Supporting Materials
Bear Hazard Assessment for the Missoula Area

PREPARED FOR:
Missoula Board of County Commissioners,
Missoula City Council and Mayor of Missoula

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PREPARED BY:
The Missoula Bear Smart Working Group

Black bear in the Rattlesnake neighborhood on Missoula Avenue. Photo by Gwen Florio

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I. A Brief Background on Bear Biology and the Role of Humans in the Creation of "Problem" Bears[1]

Bears are smart, adaptive, omnivorous and opportunistic at finding food. It is easier to describe what bears won't eat than all the things they will eat. This section briefly summarizes the life history of bears and how humans and human-related foods can create "problem" bears.

A. Understanding Natural Bear Behavior

An understanding of bears' biological requirements and the process by which they learn specific behaviors helps in understanding the development of "problem" bears. The following sections outline how bears behave in natural settings without non-natural foods and attractants. Using this framework, we can predict how bears function and we are better able to manage conflicts with bears. Although grizzly bears *(Ursus arctos)* and black bears *(Ursus americanus)* share many similarities, they are different species that have learned to exploit different niches. These differences need to be understood and applied properly for management decisions to be effective.

B. General Bear Biology

Although classified as carnivores, grizzly and black bears are opportunistic omnivores that mainly feed on graminoids (grasses and sedges), emergent forbs (the leaves or stems of herbaceous plants), roots, berries and insects such as ants and grubs found in rotting wood. Bears usually prefer rich, fatty foods when available (fish, meat or insects). Bears will switch foods according to their digestibility, distribution and abundance. Unlike deer and elk, bears lack digestive systems that are specialized for digesting the cellulose in vegetation. Instead, they have a digestive system like humans. When they eat plant foods, these foods quickly pass through their digestive system with few nutrients being digested. Only the most digestible components, such as the sugars of most green plant-based foods, are utilized by bears. Bears obtain vegetation when it is tender and higher in sugars so it can be digested more easily. Bears will often seek low-elevation habitats in spring where they find tender, sweet, green plant shoots that are low in fiber.

Bears need to accumulate a large reserve of fat to survive for four to six months of winter hibernation when they do not eat at all. Their physiological imperative is to consume enormous amounts of food, especially in late summer and fall so they can survive the winter. They eat so much during this time that biologists label the process "hyperphagia," literally "over (hyper) eating (phagia)." Bears in the Missoula area can sometimes eat 10 or more pounds of apples at one time, consuming thousands of calories per day during the fall to build the fat reserves they need for hibernation.

C. Bear Reproduction

Delayed implantation of the embryo is a special reproductive characteristic of grizzly bears and black bears. Bears mate from mid-May to early July, but the embryo does not implant until November or December, shortly after the bear enters its den to hibernate. Successful implantation of the embryo depends on the female bear's fat reserves. The embryo will implant if she has enough fat reserves to successfully sustain herself and her offspring. If she has few fat reserves, the embryo will not implant and she will not become pregnant.

[1] Much of this material is taken from: Bear Smart Community Program: Background Report prepared for the British Columbia Ministry of Water, Land, and Air Protection in 2002 by Helen Davis, Debbie Wellwood and Lana Ciarniello.

D. Bear Home Range, Movements and Dispersal

The home range of a grizzly bear is generally larger than the home range of a black bear. Home range sizes are affected by sex, age, population density and habitat quality. In both black and grizzly bears, adult males have the largest home ranges, which usually overlap the ranges of other males and often contain part of the ranges of several adult females. Bears are not territorial and do not defend their home ranges. Adult females have more restricted and well-defined home ranges than males. Females accompanied by cubs of the year generally have the smallest home ranges. The home range of a family group increases as the cubs mature. Females usually allow partial use of their home range by their female offspring when they mature. Many females that have overlapping home ranges are related to each other as mothers, daughters, grandmothers, etc. Subadult males, on the other hand, usually disperse and establish a new home range outside that of their mother. The dispersal of subadult males, their need to find and establish their own home range in areas dominated by larger, more aggressive males and their curious nature help explain why subadult males often dominate bear complaint records. Subadults, particularly subadult males, usually try to avoid adult male bears, which can be aggressive. As a result, subadults are more likely to live and feed closer to humans when natural food is limited, or where they perceive the benefits of being close to humans to be greater than the cost of being close to humans. In general, wild females with cubs of the year will try to avoid both adult male bears and humans unless they have learned to seek out human-related foods.

Home range size depends on the distribution, abundance and quality of available food. In areas with high bear density, bears normally have smaller home ranges and a richer food base. The major determinants of habitat quality are the relative and average abundance of bear foods (quantity, productivity and distribution). In areas with poor habitat quality, bears must search more widely for food, increasing the size of their home ranges.

E. Bear Learning and the Development of Behaviors

Understanding how bears learn is critical to implementing effective strategies to reduce human-bear conflicts. Grizzly and black bear cubs learn fundamental survival skills from their mother during the one to three years they remain with her. If a mother spends her time foraging for human-related foods, her cubs will learn this behavior. Such cubs will usually grow up into bears that are highly reliant on human-related foods. In some cases, they may not be able to survive in the natural environment without access to human-related foods.

Throughout their lives, bears remain curious, continuing to learn through trial and error. Bears use their lifetime of experiences to develop and refine their behaviors. Curiosity helps bears discover the most productive and nutritious foods. Bears also learn by observing and following other bears. Because bears learn quickly, they may continue searching for any high-energy food once they have fed on it.

Bears have an excellent sense of smell and can associate smells with food types. Garbage, fruit trees and animal carcasses are all extremely pungent attractants that can draw bears from long distances.

F. How Humans Create “Problem” Bears

Missoula, like many Montana cities and towns, was built in good to excellent bear habitat. When humans move into areas inhabited by bears, they often introduce new feeding opportunities the bears quickly exploit. In addition, the homes, outbuildings and roads for the expanding human population usually decrease the natural landscape’s suitability to sustain bear populations and increase the mortality risk for bears in these areas.

Montana's rapidly expanding human population continues to encroach on the natural habitat of grizzly and black bears. Bears may die or be displaced by the loss, alteration and fragmentation of their natural habitat. Grizzly bears and black bears that are wary of humans will be displaced to generally less productive habitat. Displaced bears may then have to compete with bears already established in these areas. Displaced bears may be stressed while adapting to the new habitat. More dominant bears in these areas may injure or kill them.

Black bears appear to be able to adapt to a wider variety of habitats, making them more resilient to human-related changes. Grizzly bears do not appear to be as adaptable to human development patterns, which is the main reason for their reduced resilience to human presence.

Because Montana's communities can't be moved or closed, we must make them as bear resistant and bear friendly (accommodating movement corridors) as possible. In addition, because most human communities are expanding, this development expansion should be as bear friendly as possible. At present, most bears that live near communities are drawn into the community by human-related food attractants because these communities are not securing these attractants.

G. Natural Food Shortages

Bears in North America occasionally experience food shortages. The failure of critical natural foods, such as berries, increases competition among bears, which are forced to search for alternate foods. Bears are naturally attracted to scents that suggest food. During years of natural food scarcity, hunger may lead some bears to overcome their fear of humans to seek natural foods (such as riparian area shrub fruit) near humans or to seek accessible human-related foods like garbage. The increase in human-bear conflicts during natural food shortages has been well documented for both grizzly and black bears.

In years of low food availability, bears move more and encounter more humans and human developments. When food shortages occur across the landscape, in rare cases subadults and other vulnerable bears can starve.

H. Concentration of Food Resources

Probably the primary reason bears are attracted to human communities is the concentration of food resources found there. Garbage is attractive to bears because it contains highly concentrated sources of calorie-rich foods that are easy to acquire. The amount of nutrition from human-related foods increases reproductive success for the bears that eat these foods, but the close association with humans also increases bear mortality.

Natural bear foods vary widely in abundance, quality and distribution. Bears must move widely as they seek natural foods, increasing their chances of finding human-related foods during their travels. Human-related foods are usually not seasonal except for tree fruits like apples. When bears find human-related foods, they do not have to keep searching for natural foods and some bears then become "hooked" on these easy-to-obtain, calorie-rich, human-related foods.

I. Habituation of Bears to Humans and Food Conditioning

Human-habituated bears tolerate human presence and are less likely to flee when they encounter humans. Bear habituation to humans (without food conditioning) is best illustrated at McNeil River Falls in Alaska. At this site, grizzly bears have become habituated to people who come to watch the bears feed

on salmon. Human activities at McNeil River are strictly monitored to ensure bears do not have any access to human-related foods or garbage.

Food conditioning and human habituation are separate behaviors. A food reward is not necessary for a bear to become habituated to humans. A habituated bear has reduced avoidance behaviors around humans. A food-conditioned bear is one that has received a food reward by eating human-related foods. A bear can be habituated without being food conditioned. Similarly, a bear can be food conditioned but not habituated to humans. Such a bear is wary around humans and may attempt to secure human-related foods only during darkness when humans are not around. A bear can also be both habituated and food conditioned. Such a bear will seek human-related foods in daylight, often in close association with humans.

J. Effects of Human-Related Foods on Bears

The availability of human-related foods within a residential community can have several profound effects on bears. Each of these effects increases the likelihood of human-bear conflicts. The availability of human-related foods may accelerate a female bear's natural reproductive cycle. Bears in good body condition from eating human-related foods may reproduce earlier, have larger litters, and have a shorter interval between litters. Food-conditioned bears will bring their cubs into towns and teach their cubs to how to seek and consume human-related foods, continuing the cycle of food conditioning. Mortality rates for bears that feed on human-related foods are higher than those of wild bears, as they are more likely to be involved in management actions, poached or struck be vehicles Bears that feed on garbage often suffer cuts from broken glass and can lids, broken teeth from chewing on metal and glass in the garbage and intestinal damage or even blockage from swallowing broken glass, cans, sharp objects and plastics. In some cases, bears feeding on human garbage have been found with sharp pieces of broken glass jammed into their molars, which leads to chronic tooth and jaw infections combined with intense pain and discomfort for the bear.

K. Human-Related Food Conditioning and Garbage Conditioning

Bears that are attracted to human-related foods and are subsequently rewarded by consuming them learn quickly. For example, if a bear is attracted to the smell of garbage in a container, it may push the container over, obtaining a garbage banquet. This single experience may be all that is necessary for the bear to become conditioned to pushing over garbage containers for human-related food.

If the mother is a "garbage" bear, her cubs will learn to forage on garbage. Similarly, if the mother does not avoid humans and/or if the cubs acquire foods from humans, the cubs will learn that humans are not to be feared. Cubs can become habituated to humans with just a single encounter, especially if they receive a food reward.

L. Habituation in Combination with Human Food Conditioning

Most "problem" bears display a combination of human-related food conditioning and human habituation.

Bears that are human habituated and garbage conditioned display the following traits:

1. The bear loiters around humans and/or human developments such as homes and appears tame and casual when humans are present; and/or
2. The bear (often aggressively) searches out human-related foods and garbage with little or no fear of humans, sometimes in broad daylight. Such bears may prowl residential areas during daylight and even try to enter buildings or garages to obtain human-related foods.

In the first case, the bear appears tame to humans, who in turn try to approach the bear. In extreme cases, these bears may beg and accept handouts from humans. This type of behavior increases the risk of human injury from bears.

Bears displaying the second trait pose the greatest threat to human safety by boldly approaching people. Bears that have obtained human-related foods can be a danger to humans. For example, the first documented human death due to a bear attack in Canada's Jasper National Park was caused by a black bear that had become human habituated and food conditioned.

The Bear Smart Community Program offers a proven approach to break this cycle of bears obtaining human-related foods. Application of the Bear Smart Community Program can make the Missoula area safer for both humans and bears.

II. Study Area and Missoula Community Profile

The Missoula Bear Smart Community Program Focus Area includes 174,440 acres which includes the entire area within the Missoula City limits in addition to surrounding unincorporated areas in Missoula County. The area extends from Bonner to Big Flat in the west and from Grant Creek on the north to Miller Creek (Figure 1).

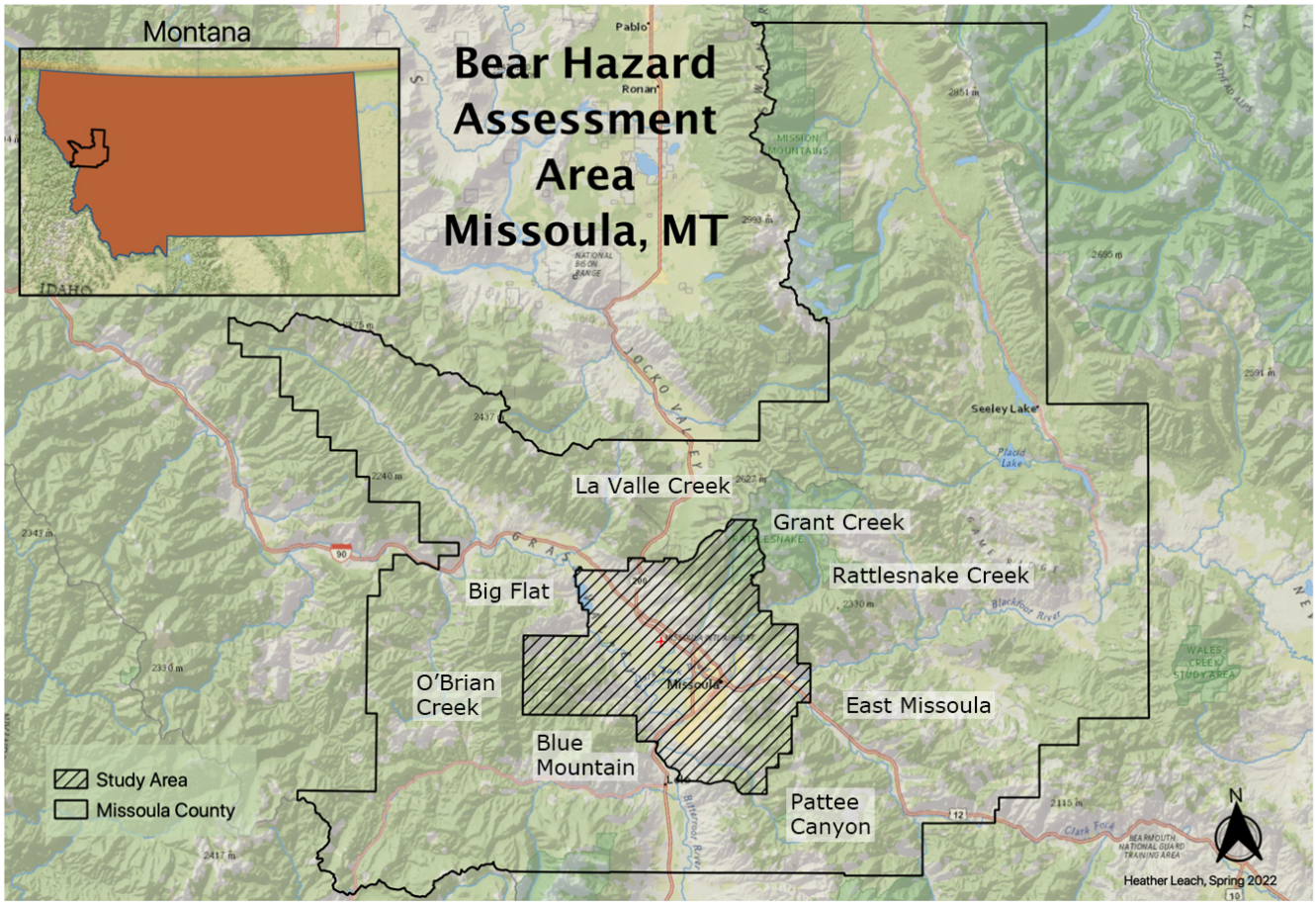

Figure 1. The Missoula Bear Smart Community Program Focus Area

III. Ecology of the Missoula Valley

Missoula is an incorporated city in west-central Montana. The Missoula area, also known as the "Five Valleys," is the convergence of the valleys of the Bitterroot, Blackfoot, and Clark Fork Rivers and smaller drainages. The Bitterroot Mountains, Sapphire Mountains, Garnet Range, Graves Range, the Rattlesnake Mountains and the Flathead Reservation Divide surround the city. The Missoula area represents one of several disruptions in North America's Rocky Mountain Range where the landscape structure creates mountain valleys of prime wildlife habitat.

Missoula is Montana's second largest city, with a population of about 75,000. Another 25,000 residents live in unincorporated areas in the Missoula Valley and surrounding mountains. Interstate 90 (I-90) runs through the Missoula Valley east to west and Montana Highway 93 runs north to south. The BNSF Railway transects the valley east to west with a spur that runs south to the Bitterroot Valley

Missoula is a vacation destination as well as a year-round community, home of the University of Montana and more than 1,200 nonprofit organizations. Missoula also is the seat of Missoula County and home to many federal, state and local government offices. Missoula is known for abundant protected open space managed by a network of partners including the U.S. Forest Service, Montana Department of Natural Resources and Conservation, Bureau of Land Management, Montana FWP, Missoula County, the City of Missoula and nonprofits such as the Five Valleys Land Trust, The Nature Conservancy and more. Recreationists enjoy public ski trails, hiking and bicycle trails, along with many parks and the city's soon-to-be-acquired Marshall Mountain ski area.

Missoula's urban core is surrounded by wild country. Montana Snowbowl ski area rests in the mountains to the north. The Rattlesnake National Recreation Area and Wilderness begin at the edge of town, continuing north to the Flathead Indian Reservation. The Blue Mountain and Pattee Canyon Recreation Areas are close to town. And just a few miles to the southeast is the Welcome Creek Wilderness in the Sapphire Mountain Range. The Selway-Bitterroot Wilderness is to the southwest.

Missoula's population increased 15.92 percent between the 2010 and 2020 censuses. Growth has put demands on housing, causing the city to expand into agricultural land in the valley and forested land in the wildland-urban interface. Small-scale and backyard agriculture are common in the Missoula area. Small acreages contain vegetable gardens, orchards and berry patches as well as chickens and other livestock. An estimated 45,000 dogs live in the Missoula area. Outdoor recreation is very popular.

The Missoula Valley contains almost all the wildlife species present when Lewis and Clark first came through this area in 1806. The forests of the study typically include Douglas-fir, ponderosa pine, western larch, grand fir and lodgepole pine. Aspen, western hemlock and western red cedar occur less frequently. Cottonwoods are abundant along streams. A wide variety of shrubs and forbs that are bear foods are native to the area. The growing season usually ranges from April through September. Missoula has a hardiness zone of 5 on the U.S. Department of Agriculture hardiness scale. Natural bear foods are abundant in the river bottoms, foothills and surrounding mountains. Beginning in late May and early June, bears seek out white-tailed and mule deer fawns. Throughout the year, road-killed deer are abundant. Bear activity and movement patterns can be predicted by the ripening and availability of natural fruit-bearing shrubs such as huckleberries, serviceberry, chokecherry and hawthorn (Table 1). Many non-native fruit and ornamental trees grow near homes and small farms.

Table 1. Time periods when five species of natural berries and apples were available to black bears during 2009 and 2010 in the Missoula area (From Merkle et al. 2013[2])

	2009		2010	
Species	**Start**	**End**	**Start**	**End**
Serviceberry	9 July	20 August	30 June	14 August
Chokecherry	4 August	20 September	14 August	10 October
Elderberry	27 September	18 October	7 September	10 October
Honeysuckle	9 July	27 September	14 August	10 October
Waxy currant	10 June	20 September	20 June	14 August
Apple	3 September	21 October[3]	16 September	10 October[3]

The Missoula Valley has an annual precipitation of about 13.5 inches, with slightly more precipitation at the higher elevations. The elevation in the study area ranges from about 3,000 to 7,000 feet. The Clark Fork River runs through the Missoula Valley with the Blackfoot River joining the Clark Fork above Missoula. The Bitterroot River joins the Clark Fork just downstream of town. Connected to these rivers are numerous tributaries that support extensive riparian corridors.

[2] Merkle, J. A., H. S. Robinson, P. R. Krausman & P. Alaback. 2013. Food Availability and Foraging near Human Developments by Black Bears. *Journal of Mammalogy* 94(2): 378–385.

[3] Fruit still available when sampling period ended on 10 October.

IV. Analysis of Human-Bear Conflicts in Missoula

A. Methodology

The following resources were used to better understand the potential areas of concern and factors affecting human-bear conflicts in the Missoula Bear Smart Community Program Focus Area:

- Montana Fish, Wildlife, and Parks Region 2 (FWP R2) bear conflict and sighting reports received from phone calls, TIPMONT and the Montana FWP web site 1998 to early 2022.
- Reports received by the Missoula Bears Web Site (missoulabears.org) and the Missoula Bears Facebook Page (https://www.facebook.com/missoulabears).
- Information provided by the local Montana FWP R2 game wardens, bear managers and Republic Services waste haulers regarding problem areas and the existence of bear travel corridors.
- Information provided by the Missoula Bear Smart Working Group.
- Information from Jerod Merkle's black bear study.
- Two general surveys of the community during the bear season to identify potential attractants and management concerns in the Rattlesnake drainage. The first survey was done with 500 residents in 2004 (Melissa Booth, University of Montana 2005) and a second survey of 1,000 residents was done in 2008 as part of Jerod Merkle's black bear study.
- Information gathered from interviews with knowledgeable people.
- Information provided by the Missoula city and county government, local news services and residents.
- A review of bear hazard assessments done for other communities.
- Models and mapping obtained during Jerod Merkle's black bear master's project and subsequent publications.

Between 2003 and 2008, Montana FWP R2 received 917 bear complaint calls. Of these calls, 284 involved bears sighted in and around residential areas, 530 involved the agency discussing problems with residents but with no agency response and 103 resulted in management actions. These incidents included bears seeking human-related attractants, human safety issues and property damage.

Both black and grizzly bears may be involved in conflicts throughout the Missoula Valley. Human-bear conflicts with either black bears or grizzlies could occur anywhere with human-related attractants.

B. Limitations of Data

The following limitations need to be considered when using information collected by the Montana FWP R2 and the Missoula Bears Web site and Facebook Page.

- Although Montana FWP R2 and Missoula city and county officials encourage residents to report sightings of bear activity, many residents do not report bear activity because they feel that a phone call results in a dead bear.
- Many longtime residents who have become accustomed to bears in their yard and garbage do not report these incidents.
- Bear incidents handled through 911, Missoula Animal Control, Missoula city and county law enforcement, Montana FWP law enforcement, Republic Services and the U.S. Department of Agriculture's Wildlife Services Program may go unreported.
- When an incident involves livestock or property damage, the resident is more likely to make a report.

Acknowledging the limitations of reporting data, the map of reports offers a valuable tool in understanding areas of bear hazard and determining ways to mitigate the risk of potential conflict.

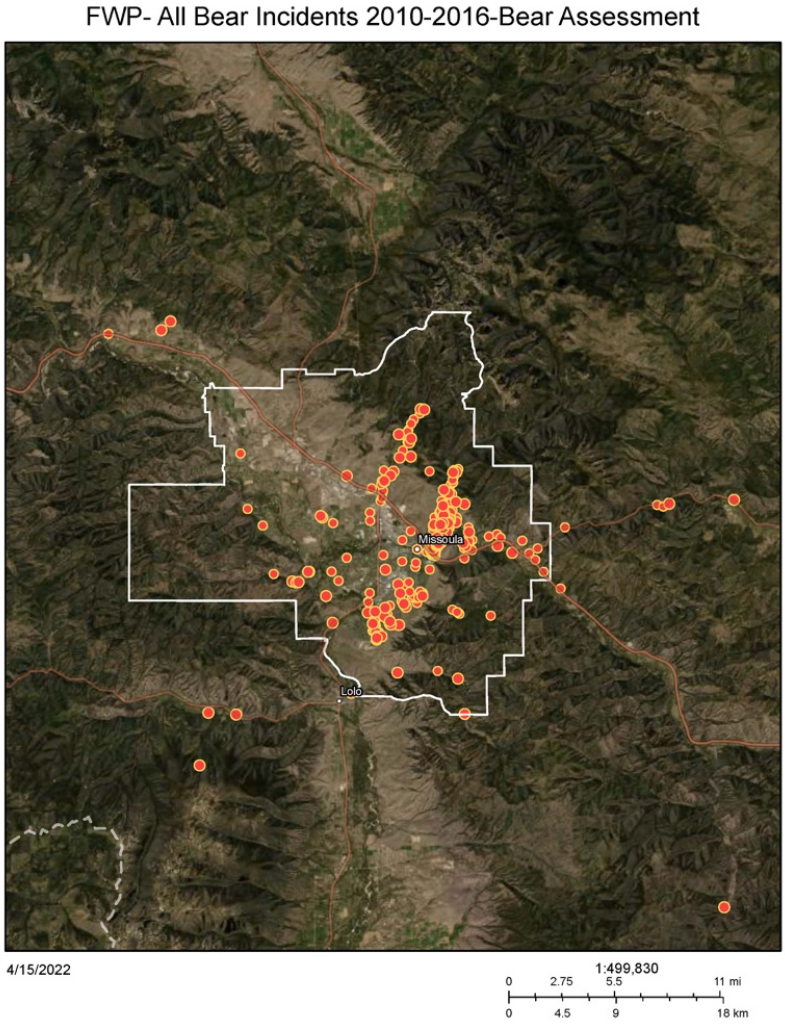

Figure 2. Map of human-bear conflicts reports 2010-2016

V. History of Human-Bear Conflicts and Efforts to Mitigate Over Time

Missoula's proximity to bear habitat has always contributed to human-bear conflicts. Beginning during the 1980s and increasing through the 1990s, wildlife activity surged in Missoula. The number of deer inhabiting Missoula's urban and rural areas increased, as did the number of elk observed wintering and summering in the foothills and agricultural lands. Lion sightings became commonplace and the numbers of bears frequenting the Missoula Valley increased.

In the early 2000s, a group of Missoula citizens and conservation organizations along with Montana FWP Region 2 (R2) and the Missoula-based garbage service Republic Services (formerly Browning Ferris Industries, BFI) began working together to reduce the number of bear conflicts in the Missoula Valley. Over time the group's reach expanded as they encouraged good stewardship and the sound management of residential attractants such as garbage across western Montana.

A series of important projects were launched. Many Missoula parks, some schools, and agency administrative sites around the county received bear-resistant dumpsters and rollouts. The Living with Wildlife Foundation's Predator Resource Guides for refuse management and electric fencing to deter predators were made available to the public and garbage industries (Resource Guides | Living with Wildlife Foundation, lwwf.org). The working group also established a bear-resistant product testing program and encouraged the design and production of bear-resistant residential garbage containers and dumpsters across the nation. The program was eventually taken over by the Interagency Grizzly Bear Committee and became the official bear-resistant product testing program at the Grizzly and Wolf Discovery Center in West Yellowstone, MT. Bear Resistant Products - Interagency Grizzly Bear Committee (igbconline.org)

Over time more Missoula residents began formally voicing their concerns about the number of bears accessing residential attractants—especially garbage. In 2004, the first neighborhood group, Rattlesnake Bear Aware, was established in Missoula. This group eventually led to the creation of Missoula Bears, an informational web site (missoulabears.org) and Facebook page (www.facebook.com/missoulabears) for residents living with wildlife in the valleys around Missoula, including the Bitterroot, Blackfoot, upper Clark Fork, lower Clark Fork and Mission Valleys. This small group of residents worked on increasing awareness of the causes of bear conflicts through meetings, door hangers and outreach events (see more under Prevention Measures). Other Bear Aware neighborhood networks were organized. Residents began pressuring Missoula city officials to address the concerns around bears getting into garbage and to place more bear-resistant garbage containers in parks and at city recreation sites. In 2006, after multiple meetings with local residents, nonprofits, and the local garbage service, the City of Missoula adopted Ordinance 3330 prohibiting the feeding of certain wildlife (including bears) with the goal of eventually containing all residential attractants, especially garbage, and reducing the number of bear conflicts and management actions.

In 2008, a black bear research project was launched through the University of Montana. Then master's student, now Dr. Jerod Merkle, started his graduate project: Human-Black Bear Interactions in Missoula MT. Working closely with Montana FWP, Merkle analyzed 917 black human-bear conflicts between 2003 and 2008. During the course of Merkle's study, 10 female and 6 male black bears were trapped and outfitted with GPS radio collars that recorded more than 14,000 individual locations.

The study's objective was to describe the movements and diet of black bears living in Missoula while also assessing management strategies to reduce human-bear conflicts. The goal was to determine the

natural foods bears were using along the fringes of Missoula as well as to identify the human food sources that were drawing bears out of the surrounding habitats into town.

Using point data, Merkle determined which human-related foods were the strongest attractants. Results showed minimal bear activity near homes during the spring (urban greenup) with a slight increase in the summer (May through July when berries were ripening), increasing dramatically from August to mid-October when activity slowly decreased as bears headed to their dens for the winter (Figure 2).

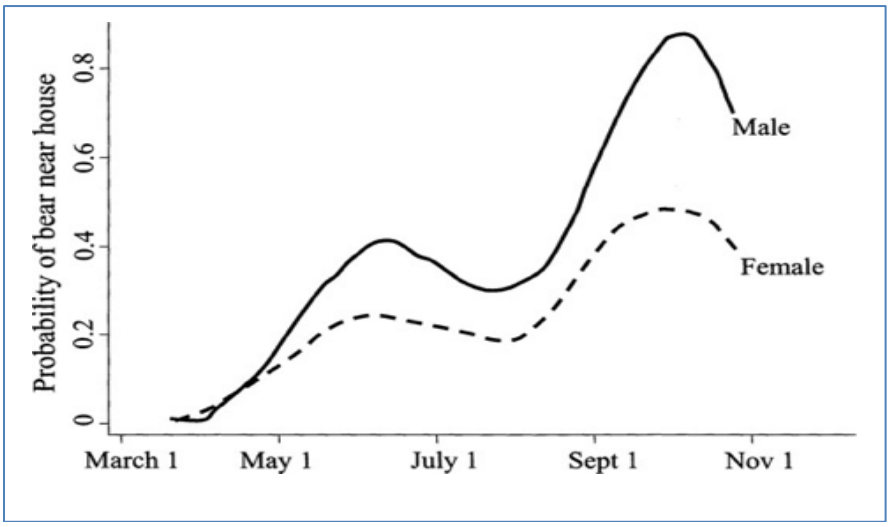

Figure 3. Smoothed hazard function showing the probability of a radio-collared black bear being near a house in Missoula (from Merkle et al. 2013)

The time when most of the radio-collared bears began feeding on garbage and other residential attractants was directly correlated to the ripening of apples. No other unnatural food item, including garbage, was as important in explaining the bears' behavior.

Every year, as the natural foods, such as berries, are consumed, more and more of the bears begin coming into town to forage on fruit trees. While there, the bears also take advantage of garbage, pet food, bird seed and other residential human-related foods.

The other goal of the Merkle study was to develop a decision-making regression model to predict spatial distribution of human-bear interactions for the Missoula urban landscape. By comparing known locations of human-bear conflicts between 2003 and 2008 to random bear locations using logistic regression, Merkle produced a model that accurately predicted bear conflicts wherever residents lived close to forested patches and major rivers and streams and where housing densities were intermediate for the Missoula area.

While Merkle was conducting his research, community representatives, Montana FWP R2 and Republic Services approached the Missoula City Council to discuss amending the city garbage ordinance, creating a bear buffer zone within the City of Missoula outlining areas where bears were most likely to access garbage. In 2010, the Missoula City Council adopted a resolution creating a Missoula Bear Buffer Zone Working Group. Between 2010 and 2011, using data from Merkle's black bear study, records of human-bear conflicts, institutional knowledge from Montana FWP and reports from drivers for the local

garbage service, areas of high black human-bear conflict were mapped within the Missoula city limits. In addition, preparations were made for delineating the Missoula Bear Buffer Zone.

In 2016, the City modified Fencing Ordinance 3577 to allow electric fences to be used in the Bear Buffer Zone and other sites where conflicts occur, giving residents the ability to use electric fences around garbage storage facilities, orchards, gardens and chicken coops (https://www.ci.missoula.mt.us/DocumentCenter/View/36387/Ordinance-3577).

Having a bear buffer zone within the City has not stopped human-bear conflicts and it did nothing to address the issues occurring on county lands. More needs to be done. During the winter of 2022, the Missoula Bear Buffer Zone Committee was instructed by the Mayor, the Missoula City Council, along with the Missoula County Commissioners, to discuss next steps at solving the Five Valley's area human-bear conflict situation. It was at that time that the group developed the concept of establishing a Missoula Bear Smart Community Program within the Missoula Bear Smart Community Program Focus Area (Fig. 1). On February 8, 2022 the group presented the concept to City and County officials. After receiving approval to move forward, the committee has renamed itself the Missoula Bear Smart Working Group and produced the Bear Hazard Assessment for the Missoula Area.

VI. Wildlife Travel Corridors and Human-Bear Conflicts

Within and surrounding the Missoula Valley there are abundant natural bear foods. With the changing seasons the river bottoms, the valley floor, the foot hillsides and mountains offer a variety of seasonal foods. During the spring, summer and fall the local bear population follows various food sources and uses habitats accordingly. In April and early May, with first green up, bears will venture to the valley floor for the sprouting grasses and forbs. In late May and June during the bear breeding season, bears will turn to Missoula's urban wildlands interface to hunt for the abundant white tail and mule deer fawns. Throughout the summer, carrion because of vehicle collisions, are abundant and bears routinely venture to the edges of town to search along highways and side streets for carcasses. But really the driving force for the bulk of natural bear activity, which occurs in the late summer and fall, is the ripening of low elevation berries.

During certain time periods, or in years when there are exceptional fruit crops, the surrounding local bear populations will inundate the Missoula Valley. Bears will travel in security areas to avoid contact with people (Figure 4).

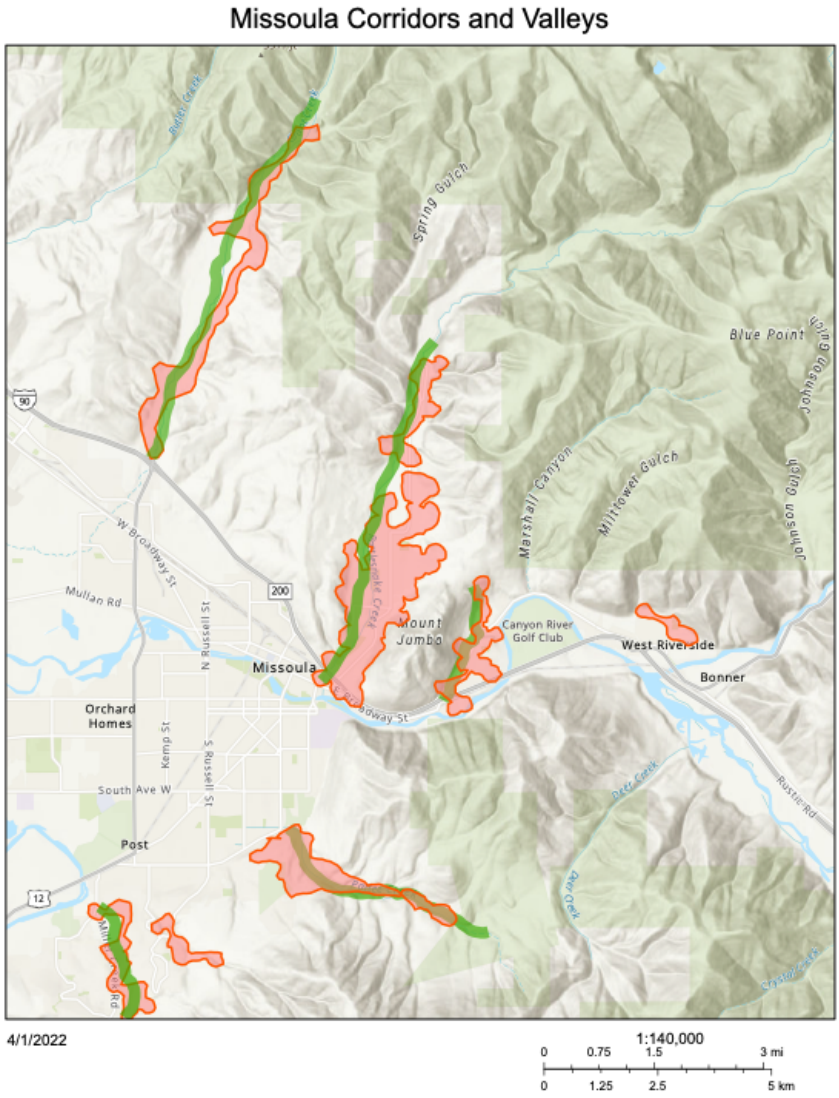

Figure 4. Riparian zones (bear travel corridors) in green and potential conflict areas in red in the Missoula Valley

Anywhere in the Missoula Valley where people live near mountainous terrain, a river, stream, ditch or draw, wooded area or agricultural field, they're living near a bear travel corridor. Much of the Missoula Valley is prime bear habitat with abundant natural foods. Bear activity and movement patterns can be predicted throughout the wildland-urban interface by the ripening and availability of natural fruits. From early July through October, especially during productive years, the number of bears feeding on serviceberry, chokecherry and hawthorn has warranted the U.S. Forest Service and the Missoula Parks and Recreation Department posting warning signs and sometimes closing trail systems.

The drainages and ravines that enter the Missoula Valley act as bear travel corridors. These corridors tend to direct bears into the urban core as bears travel downstream using the cover and foods in the riparian valleys. Because grizzly bears are likely to enter the Missoula Valley from the Rattlesnake and sadly, this is the time that bears discover human-related foods such as bird feeders and garbage. Over the course of a few days a bear can become food conditioned. And from then on, will continue to access these travel corridors on a more regular bases to access human food, with the evidence being where bears will carry garbage back to security areas where they feed on it. We can expect this same behavior with grizzly bears. The North Hills, drainages entering from the north are most likely to experience conflicts with grizzlies.

VII. Important Hazard Area Sites in the Missoula Valley

A. Schools

Reports of bears and lions near schools are common in the Rattlesnake, East Missoula, South Hills, Frenchtown and Bonner. The Rattlesnake Elementary School, Chief Charlo School in the South Hills and the Bonner Elementary School and perhaps the Clark Fork School all have shortcuts where children walk to school through forested areas or brushy draws. The Montana FWP R2 has worked with these schools to help manage bear activity.

The Rattlesnake Elementary School is adjacent to a city park and is surrounded by a residential neighborhood heavily frequented by bears. Lion activity is also common. The Rattlesnake school and neighborhood have a long history of bears getting into garbage and other attractants. Children in this residential area and at the school are instructed to be accompanied by an adult and be aware of bear activity when walking into forested areas along Rattlesnake Creek. School alerts are regularly sent out to parents through the Missoula County Public Schools Alert System. The cafeteria's dumpsters are now contained within expanded steel structures. The playground and soccer fields have bear-resistant garbage containers.

B. Parks, Trails and Open Space Lands

The Missoula Bear Smart Community Focus Area contains an extensive parks and trails network, which is managed by a variety of agencies. Bears use Missoula's developed parks, conservation lands, greenways, paved commuter trails, and natural surface trails when moving from place to place and when accessing food, water and shelter. Three state parks and numerous fishing access sites are managed by Montana FWP R2 adjacent to Bonner, Missoula and Frenchtown: Milltown State Park, Council Grove State Park and Frenchtown State Park, as well as the much larger (648-acre) Kelly Island Fishing Access Site.

Trails in the Missoula Valley include paved commuter trails and natural surface trails used for hiking, biking, dog walking and trail running. Commuter trails bordering the Clark Fork River through the heart of Missoula connect to East Missoula. Commuter trails also extend up the Grant Creek and Rattlesnake Creek drainages, passing through natural areas with dense vegetation frequently used by bears. Numerous trailheads access public trails along the edge of residential areas in the Rattlesnake, University District, and South Hills neighborhoods. All these trails (paved and natural surface) are used frequently for dog walking, with dogs both on and off leash.

The Missoula City Parks and Recreation Department began installing bear-resistant garbage containers at many parks and at trailheads in the early 2000s. As of 2022, all the trailheads on City Conservation Lands have bear-resistant garbage cans.

C. Golf Courses

The Montana FWP R2 has responded to bear complaints at each of Missoula's seven golf courses. The complaints have been related to bears passing through, climbing trees, getting into garbage, feeding on ornamental fruit trees or grazing on manicured grass. Most of the calls have involved the University and Highlands Golf Courses, but the Linda Vista, Larchmont, Missoula Country Club, Ranch Club and Canyon River Golf Courses have all had calls involving bears being sighted or bears passing through—especially areas along the river and near irrigation ditches, ponds and sloughs. The Canyon River Golf Course is an especially important travel zone for bears and other species trying to cross I-90.

VIII. Missoula Neighborhoods Experiencing Excessive Human-Bear Conflicts

Human-related attractants are the primary hazard to bears in the Missoula Valley. The major attractant is garbage, followed by bird feeders, fruit trees (in the fall when fruit ripens), livestock and pet feed, human foods such as the contents of freezers and other items. Almost all these items are associated with homes and gardens in residential areas. Conflict reports clearly demonstrate the causes of human-bear conflicts and the need to limit the availability of these attractants to bears. The difficulty of securing attractants is illustrated by the lack of success to date, despite considerable effort. Securing most garbage, bird feeders, tree fruit, livestock and pet feed and stored human foods (chest freezers) would prevent most human-bear conflicts in the Missoula Valley.

A. Rattlesnake Neighborhood

The Rattlesnake neighborhood flanks Rattlesnake Creek at the bottom of the 95-square-mile Rattlesnake Creek watershed. From the neighborhood's southern edge at I-90 and the Clark Fork River, it is just four miles north to the Rattlesnake Wilderness. The Rattlesnake Valley is from three-fourths to one-and-a-fourth miles wide, bounded on the west by the North Hills and on the east by Mount Jumbo. The residential neighborhood is largely surrounded by open space owned or managed by public agencies. The lower Rattlesnake has denser development with older homes, more apartments and a more transient population. It is somewhat urban. Development in the upper Rattlesnake is not as dense and there are more homes than apartments, giving it a suburban to quasi-rural flavor. Parks and a well-used trail system, especially along the creek, intersperse with dwellings throughout the Rattlesnake. The valley's residents include college students, families, long-time Missoulians, newcomers, homeowners, renters, landlords, management companies, and a few businesses.

As early as the 1880s, Missoula's residents discovered that the Rattlesnake's microclimate favors domestic fruit. Numerous apple and other fruit trees planted then and over the succeeding decades have drawn bears, primarily black bears, and other wildlife into the area. Old-timers say that bears used to be shot when they ventured near homes and fruit trees, particularly in the then rural upper Rattlesnake. More intensive development has not deterred bears from following their long tradition of fall and spring visits to the upper and lower Rattlesnake for wild foods supplemented by non-natural food, primarily domestic fruit followed by garbage and other human-related food. The open space that nearly surrounds the Rattlesnake gives bears lots of entry and exit points to the neighborhoods. In addition, bears use Rattlesnake Creek, its tributaries, and ditch systems as interior roads offering cover and food.

The Rattlesnake is Missoula's most problematic area for human-bear encounters. During the fall of 2021, 30 to 40 bears were active in the Rattlesnake Valley. The city portion of the Rattlesnake is within Missoula's Bear Buffer Zone. Missoula's regulations are only weakly enforced. Nonprofits such as the Great Bear Foundation and Rattlesnake Creek Watershed Group, and agencies, including the Montana FWP and the Missoula Parks and Recreation Department, try to keep Rattlesnake inhabitants informed about bear activity and educated about living responsibly with bears.

Republic Services has 1,100 paying customers in the Rattlesnake. About 350 of the containers are bear resistant. Factors affecting waste services include only two major north-south roads in the Rattlesnake, and overhead electric wires in some alleys that preclude automated service.

B. Missoula's North Hills

Besides the Rattlesnake, two other major drainages extend north of the city of Missoula: Grant and Butler Creeks. Of the three drainages, the Rattlesnake has the highest density of development, Grant Creek has less and Butler Creek has the least.

Bears can move from one of the drainages to the other two relatively easily by traversing forested terrain at the upper ends of the drainages. As bears move down any one of the drainages, they will encounter more homes, roads and orchards as they approach I-90, a substantial barrier to movement. What this means in the most practical sense is that bears trained to seek human food in one of the drainages may well take their new skills to either of the other two drainages. Bears that find their way across I-90 often cannot find their way back and may end up having to be trapped and relocated.

C. Pattee Canyon, Miller Creek, Far Views and Missoula South Hills

Pattee Canyon is a forested valley with numerous residences that flows into the Missoula Valley on the southeast side of Missoula and Far Views and Missoula South Hills are subdivisions on the south side of Missoula situated along the foothills of Mt Dean Stone. Black bears in this area are common, as is bear use of garbage. Bird feeders and uncontained garbage are commonplace. Pattee Canyon has a serious problem. This area requires residents with garbage service to have cans that are compatible for automated pickup. As a result, most residents use the large blue polycarts provided by the company that are picked up along the main road by Republic Services. Because the blue polycarts are too large for residents to carry back and forth in their vehicles, most of these carts are left along the main road all week. Residents take their garbage to the carts along the road periodically. The result is that carts filled with garbage are available to bears all week long with garbage spread out into the forest along the road as bears carry bags of garbage away from carts. Miller Creek has similar issues.

D. Other Neighborhoods

In the University District, along the face of Mount Sentinel, the Haze Creek, Blue Mountain, Obrien Creek and Big Flat residential areas also have issues with black bears. And throughout the Missoula area there are multiple mobile home sites of varying sizes and apartment complexes that are adjacent to wildlife corridors. This is especially true for East Missoula, Milltown, West Riverside, Bonner, Grass Valley and elsewhere. It should be noted that it is in these mobile home parks and apartment complexes where many incidents of bears accessing garbage occur. In addition, the Missoula Valley has a high turnover of residents, especially in the University area. Often, new residents, renters and college students are unaware that bears even inhabit the area or that it may be illegal to leave garbage out where they now live.

IX. Solid Waste Management in the Missoula Valley

The Missoula municipal landfill was established in 1968. Although the fence enclosing the landfill is not electrified, conflicts involving bears have been minimal. The landfill does attract thousands of crows, ravens, magpies and seagulls as well as skunks, raccoons, foxes and feral cats and dogs. Black bears have been documented within the fenced area only a few times. On two occasions, radio-collared grizzlies traveled past the landfill. In 2021 a grizzly bear family group damaged a bee yard near the dump, but there was no indication that the grizzlies visited the dump itself. In other communities, such as Seeley Lake, garbage at the dump can provide a major food source for bears. It can be theorized that bears will eventually key into the Missoula landfill.

Residential garbage in the City of Missoula is collected by curbside pickup at about 14,000 locations. Republic Services' pickup in neighborhoods begins at 6 a.m. weekdays on a rotating schedule. Bear buffer zone regulations on the edges of the City of Missoula limit when and how garbage may be placed at the curb.

Multi-residential, commercial and city dumpsters are picked up beginning at 5 a.m. seven days a week. Although many businesses have locks on their dumpsters, others are left open. City ordinances do not require that dumpsters are secured.

Residents living in Missoula also have the option of hauling their waste directly to the Missoula landfill. The Missoula Municipal Code and the Missoula City-County Heath Code require that all municipal solid waste be picked up or disposed every seven days. Missoula residents also have curbside and commercial recycling options along with three drop-off centers scattered through the community.

X. Wildlife Attractants

As mentioned above, the Missoula Valley has abundant natural bear foods that draw bears into town. Once there, bears are continually exposed to human-related foods of various types.

During certain time periods, or in years when there are exceptional fruit crops, the surrounding local bear populations will feed extensively on natural foods in the Missoula Valley's riparian areas. For example, in 2021 Missoula experienced productive serviceberry, chokecherry and hawthorn crops back-to-back. Bears could be found everywhere. It is during these times that bears become vulnerable to learning new behaviors—especially when they find unnatural foods such as garbage. The fact that bears have always fed on the natural foods in and around residential areas, particularly the valley bottoms like Rattlesnake and Grant Creeks, makes it especially important to secure all human-related food attractants from bears in the Missoula area.

A. Residential Garbage

The availability of uncontained residential garbage is the single largest attractant bringing bears into Missoula. Bears access garbage on driveways, next to homes, on porches and in sheds, garages and carports. Some residents understand the importance of securing garbage and go to great lengths to do so, but many others do little or nothing.

The City of Missoula has a Bear Buffer Zone and Ordinance 3419[4] that requires residents living in the zone to keep garbage secured until the morning of pickup unless it is in a bear-resistant container. Many residents living in the Bear Buffer Zone put their garbage out the night before pickup because

they do not want to get up in the early morning on the day of pickup. Some residents leave garbage out all week. In addition, because of the way garbage is picked up, it can be legal for a neighbor on one side of the street to have his garbage out but illegal for a neighbor on the other side of the street to do so. Whenever the garbage pickup schedule changes, there is confusion. Residents who live in Missoula's city limits, but outside the Bear Buffer Zone, and residents who live in the county, even if they live just one block from the Bear Buffer Zone, are not obligated to contain their garbage or to lease bear-resistant garbage containers.

Some Missoula County residents use burn barrels or store garbage in trailers until they take a trip to the landfill. In summary, despite Missoula's Bear Buffer Zone ordinance:

- The public remains confused about the need to store garbage securely.
- Some residents might not be required to store their garbage securely, even though neighbors nearby are required to do so.
- Enforcement remains challenging.
- Garbage continues to be the main attractant causing human-bear conflicts.

Missoula Animal Control enforces Missoula's bear buffer zone and wildlife feeding regulations (http://missoulabears.org/community-resources/local-ordinances/). Animal control officers respond to citizen complaints they receive and typically make several patrols the night before garbage collection during the spring and fall, focusing mainly on the Rattlesnake and Grant Creek drainages. On a resident's first offense, officers leave informational flyers on the garbage containers left out the night before collection. If the containers are left out a second time, officers issue a ticket. Officers usually find significantly higher compliance during their second or third patrol each season. Unfortunately, the increased compliance doesn't seem to last from year to year. Turnover in rental properties, limited patrols and limited enforcement contribute to backsliding.

The wildlife feeding ordinance applies to the entire city, but not to the county. If bears are getting into garbage on property outside the bear buffer zone in the city, the officer can issue a ticket, but cannot require the resident to keep garbage inside until the day of pickup or use a bear-resistant garbage can.

Missoula has at least one animal control officer working every day of the week, with only five officers total. Limited staff, seven-day-a-week operation and competing priorities limit Missoula Animal Control's ability to patrol the bear buffer zone.

B. Commercial and Multi-Residential Garbage

Republic Services and Grizzly Disposal lease residential bear-resistant roll-out carts. These carts are expensive, have a limited life span and if not always locked correctly, can be damaged by bears or by the garbage service equipment. Customers can purchase their own bear-resistant garbage containers, but if they are damaged, the companies will not replace them.

A good portion of the Missoula County area serviced by Republic Services is on automated pickup routes. With automated routes the driver stays in the truck and uses a mechanical side lift to pick up cans. Only two automated bear-resistant garbage cans have been approved. Republic Services primarily uses the 95-gallon, fully automated residential bear-resistant container made by Kodiak Industries. The only other option for customers who live in Republic's fully automated areas is to get approval from Republic for a containment structure design that is compatible with automated pickup. Grizzly Disposal leases 65- and 95-gallon Toter bear-resistant carts, all of which are manually operated, but recent

locking mechanism failures have resulted in the Toter company losing its bear-resistant qualification until the problem is resolved and the product retested at the Grizzly Bear Discovery Center in West Yellowstone, MT.

Steel bear-resistant dumpsters are available, or they can be purchased with outside funds as long as they are compatible with a company's trucks and are not on an automated route. Bear-resistant dumpsters are secured with a locking mechanism, but they often break or are not secured correctly by the public, allowing bears to access them. When bear-resistant dumpsters are overfilled, they will not lock correctly. Whenever possible, restaurants, hotels and other food service businesses are encouraged to build bear-resistant containment structures around standard dumpsters and accompanying grease collection systems. Often these structures, especially if they are well built, can be a longer-term solution than bear-resistant dumpsters. If necessary, additional bags of garbage can be stacked inside the structure. Unless the structures have electrified wires, they will need a stout roof. Any structure designs need to be approved by the respective garbage collection service.

Most state and federal administrative sites in the Missoula Valley contain garbage in compliance with various agency food orders.

C. Fruit Trees

Hundreds of domestic fruit trees in the Missoula Valley are the remnants of historic orchards that once provided the region with fresh fruit. Warm summers and a long growing season often produce bumper crops of cherries, plums, apples and pears.

Home developers and city planners often include flowering fruit-bearing trees, such as crabapples and mountain ash, in landscaping, inadvertently luring bears into urban areas. Montana FWP R2 has responded to multiple conflicts involving bears feeding on ornamental fruit in people's yards, public boulevards, parks, and even in the greenway of the Van Buren Street I-90 exit. These types of fruit trees are extremely difficult to pick and are not recommended for planting in any areas of predicted bear activity.

Some homeowners maintain their fruit trees and pick their fruit; however, others don't. Problems occur each year as the fruit ripens because the fruit is attractive to bears. Fruit trees are abundant in the Rattlesnake and in Grant Creek, two areas of great concern. The same can be said of Hayes Creek, O'Brien Creek, Big Flat, a good portion of the Grass Valley and Hellgate Canyon. Electric fencing can be used to secure fruit trees within city limits with approval of the Development Services Director (see City of Missoula Ordinance Number 3577 (https://www.ci.missoula.mt.us/DocumentCenter/View/36387/Ordinance-3577?bidId=). See MCA 87-6-216 concerning intentional feeding of wildlife in the county (https://casetext.com/statute/montana-code/title-87-fish-and-wildlife/chapter-6-fish-and-wildlife-criminal-provisions/part-2-general-hunting-fishing-and-trapping-offenses/section-87-6-216-unlawful-supplemental-feeding-exemption).

D. Livestock and Apiaries

In the Missoula area human-bear conflicts involving apiaries, rabbits, pigs, goats, sheep, llamas and domestic fowl are common. Honey producers and hobbyists all experience damage by bears. Annually, Montana FWP R2 responds to an array of complaints regarding property damage as it relates to bears accessing poorly stored pet feed, chicken feed and other livestock feed. A property owner with livestock is more likely to make a complaint call regarding bear conflict and the outcome is also more likely to result in a management action than when bears get into garbage. In any case, livestock and livestock

feed have been identified as an attractant and are posing a hazard in the community. Use of electric fence to contain apiaries, chickens and livestock is recommended.

Several Missoula ordinances allow backyard chickens and small livestock (see Missoula Municipal Code 6.12 Section 2 for chickens (**http://www.ci.missoula.mt.us/1579/Chicken-Permit#:~:text=Missoula%20residents%20are%20allowed%20up,permission%20from%20the%20parcel%20owner**). Other than a few subdivisions with covenant restrictions, no rules pertain to raising poultry and small livestock in the county. State law prohibits feeding wildlife, including bears (Montana Code 87-6-216). However, this law has proven difficult to enforce. The number of chickens in the Missoula Valley has increased substantially during the last 10 years. Conflicts involving poultry and poultry feed are increasing.

E. Wildlife and Livestock Carcasses

The Missoula Valley's burgeoning deer population provides bears ample opportunities to scavenge road-killed deer. As many as seven deer a night may be killed in the project area, along with the occasional bighorn sheep. Interstate 90 and the various frontage roads adjacent to the wildland-urban interface account for most of the road-killed deer but deer carcasses can be found anywhere in the Missoula Valley. Motorists can get a salvage permit (https://fwp.mt.gov/buyandapply/vehiclekilledsalvagepermit) if they kill a deer, but often carcasses are left to decompose along roadsides.

Trains kill a few deer and elk. Some landowners lose horses and cows. Removing carcasses can be burdensome. Where bears and lions may be present, Montana FWP R2 picks up carcasses in backyards and along the residential rights-of-way in and around the wildland-urban interface. A rudimentary protocol between the Missoula City Police, Montana Highway Patrol, Missoula County Sheriff's Department and Montana FWP R2 establishes procedures for dispatching wounded deer and removing carcasses. Carcasses along major roadways are picked up by road maintenance crews and hauled to a composting site outside town.

When complaints come in repeatedly about a carcass in residential areas, the carcass is picked up by whichever entity (city, county or Montana FWP) gets called the most. Republic Services assists with carcass pickup as long as the deer carcasses are placed alongside a garbage collection site and they are called in a timely manner. Pickup only occurs once a week. For large livestock carcasses, Montana FWP provides assistance when needed.

All cow and horse carcasses should be hauled to the landfill rather than being buried or burned. Otherwise, odor can linger in the soil for many years, attracting bears. Grizzlies have no trouble digging up carcasses. In the fall of 2021, for example, a family group of grizzlies dug up two horses that had been buried with a backhoe in Grant Creek.

F. Other Attractants

Grease barrels behind food service businesses are an attractant. Other attractants include pet food and dishes, livestock feed, bird feeders, petroleum products, outdoor refrigerators or freezers, compost heaps, and barbecue grills. On occasion, bears will damage vehicles as they seek garbage or pet food stored there. Bears sometimes damage buildings where squirrels have cached food or ants are active. Sometimes bears dig up backyards looking for worms. They chew up ATV seats and hydraulic lines on equipment. These attractants should be secured from bears, especially along commonly used bear travel corridors or in those areas where black bear and grizzly bear conflicts are predicted.

XI. Areas in Need of Special Management

A. City and County Parks

Several parks managed by the City of Missoula are in areas frequently used by bears, including parks in the South Hills, the Rattlesnake, and along the Clark Fork River. These are mostly small, neighborhood parks with playgrounds, picnic tables and shelters. Many of the parks have been upgraded with bear-resistant containers, but a small number have not.

Undeveloped county parks in Rattlesnake and Miller Creek neighborhoods do not have garbage containers. These parks are frequently used by bears accessing attractants in the adjacent neighborhoods. More developed county parks in East Missoula and West Riverside have garbage containers that are not frequently emptied. Missoula County is installing bear-resistant containers at these parks.

B. Campgrounds

The Missoula Valley includes a few private RV-resort campgrounds: the Outpost RV Park, Missoula KOA Holiday, Jim and Mary's RV Park and Primrose Meadows by the Wye. Several of these campgrounds have ornamental fruit trees, such as crabapple and mountain ash. The Missoula Valley has no official national forest or state campgrounds, but federal, state and county lands include many dispersed campsites. Most sites on federal and state lands fall under the jurisdiction of food storage orders created to prevent bear conflicts. They also are subject to the State of Montana's 16-day camping limit (enforcement is often an issue). Over the years Montana FWP R2 has responded to a handful of bear conflicts at dispersed campsites and one or two at the private resort campgrounds. Glamping, short for glamorous camping, has become popular in the Missoula Basin. And there are a handful of "Hipcamp" sites registered on the online Hipcamp Booking Platform for the Missoula area. These are private land campsites in landowners back yards and back lots, where for a fee campers and outdoor enthusiasts can find unique camping sites.

Missoula has a history of homeless camps along the Blackfoot and Clark Fork Rivers, I- 90, the railroad tracks and other areas. Well-established homeless camps are under the Reserve Street Bridge in Missoula and along the Hellgate Canyon riparian area. Missoula County Sheriff's deputies and Montana FWP R2 have responded to a handful of incidents involving bears at these homeless camps. Two new city-run homeless camps, one on three acres near the river behind Super Wal-Mart and another west of Buckhouse Bridge, have recently been opened to provide temporary safe outdoor camping for persons who are homeless. The food storage order is required in these camps but enforcement is always a challenge.

C. Residential Facilities

Several nursing homes and assisted living centers are adjacent to important travel corridors that have a long history of conflicts with bears. Any facilities that have cafeteria-style food service will have food waste that can draw bears. The Montana FWP R2 has been encouraging management of such facilities to lease bear-resistant dumpsters or build a containment structure. A facility in East Missoula is located where bears leave the Canyon River Golf Course or the Mount Jumbo ridgelines to cross the Clark Fork River at the Deer Creek Bridge. Montana FWP R2 has been encouraging the facility's management to remove bird feeders, remove their fruit trees and lease bear-resistant dumpsters or build a containment structure. Even with these precautions, bears will continue to use the site for passage, will no doubt continue to feed on fruit trees, and will find garbage in the adjacent neighborhood.

D. University of Montana

The University of Montana is located at the base of Mount Sentinel and at the mouth of Hellgate Canyon. The university has a long history of bears getting into garbage and other residential attractants—especially at the food service sites and Married Student Housing. The University of Montana is creating a campus bear management plan as a joint effort between the Student Chapter of the Wildlife Society, University faculty and Montana FWP. The plan includes an outline of potential hazards on campus as well as strategies to mitigate those hazards, including student education about bear safety, an email-based bear activity warning system, and securing attractants such as garbage and fruiting plants.

During July, bears feed on extensive serviceberry crops along the face of Mount Sentinel and in the Hellgate Canyon area. Chokecherry and hawthorn crops ripen in August, September and October, when most bears appear in the university campus. Bears frequently leave the face of Mount Sentinel to access the garbage, fruit trees and bird feeders in the University District's residential neighborhood. Bears also follow the Kim Williams Trail and the University Ditch to access residential areas along the south bank of the Clark Fork River. The campus police department has set up a very efficient system for alerting students and responding to bear activity.

E. Railroad System

The BNSF has a large rail yard along Missoula's North Side paralleling I-90. Bears have been sighted in the rail yard on occasion and have been observed getting into garbage, spilled grain, and railroad cars and investigating oil spills. On one occasion, a black bear captured in the Missoula area was documented traveling in a railroad car to Three Forks, MT.

Bears travel along the BNSF and the old Milwaukee railroad beds and spend a great deal of time feeding on the low-elevation berry crops growing in the rights-of-way. These railroad beds serve as a travel corridor directing bears into the urban area of Missoula.

F. Montana Snowbowl and Marshall Mountain Recreation Area

Montana Snowbowl is privately managed under the jurisdiction of the Lolo National Forest. Between 2011 and 2020 the ski area added chairlifts, ski runs and facilities. The ski area has a long history of bear conflicts, mostly related to the availability of garbage. Most of the garbage sites are now secure. Montana Snowbowl is required to follow the Food/Wildlife Attractant Storage Special Order F11-005-Lolo-Forest (https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5287228.pdf).

G. Rattlesnake Wilderness

Missoula has a 32,976-acre wilderness area in its back yard. The Rattlesnake Wilderness in the Lolo National Forest was created in 1980. It protects into perpetuity much of the very wild and remote Rattlesnake Mountain complex. The wilderness area and the adjoining Rattlesnake National Recreation Area are prime black and grizzly bear habitat. These areas are prized by visitors using the area for hiking, mountain biking, and other natural amenities. Bear and lion activity is constant. Signs are often posted at trailheads warning of bears or lions. On occasion, trails have been closed because of bear activity.

The Lolo National Forest Supervisor's Office in Missoula office provides visitor information regarding bear safety and food storage orders. Trailheads have bear-resistant garbage containers. Some backcountry campsites have bear poles allowing food to be hung out of reach of bears. Rangers knowledgeable about bears regularly patrol the area.

XII. Preventive Measures in Place

A. Missoula Bears

Missoula Bears (http://www.missoulabears.org) is an informational web site and Facebook page for residents living in the valleys around Missoula, including the Bitterroot, Blackfoot, upper Clark Fork, lower Clark Fork and Mission valleys. This web site is a result of years of working to minimize human-bear conflicts, beginning in 2004 with the Rattlesnake neighborhood. This small group of residents increased awareness of the causes of bear conflicts through meetings, door hangers and outreach events. In 2009 Missoula Bears was expanded to include all of Missoula County. This web site is maintained by a partnership between Montana FWP, the U.S. Fish and Wildlife Service Grizzly Bear Recovery Office at the University of Montana and Defenders of Wildlife. The goal of Missoula Bears is to increase local awareness by disseminating information to minimize conflicts with wildlife, particularly bears and mountain lions, while also:

- Increasing human safety
- Minimizing bear mortalities
- Improving sanitation in our neighborhoods
- Reducing the time Montana FWP spends addressing bear conflicts each year.

B. Bears and Apples Program

The Great Bear Foundation's Bears and Apples Program uses staff and volunteer labor to glean fruit from late August to November for Missoula residents who can't manage their own fruit trees. The most common domestic fruits ripening during the gleaning season are apples, pears and plums. The program prioritizes gleaning efforts based on current bear activity, encouraging landowners who can do so to glean their own trees. Fruit is donated to the Food Bank and Poverello Center, given to Western Cider to create Great Bear Cider, used by volunteers or composted. The program removes 6,000 to 10,500 pounds of fruit each year from bear corridors.

The Great Bear Foundation uses data from its gleaning program and Montana FWP bear conflict reports to map bear conflicts and fruit trees, identifying high conflict areas where gleaning efforts should be focused. The Great Bear Foundation partners with local school and college groups, youth programs, and other organizations to share the message of securing bear attractants to keep bears and humans safe.

C. Bear-Resistant Residential Garbage Carts

Republic Services and Grizzly Disposal provide a variety of bear-resistant roll-out carts and metal bear-resistant dumpsters for leasing to the community. Over the years Republic Services has supplied or temporarily loaned bear-resistant metal dumpsters to schools, parks and administrative sites free of charge. The company has worked with multiple non-governmental organizations and community Bear Aware groups to purchase and place bear-resistant dumpsters and bear-resistant roll-out carts.

For example, between 2000 and 2003 funding through Brown Bear Resources and Defenders of Wildlife allowed bear-resistant steel dumpsters to be purchased for schools and parks in the Missoula area. Also in 2003 and 2004, Republic Services worked with the National Wildlife Federation and the National Fish and Wildlife Foundation to place bear-resistant dumpsters around the community of Lolo and along Highway 12. In 2008 Friends of Grant Creek received a grant to place bear-resistant polycarts at priority sites in the upper portions of the Grant Creek. In 2013 the Ninemile Wildlife Working Group received Resource Advisory Committee (RAC) funding to place bear-resistant roll-out carts in the Sixmile Drainage. In 2018 Republic Services worked closely with the Bear Buffer Zone Working Group to place more than 250 used bear-resistant roll-out carts, acquired from the town of Red Lodge, in the Rattlesnake. In 2021 Republic Services agreed to empty bear-resistant poly carts the town of Lolo purchased with funding from another RAC Grant.

Glossary

Aversive Conditioning: A learning process in which negative effects such as sounds or items that strike a bear (non-penetrating bean-bag rounds fired from a shotgun) applied by wildlife professionals are consistently administered to attempt to reduce the frequency of an undesirable behavior. This may or may not work, depending on the animal. A bear that is food conditioned is rarely successfully aversively conditioned.

Bear Attractant: A food, smell, or human-related factor such as garbage, tree fruit, chickens, compost, livestock feed, pet food, and gardens that will attract bears and other wildlife such as deer.

Bear-resistant Container: A container for garbage or human-related food such as livestock feed that is designed to latch or lock to keep bears out. Such containers can be plastic or metal. The latches on such containers are usually designed to be opened by human hands but not by bears. Such containers must be latched/locked by humans using them to successfully function. The design of such containers usually requires that they be easily emptied by garbage trucks to facilitate waste collection.

Coexistence: The term coexistence refers to human-bear relations resulting from a suite of strategies that have successfully balanced the needs of bears with the needs and desires of humans. These can include managing human use in designated wildlife habitat, excluding or deterring bear attraction to human use and developed areas, securing human-related foods from bears and minimizing negative human-bear interactions. Coexistence is best accomplished by securing human-related attractants from bears.

Conditioning: Learning by a bear or other wildlife that has received a reward or punishment for a behavior.

Developed Areas: Lands designated for human use including parks, picnic areas, industrial areas, urban areas, urban green spaces and campgrounds. Such areas are also frequently used by wildlife.

Displacement: The decline in habitat use by bears and other wildlife, often due to increased levels of human activity resulting in wildlife perception of insecurity. Can also refer to a particular incident where the person and/or the bear flees an area to avoid escalation or contact.

Food-conditioned Bear: Bears that have learned to associate humans (or the smell of humans), human activities, human use areas, or food storage or garbage containers with human-related foods. Food-conditioned bears connect human presence with food and will usually continue this behavior for long periods. These bears frequent developed areas and will continue to seek bear attractants because they have received a food reward. A bear can be food conditioned without being habituated.

Food Conditioning: Food conditioning develops when bears begin to associate humans and human developments with a food reward and then continue to seek human-related foods.

Human-bear Conflict: When bears use human-related foods and thus come into undesirable close association with humans or human use areas, exhibit stress-related or curious behavior, make physical contact with a person or exhibit clear predatory behavior, or are intentionally harmed or killed (not including legal harvests) by a person.

Habituated Bear: Bears that show little to no overt reaction to or avoidance of humans because they have been exposed repeatedly to humans without substantial negative consequences.

Habituated and Food-conditioned Bear: A bear that does not avoid people and seeks human-related foods. Such bears can be unafraid of humans and may be aggressive as they seek human-related foods by approaching humans and being active in daylight.

Habituation: The waning of a normal avoidance response by bears and other wildlife caused by repeated interactions with something that is normally avoided with no negative consequences. For example, close association with humans or close association with vehicles along a road without a negative consequence can lead to reduced avoidance and increased acceptance of humans or vehicles. A bear can be habituated but not food conditioned.

Hazing: A technique where aversive conditioning is administered to a bear to immediately modify the bear's undesirable behavior.

Human-related Food: Foods related to humans that bears can eat. See "Bear Attractant."

Incident: An occurrence that involves a bear conflict where a bear caused property damage, obtained human-related food, or killed or attempted to kill chickens, livestock or pets.

Interaction (human-bear): A sighting or encounter when a person and a bear are mutually aware of each other. The person or the bear may perceive the interaction as negative, positive, or neutral.

Management Removal or Management Action: A lethal or nonlethal removal of a bear from the population by or at the direction of management personnel. Such removals are usually due to the bear's actively seeking or using human-related bear attractants. Nonlethal removal involves capturing and relocating the bear to a remote area away from human development.

Occurrence: Any human/wildlife interaction that warrants a management response. See "incident."

Problem Bear: Generally, a problem bear is one that has attracted public attention or required agency action due to its behavior around humans and/or human use areas. Such bears may or may not be food conditioned and/or habituated. A problem bear could be a bear that has entered the urban core by exploring along the river or a major drainage. Such bears can be candidates for preemptive capture and relocation before they become either habituated or food conditioned.

Secured Attractants: Human-related foods that are inside bear-resistant containers, inside secured buildings, or inside electric fencing that prevents bears from accessing these foods.

Translocation or Relocation: The capture and subsequent transport of a bear or bears (in the case of a family group of a female and her cubs) from the site of capture to a location outside the presumed home range to keep the bear from continuing behaviors that resulted in human-bear conflict. Translocation or relocation is rarely a solution to human-bear conflicts because relocated bears will often return to the site of the conflict or continue conflict behaviors in or near the relocation site.

Urban Area: Human developed area in and around a community or town where people reside.

Wildlife Corridor: An area used by bears and other wildlife for travel and bedding/resting. Bears naturally use riparian areas (stream areas) as travel corridors because they are linear features on the landscape with dense vegetation that provides visual cover. Because riparian areas can be natural wildlife corridors, human developments there can be especially susceptible to human-bear conflicts if human-related attractants are not secured from bears.