However, in extreme weather conditions (wind/heavy rain) the range and effectiveness can become limited and have an adverse effect on the individual deploying the bear spray. Strong crosswinds can cause spray particles drift at much shorter distances, causing an ineffective application of the pepper spray by missing the intended target or reducing the amount of spray reaching the bear. Additionally, when the user deploys bear spray into a strong headwind and the pepper spray blows back into the user, the self-contamination effect of the spray particles certainly has an adverse effect on the user. Pepper gels are becoming more popular among law enforcement and personal protection customers for use on humans and have proven more effective against the adversities of wind and self-contamination. Advances in the technology for the use of pepper gels for use on wildlife would certainly be advantageous to reduce human/wildlife conflicts.

#### Conducted Electrical Device – Taser

As mentioned earlier, conducted electrical devices are quickly becoming a valuable tool for wildlife managers as an aversive conditioning technique, as well as a temporary immobilization



tool. However, in order for effective use on larger animals, such as grizzly bears and moose, current technology is lacking options for long-range deployment. Technology allowing deployment of conducted electrical devices at ranges of 30 feet or greater would significantly increase opportunities to use conducted electrical devices to address large carnivore and ungulate conflicts.

### Unmanned Aerial Vehicles (Drones)

I have previously mentioned the advantages of UAVs, or drones, in human safety situations and the benefits of that technology. Improvements in drone technology that allows for the deployment of aversive conditioning tools would greatly improve our ability to keep people safe and change behavior in habituated and aggressive wildlife. Having the ability to deploy bear spray and conducted electrical devices from UAVs would be significantly improve success in reducing human/wildlife conflicts by allowing greater opportunity to utilize these tools at much greater distances.

### Acoustic Sound Deterrents

Long-range acoustic sound devices and sound cannons are devices that deliver very loud sounds over long distances. Law enforcement has utilized acoustic sound technology for crowd-control purposes since the early 1990s and our military has exercised various forms of acoustic sound tools for years. The potential for development of long-range acoustic deterrents for wildlife management exists and work to develop an appropriate aversive conditioning tool for addressing wildlife conflicts would be beneficial.

### Electric Fencing

Earlier in my testimony, I mentioned valuable uses for portable electrical fencing in deterring large carnivores in order to protect agricultural crops. Portable electric fencing is also a valuable tool for deterring bears and preventing conflicts in back country situations, such as protecting livestock feed and cook tents in back country camps. Developments in new technology allowing for improvements to electric fencing options that include increasing portability, lightening the weight of equipment and batteries and improving battery strength and longevity are innovations that could increase the potential of portable electric fencing as a back country human safety tool.

### Evaluation of Management

As managers, we constantly are assessing our strategies and action to ensure we continue to remain efficient and effective. In regards to managing grizzly bear conflicts this is accomplished through analysis of decades of intensive data collection and monitoring of the population and of our management strategies. As grizzly bear populations continue to expand beyond suitable

habitats we must be diligent in evaluation of strategies and adaptable in how we deal with conflicts from a management standpoint as to where we promote grizzly bear populations and our interactions with the people who live, work, and recreate in grizzly bear country. We are currently analyzing the efficacy of grizzly bear relocations as the population increases and are working to continually provide context to the public in regards to how data are portrayed, used, and misused. It is vital to portray how management action such as relocation and lethal removal are used as management strategies to reduce conflict between humans and grizzly bears that benefit both bears and people.

### Human Dimensions

Social media and instantaneous information sharing has come to the forefront in highlighting our need to understand the human dimensions of human-wildlife conflicts. Interest and conflict are inherent with wildlife and humans cohabitating on the same landscape. A better understanding of how to successfully share information and communicate with a diverse public will increase our success in managing conflicts between wildlife and humans.

### **Conclusion and Summary**

The citizens of the United States have a genuine appreciation for wildlife resources and expect wildlife managers strive to better understand and improve upon past and current technology in an effort to reduce human/wildlife conflicts. Investigating ways to minimize the pitfalls and reduce the inadequacies of current technology and techniques is a great place to focus our work. Wildlife populations continue to expand into human dominated landscapes in Wyoming and throughout the West, and human development is constantly encroaching on wildlife habitat. The opportunity for new and innovated solutions to arise that carry much greater effectiveness at reducing conflicts between humans and wildlife is paramount to the future of the coexistence between people and wildlife. These opportunities are most likely to develop through partnerships between private industries and government organizations with a reasonable and practical investment of financial resources in the initial stages of development.

Although much of what I have talked about today revolves around conflict between humans and grizzly bears, it is important to realize that developments on that front are likely to have significant application and provide solutions for conflicts between humans and other wildlife species. Technologies that are effective for grizzly bears would most certainly be an effective tool in dealing with conflicts involving moose, elk and other large carnivores.

I sincerely thank you for the opportunity to provide this testimony and share the perspectives of the Wyoming Game and Fish Department on reducing human/wildlife conflicts.