MONTANA GRIZZLY BEAR MANAGEMENT PLAN 2022

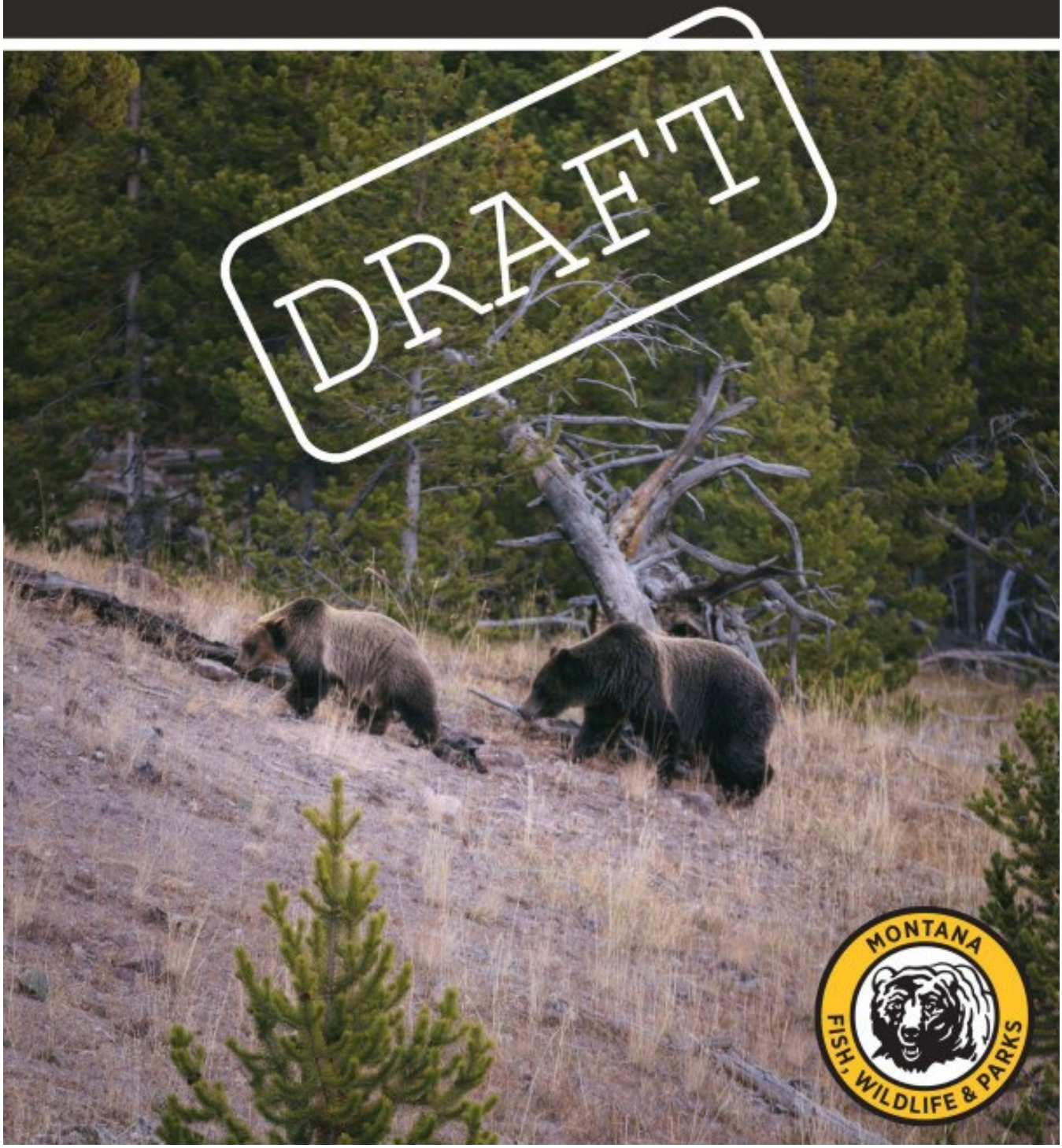


Table of Contents

Figures and Tables

Executive Summary

Montana Fish, Wildlife and Parks (FWP) proposes to manage grizzly bears (*Ursus arctos*) within the state of Montana under the direction of a new, programmatic plan. This plan, analyzed through the Montana Environmental Policy Act (MEPA) process and accompanied by an Environmental Impact Statement (EIS), will be fully compliant with the Endangered Species Act (ESA) and will maintain commitments in existing agreements with federal, state, and tribal agencies. The plan will supplant two previous plans under which FWP has operated: one for Western Montana, and one for Southwest Montana.

Recognizing that grizzly bears have expanded their area of occupancy to include many areas beyond the federally designated Recovery Zones (RZs)—as well as the buffer areas surrounding two of these zones, called Demographic Monitoring Areas (DMAs)—this plan will guide management statewide, focusing on the 30 counties where grizzly bear presence has been documented in recent years or may be documented in the near future. Since grizzly bears currently are listed as threatened under the ESA, the plan is designed to guide state management while this species remains so listed—and also to articulate FWP's future vision for management should any grizzly bear populations in Montana be delisted and full management authority for them be returned to the state.

FWP envisions a future in which grizzly bears will continue to be an important symbol of the State of Montana and part of its cultural heritage. The overwhelming success of grizzly bear recovery, to date, speaks to its importance and central role in the culture of Montana. FWP would continue to ensure their long-term presence in Montana, recognizing that they are among the most difficult species to have in our midst. FWP views grizzly bears as both "conservation-reliant" (meaning the threats grizzly bears face can never be eliminated, only managed; Goble et al. 2012) and "conflict-prone" and embraces the challenges of ensuring the species' healthy future, while ensuring the safety of people and their property. As it supports a thriving grizzly bear population, FWP expects to continue its internationally recognized conflict prevention and response program, and fully expects that removal of some animals will be necessary in the implementation of this plan.

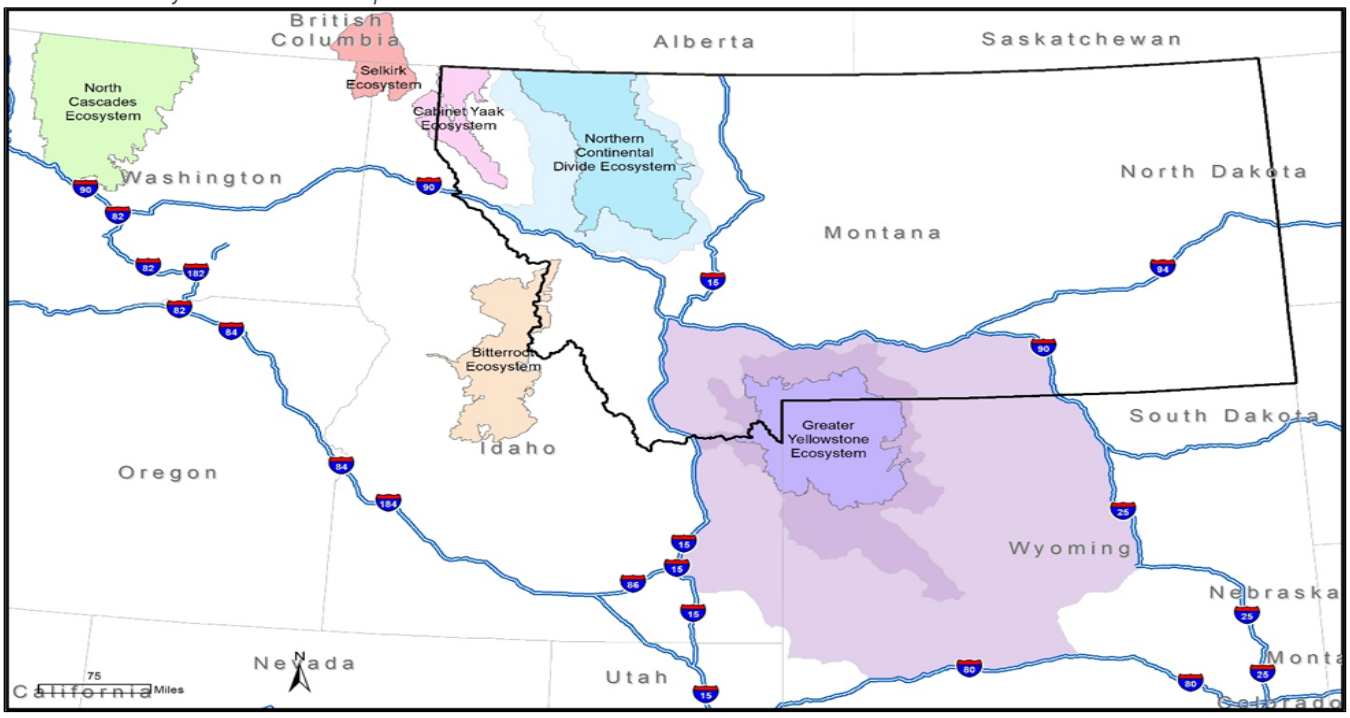
As shown in the Figure 1, FWP's Preferred Alternative considers the cornerstone populations occupying the Northern Continental Divide Ecosystem (NCDE) and the Greater Yellowstone Ecosystem (GYE) as having met recovery targets and supports their delisting. As this plan documents, populations in these two secure areas are abundant and appropriately distributed across the landscape. FWP supports federal policies for meeting recovery goals in the Cabinet-Yaak Ecosystem (CYE) and for attaining natural recovery of a population in the Bitterroot Ecosystem (BE); the latter is comprised largely of wilderness. FWP also takes the position—and this plan documents the case—that populations occupying the NCDE and GYE are abundant enough to provide dispersal opportunities for establishing connectivity among recovery ecosystems. Therefore, FWP's Preferred Alternative does not identify specific statewide population targets beyond those already referenced in the Recovery Plan or Conservation Strategies. Related details are covered in the remainder of this document.

In recent years, grizzly bear populations in the various recovery zones have expanded until they are close to connecting (e.g., NCDE and CYE, NCDE and GYE, NCDE and BE, GYE and BE). A remaining challenge is ensuring long-term connectivity between those zones, across human-populated areas—a challenge that will require effort and patience from FWP and from Montanans. Fortunately, connectivity does not require that grizzly bears occupy the entire state nor does the density of bears in between recovery zones need to match the density of bears within those zones.

FWP believes connectivity can be achieved by securing attractants (to help grizzly bears rely on natural, not anthropogenic, foods and avoid human contact) and in the case of the GYE, by occasional, thoughtful translocations for genetic exchange. Translocation for genetic exchange is not a standalone strategy for connectivity as the conservation of habitat and the prevention of conflicts in between recovery zones are necessary components to ensure long-term connectivity. Measures described in the current GYE Conservation Strategy are and will continue to be used to promote connectivity through natural movements. These measures include habitat protections, population standards, mortality control, outreach efforts, and adaptive management. It is believed these strategies together can bring connectivity between core populations to fruition.

Figure 1. All six grizzly bear Ecosystems, as mapped by USFWS

USFWS-identified grizzly bear Recovery Zones: North Cascades Ecosystem (NCE); Selkirk Ecosystem (SE); Cabinet-Yaak Ecosystem (CYE); Northern Continental Divide Ecosystem (NCDE); Bitterroot Ecosystem (BE); Greater Yellowstone Ecosystem (GYE). The lighter blue surrounding the NCDE, and the darker purple immediately surrounding the GYE, show those zones' Demographic Monitoring Areas (DMAs). The medium purple surrounding the GYE and its darker-purple DMA is a Distinct Population Segment (DPS) boundary. To date, the USFWS has not officially designated any of the remaining populations as DPSs or established DPS boundaries for them. Note the western two Ecosystems do not overlap Montana.



In this document, FWP uses the term "core" or "population core" or "cornerstone population" to refer to the four focal areas entirely or partially in Montana that have been termed "grizzly bear ecosystems" since the early 1980s. FWP's Preferred Alternative does not actively manage for grizzly bear presence outside of core areas, where the likelihood of conflict is elevated and legitimate concerns about human safety are the single highest priority. Core areas refer to the four focal areas entirely or partially in Montana that have been termed "grizzly bear ecosystems," and include the recovery zones and associated demographic monitoring areas. Management decisions for any bears found outside of core areas will be guided by the likelihood that the bear will contribute to the long-term persistence and connectivity of populations. Where that likelihood is low, FWP will be quick to recommend (or implement, if appropriate) control when conflicts arise. Because there are no cornerstone populations of grizzly bears in Central or Eastern Montana (nor does FWP envision a future in which there will be

any), there is nothing with which to connect bears from the West. While grizzly bear presence would not be an objective in areas far from largely mountain habitats and in prairie habitats where agricultural development predominates, individual animals in these areas would be accepted to the degree they remain conflict-free. Hunters could target bears in these areas however only if the Commission approved seasons that allowed hunting there.

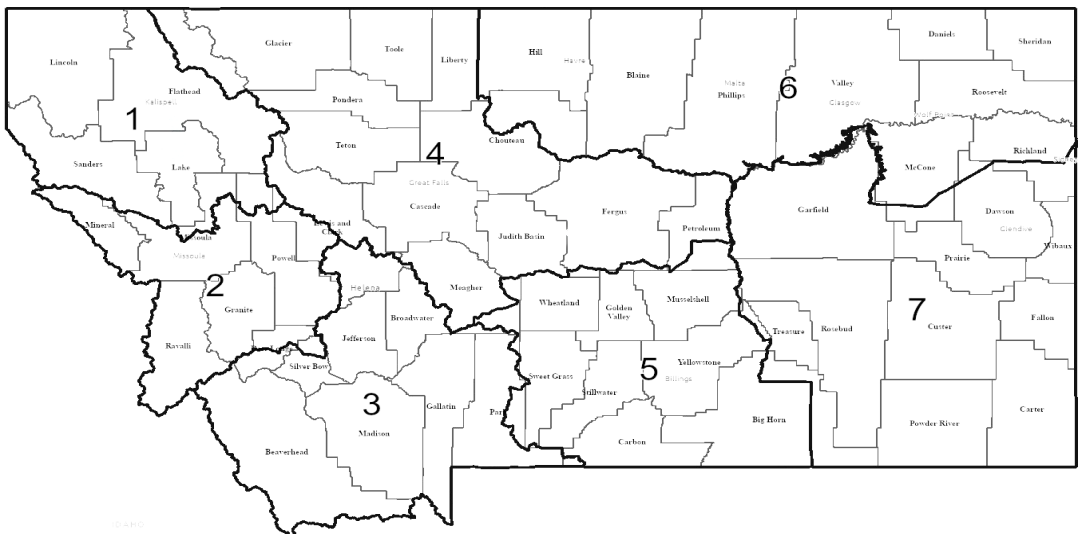
In contrast, where the likelihood is high that grizzly bear presence can contribute to long-term persistence and connectivity with low potential for conflict, FWP would make all reasonable efforts to recommend (or implement, if appropriate) actions that minimize bear removal.

FWP emphasizes that i) human safety would not be compromised under any scenario, and ii) decisions in any given case may deviate from these fundamental principles, as no programmatic plan can anticipate all variables in a situation.

In addition to the years of working with state, federal, and tribal partners, and commitments made under various agreements, FWP's Preferred Alternative has benefitted from the work of the Grizzly Bear Advisory Council (2019-2020), a group of 18 citizens empaneled to draft recommendations related to grizzly bear management. FWP also notes the rigorously implemented public opinion survey of Montanans, finalized in 2020 (survey questions and results are available online at: https://www.cfc.umt.edu/research/humandimensions/news/human-dimensions-grizzly-bear.php). This plan builds upon the experience and interactions of many, both within and outside of FWP, in identifying and successfully "threading the needle" between the difficulties of managing this particular species.

Figure 2. FWP regions in Montana

Below are Montana's seven FWP regions, each with its headquarters city (in parentheses) and approximate counties served. However, note that regional boundary lines do not always correspond to county lines.



Region 1 (Kalispell)	*Region 2 (Missoula)*	*Region 3 (Bozeman)*	*Region 4 (Great Falls)*	*Region 5 (Billings)*	*Region 6 (Glasgow)*	*Region 7 (Miles City)*
Lake	*Granite*	*Beaverhead*	*Cascade*	*Golden Valley*	*Blaine*	*Carter*
Lincoln	*Mineral*	*Broadwater*	*Glacier*	*Musselshell*	*Daniels*	*Custer*
Sanders	*Ravalli*	*Gallatin*	*Judith Basin*	*Stillwater*	*Hill*	*Fallon*
…and parts of…	*…and parts of…*	*Jefferson*	*Liberty*	*Sweet Grass*	*Phillips*	*Garfield*
Flathead	*Deer Lodge*	*Madison*	*Pondera*	*Wheatland*	*Richland*	*Prairie*
Lewis & Clark	*Lewis & Clark*	*…and parts of…*	*Teton*	*Yellowstone*	*Roosevelt*	*Rosebud*
Missoula	*Missoula*	*Carbon*	*Toole*	*…and parts of…*	*Sheridan*	*Treasure*
Powell	*Powell*	*Deer Lodge*	*…and parts of…*	*Big Horn*	*Valley*	*Wibaux*
Lewis & Clark	*Silver Bow*	*Lewis & Clark*	*Chouteau*	*Carbon*	*…and parts of…*	*…and parts of…*
		Meagher	*Fergus*	*Fergus*	*Chouteau*	*Big Horn*
		Park	*Flathead*	*Meagher*	*Dawson*	*Dawson*
		Silver Bow	*Lewis & Clark*	*Park*	*McCone*	*McCone*
			Meagher	*Petroleum*	*Richland*	*Richland*
			Petroleum			

Table 1 compares, side by side, the no-action alternative vs. FWP's Preferred Alternative, with each row corresponding to an identified issue. Background and details are provided in the main body of the document. (Note: For definitions of the abbreviations, acronyms, and other terms used throughout this document, see the Definitions section following this table.)

Table 1. Alternative A vs. Alternative B: Comparison of two plans and their outcomes

Issue	A. No action (status quo)	B. FWP Preferred Alternative
Role of grizzly bears in Montana	Grizzly bears would continue to be the "official state animal of Montana," recognizing the importance that Montana plays nationally in conservation of the species. However, contention and uncertainty would continue to surround appropriate policy for bears outside of RZs or DMAs, especially in light of growing population dispersal and increasing conflict.	Grizzly bears would be seen as a valued part of Montana's fauna, a species that is both "conservation-reliant" and "conflict-prone." Under this Alternative, clarity would be provided about where grizzly bear presence is a management objective. Core populations associated with existing RZs and DMAs would be maintained near recovery levels. FWP would not actively manage for grizzly bear presence between core areas, where the likelihood of conflict is high but would promote low density populations in between core areas for connectivity purposes. The Preferred Alternative recognizes that human–bear conflicts and bear mortalities would be greater in areas between population cores. Management decisions for any bears found outside of core areas will be guided by the likelihood that the bear will contribute to the long-term persistence and connectivity of populations. Where that likelihood is low, FWP will be quick to recommend (or implement, if appropriate) control when conflicts arise. FWP would use available discretion to remove or relocate grizzly bears involved in conflicts with humans, particularly in areas where connectivity among population cores is unlikely.

Issue	A. No action (status quo)	B. FWP Preferred Alternative
Numerical objectives	There would be no numerical statewide objectives. FWP has committed to population and habitat objectives in the GYE CS, and in the NCDE CS.	FWP would renew its commitment to recovery and long-term demographic and genetic health of grizzly bears, statewide. FWP is committed to specific numeric goals in the GYE and NCDE as articulated in the two Conservation Strategies (CSs) and supports the recovery goal in the CYE. FWP commits to working with the USFWS in developing a goal for the BE when appropriate. However, this Alternative finds that establishing a statewide numeric minimum, optimum, or maximum population objective would not be useful.
Distributional objective	No explicit distributional objective would be identified. FWP would manage for core populations in the NCDE, GYE, and CYE. Current FWP plans envision future biological connections among these cores as well as to the BE. A goal of the NCDE CS is to provide opportunity for connectivity with other Ecosystems in Montana, but no explicit objective is articulated. FWP would continue to struggle with the meaning of "biologically suitable and socially acceptable."	Sustaining grizzly bear recovery would continue to be an objective where recovery objectives have been met. Achieving recovery would continue to be an objective where objectives have not yet been met. Connectivity does not require that grizzly bears occupy the entire state nor does the density of bears in between recovery zones need to match the density of bears within those zones. FWP believes connectivity can be achieved by securing attractants (to help grizzly bears rely on natural, not anthropogenic, foods and avoid human contact) and in the case of the GYE, by occasional, thoughtful translocations for genetic exchange. Translocation for genetic exchange is not a standalone strategy for connectivity as the conservation of habitat and the prevention of conflicts in between recovery zones is a necessary component to ensure long-term connectivity by free-ranging bears. Because there are no cornerstone populations of grizzly bears in Central or Eastern Montana (nor does FWP envision a future in which there will be any), there is nothing with which to connect bears from the West. While grizzly bear presence would not be an objective in areas far from largely mountain habitats and in prairie habitats where agricultural development predominates, individual animals in these areas would be accepted to the degree they remain conflict-free.
Human safety	FWP would maintain a focus on human safety and conflict prevention.	FWP would maintain a focus on human safety and conflict prevention. Grizzly bears will not be proactively removed on public or private lands outside of core habitats unless the bear is exhibiting human habituated and or dangerous behaviors and non-lethal efforts at harassment have been unsuccessful. FWP would use available discretion to remove or relocate grizzly bears involved in conflicts with humans, particularly in areas where connectivity among population cores is unlikely.

Issue	A. No action (status quo)	B. FWP Preferred Alternative
Role of private lands in grizzly bear conservation and management	No explicit direction would be articulated for private lands, but FWP would recognize the pivotal role of private-landowner support in recovery and the significant contribution of private lands in the recovery effort.	FWP would acknowledge the contribution of private lands in providing habitat for grizzly bears beyond secure[1] and would prioritize aid to landowners to minimize conflicts wherever they might occur. Where grizzly bear expansion does not contribute to connectivity, FWP would have lower tolerance for grizzly bears involved in conflicts. Management decisions for any bears found outside of core areas will be guided by the likelihood that the bear will contribute to the long-term persistence and connectivity of populations. FWP would use available discretion to remove or relocate grizzly bears involved in conflicts with humans, particularly in areas where connectivity among population cores is unlikely.
Conflict prevention	Focus would be on the NCDE, GYE, CYE and surrounding areas, including Sapphire, Flint, Highwoods and nearby ranges and, beginning in 2022, the Bitterroot area.	FWP would continue its active conflict prevention program, focusing on the same core areas as at present and areas important to connectivity. FWP would continue to research emerging technologies to minimize human–bear conflict, and provide funding and in-kind support to independent research programs
Conflict response	Conflict bears would be controlled as recommended by IGBC (1986), attempting to minimize number of bears removed. FWP would consider conservation as well as human safety and tolerance in addressing conflicts outside fundamental recovery areas. Responses to conflicts would be generally more aggressive when they occur on or near private lands. FWP would not participate in moving federally listed bears involved in conflicts if captured outside of RZs.	FWP would continue its emphasis on reducing attractants that often precipitate conflicts. When necessary, bears involved in conflicts would be controlled consistent with state and federal guidelines throughout Western Montana. Where discretion is possible, FWP would attempt to minimize removal (moving bears or euthanizing them) where connectivity between core populations is likely but would be quicker to recommend and/or implement removal where connectivity is unlikely. Under 87-5-301, MCA, FWP would not participate in moving federally listed bears involved in conflicts if captured outside of RZs. Under 87-6-106, MCA, a livestock owner or other authorized person may lethally take a delisted grizzly at any time without a permit or license from FWP when a grizzly bear is attacking or killing livestock. Under 87-6-106, MCA, FWP may issue a permit to a livestock owner or authorized person to kill a delisted grizzly bear that is threatening livestock. Such take under 87-6-106 would be constrained by a quota set by the commission and would count against established mortality limits where applicable (e.g., GYE and NCDE demographic monitoring areas). In no case would this quota compromise recovered populations.
Public certainty vs. agency flexibility in conflict response	FWP would anticipate less predictability for the public about agency management actions since there will be no management direction in the different management areas (e.g., RZs, DMAs, outside of the DMAs, connectivity areas).	FWP would anticipate more predictability than the status quo due to adoption of different management direction in different management areas because of the additional guidance provided in the preferred alternative regarding the biological importance of bears in certain locations. However, FWP would retain some discretion to respond to conflict bears on a case-by-case basis.

[1] See ARM 12.9.1401. "Secure" is a general term meaning wild places where humans visit but do not live, where extractive activities are limited spatially and temporally, where roads are primitive and do not dominate the landscape, and where wildlife generally lives with minimal interaction with people. No specific standards are implied.

Issue	A. No action (status quo)	B. FWP Preferred Alternative
Destinations of a bear captured in a conflict setting when moving it away from the site is recommended and FWP is allowed to move it under state law (i.e., captured inside RZ).	Bears involved in conflicts would be moved to areas where the probability of causing additional conflict is low (and only to sites previously approved by the Commission). Since 2009, 84% of destinations have been in FWP Region 1 (72% in Flathead County). Under MCA 87-5-301, only bears captured within RZs could be moved by FWP under listed status.	Bears involved in conflicts with people would be moved to areas with a lower probability of conflict. However, if a non-conflict (non-target or preemptively trapped) animal is captured, FWP would consider moving it to an area outside of the Ecosystem of origin, in which connectivity is an objective, if a Commission-approved release site exists. As the known range of grizzly bears changes, FWP would continue to engage with the Commission to gain pre-approval of new sites within Occupied range (Appendix G) to which grizzly bears could be moved. If delisted, bears involved in conflict outside RZs also could be handled in this way.
Moving non-conflict bears (captured outside RZs) whose origin is uncertain	FWP would have no overall policy; decisions would be made on a case-by-case basis.	If the situation allows, these bears would be left in place. If moving the bear is required, it would be moved to a Commission-approved release site which provides the best chance for the bear to find life requisites while minimizing conflict. The site selected for release need not be located within the Ecosystem of origin, particularly if releasing the bear at the selected site would advance the interests of connectivity. As the known range of grizzly bears changes, FWP would continue to engage with the Commission to gain pre-approval of new sites within Occupied range to which grizzly bears could be moved but would not seek approval of new release sites beyond the most recently updated Occupied range without first going through and extensive environmental analysis.
Moving non-conflict bears to areas outside of Occupied range	Movement of grizzly bears outside occupied range would require a separate environmental analysis and decision notice, as well as approval from the Commission.	If FWP proposes to move a bear into unoccupied habitat for purposes of recovery or connectivity, it will first complete an environmental review and seek approval from the Commission. New FTE positions as approved by the legislature may be established for transfer of bears between ecosystems and does not focus on unoccupied habitat.
Orphaned cubs	Cubs orphaned after September 1 generally would be left in the wild. Bringing younger orphans to Montana Wildlife Rehabilitation Center (MWRC) is discouraged and must follow the MWRC intake policy because i) acceptable permanent captive situations are very difficult to find, and ii) re-release into the wild is only permitted with pre-approved plan and release area.	Cubs orphaned after September 1 would be generally left in the wild. Bringing younger orphans to MWRC is discouraged and must follow the MWRC intake policy because i) acceptable permanent captive situations are very difficult to find, and ii) re-release into the wild is only permitted with pre-approved plan and release area.
Conflict management operational structure	FWP would continue supporting bear managers in or near Anaconda, Bozeman, Chouteau, Conrad, Hamilton, Kalispell, Libby, Missoula, and Red Lodge.	Building on current structure, FWP would prioritize bear manager FTE where expanding population presents the need for conflict management and also opportunities for connectivity while maintaining efforts in the three Occupied cores.
Prioritizing information, outreach, and communication efforts	FWP would maintain efforts aimed at people living, working, and recreating in grizzly bear habitat, targeting both new and long-term residents.	FWP would prioritize efforts where expanding population presents the need for conflict management and also opportunities for connectivity while maintaining efforts in the three Occupied cores.

Issue	A. No action (status quo)	B. FWP Preferred Alternative
Population research and monitoring	Population monitoring and research would continue as described in the NCDE and GYE CSs and in any future CYE or BE CS.	FWP would continue monitoring, as committed to in CSs, but also would prioritize finding ways to increase its understanding of bear status in areas of potential connectivity.
Resources required	No change from present.	Slightly more than current baseline.
Hunting of grizzly bears: Values and beliefs	Goal would be to allow for limited regulated harvest upon delisting of bears, but no specific plans are in place. MCA and ARM identify the potential of grizzly bear hunting if not federally listed.	FWP would prepare for a conservative grizzly bear hunting season if not federally listed, but the decision on whether to establish a hunting season would rest with the Commission. FWP recognizes the strongly held views held by many members of the public. FWP will not recommend a hunting season for at least 5 years after an ecosystem is delisted.
A potential grizzly bear hunt: Functions, expectations, regulations.	If delisted, hunting would be implemented within a scientifically sound framework that maintains a viable and self-sustaining population, and to garner additional public support.	Grizzly bears are statutorily classified as a game animal (87-2-101, MCA). As such, they are protected/regulated by Commission rules. If delisted and a hunting season is adopted by the Commission, it could be used to limit expansion where core connectivity is unlikely (particularly in Central and Eastern Montana), but it would be consistent with maintaining an appropriate density of grizzly bears where connectivity is prioritized. Hunter-killed bears within the DMA would be counted against DMA mortality limits as outlined in the GYE CS and NCDE CS. In no case would hunting compromise recovered populations.
Law enforcement	FWP would continue to work cooperatively with federal (where listed) and tribal authorities to deter unlawful take, and to apprehend violators.	FWP would continue to work cooperatively with federal (where listed) and tribal authorities to deter unlawful take, and to apprehend violators.
Recreational use	FWP would consider grizzly bear presence in all recreation planning and decisions on FWP lands. FWP also would consider grizzly bear presence when providing input on other public land management decisions. FWP would continue or expand its program of educating recreationalists, including hunters, about recreating safely in grizzly bear country.	FWP would consider grizzly bear presence in all recreation planning and decisions on FWP lands. FWP would also consider grizzly bear presence when providing input on other public land management decisions. FWP would continue or expand its program of educating recreationalists, including hunters, about recreating safely in grizzly bear country. Efforts targeted for black bear hunters and wolf trappers will be emphasized.

Issue	A. No action (status quo)	B. FWP Preferred Alternative
Motorized access management	FWP would support land management agencies' policies previously agreed to as part of the CSs. Elsewhere, FWP would continue existing policy of avoiding open road densities exceeding 1 mi/mi^2 on lands it owns or manages. FWP would take the view that, outside of areas with specific road density standards, grizzly bears can coexist with humans in areas with moderate amounts of motorized access if attractants are well managed, conflicts are minimized, and mortality of grizzly bears is sufficiently low.	FWP would support land management agencies' policies previously agreed to as part of the CSs. Elsewhere, FWP would continue existing policy of avoiding open road densities exceeding 1 mi/mi^2 on lands it owns or manages. FWP would take the view that, outside of areas with specific road density standards, grizzly bears can coexist with humans in areas with moderate amounts of motorized access if attractants are well managed, conflicts are minimized, and mortality of grizzly bears is sufficiently low.
Engagement with community groups	FWP would continue informal communication and cooperation with community groups.	FWP would stand ready to adopt the leading role in grizzly bear management but would also acknowledge that success will depend on actions taken by citizens working collaboratively. While exercising its authority and leadership role, FWP would actively encourage bottom-up, community-based efforts to resolve management challenges. FWP expects this approach to yield solutions which are tailored to local communities, bolstered by local buy-in, but which also respect the values and mandates expressed in national and/or state laws and regulations.
Climate change	FWP would not explicitly consider climate change as part of its grizzly bear management.	In allocating resources or suggesting regulations, FWP would consider habitat variations, including those manifest in climate—e.g., lengthening of non-denning seasons may increase chances of human–bear conflict, particularly in autumn. FWP would continue to monitor populations as they respond to these variations and would adjust management responses accordingly.

Definitions

Below are some acronyms, abbreviations, and other terms used in this document.

Acronyms and abbreviations

Term	Meaning
ARM	Administrative Rules of Montana.
BE	Bitterroot Ecosystem, as commonly used and understood by the IGBC.
BIR	Blackfeet Indian Reservation.
BLM	[United States Department of the Interior] Bureau of Land Management.
Commission	Montana Fish and Wildlife Commission—the body appointed to make policy and regulations for FWP.
CS	Conservation Strategy. In this document, "CS" and "Conservation Strategy" refer to two specific documents: the GYE CS (GYE Subcommittee 2016) and the NCDE CS (NCDE Subcommittee 2019) or the most recent version of the Conservation Strategies.
CSKT	Confederated Salish and Kootenai Tribes.
CYE	Cabinet-Yaak Ecosystem, a geographic area defined by the 1993 USFWS Grizzly Bear Recovery Plan as the recovery zone plus the larger area surrounding it in which grizzly bears may be anticipated to occur as part of the same population (USFWS 2022, Species Status Assessment).
DCA	Demographic Connectivity Area. Defined in the NCDE CS as "an area in zone 1 intended to allow grizzly bear occupancy and potential dispersal beyond the NCDE to other recovery areas."
DMA	Demographic Monitoring Area—a geographic area specifically mapped as part of the GYE CS or the NCDE CS. A DMA is an area surrounding an RZ, within which recovered grizzly bear populations will be maintained, population monitoring will be conducted, and demographic objectives will be applied.
DNRC	Montana Department of Natural Resources and Conservation.
DPS	Distinct Population Segment—a designation used by the USFWS to identify a vertebrate population that is distinct and significant relative to the entire species, for the purposes of listing, delisting, or reclassifying under the Endangered Species Act (ESA). In the previous, but vacated delisting proposals, the USFWS designated the grizzly bear population in the GYE as a DPS and delineated a geographic boundary within which this designation applies.
ESA	Endangered Species Act.
FIR	Flathead Indian Reservation.
FTE	Full-time equivalent (staff position).
FWP	Montana Fish, Wildlife, and Parks.
GBAC	Grizzly Bear [Conservation and Management] Advisory Council—a group of 18 citizens selected and empaneled, by then-governor Steve Bullock of Montana, via Executive Order 9-2019. Their final report was issued in 2020.
GBRP	1993 USFWS Grizzly Bear Recovery Plan.
GNP	Glacier National Park.
GYE	Greater Yellowstone Ecosystem, a geographic area defined by the 1993 USFWS GBRP as the recovery zone plus the larger area surrounding it in which grizzly bears may be anticipated to occur as part of the same population (USFWS 2022, Species Status Assessment). This is different than the definition in the Tri-state MOA which uses the geography as the distinct population segment delisting in the 2007 and 2017 USFWS rules.
IGBC	Inter-agency Grizzly Bear Committee.
IGBST	Inter-agency Grizzly Bear Study Team, an inter-agency team tasked with monitoring and researching the GYE population (led by the Northern Rocky Mountain Science Center, under the USGS).
MCA	Montana Code Annotated.
MEPA	Montana Environmental Policy Act.
MOA	Memorandum of Agreement.
MOU	Memorandum of Understanding.
MWRC	Montana Wildlife Rehabilitation Center
NCDE	Northern Continental Divide Ecosystem, a geographic area defined by the USFWS GBRP as the recovery zone plus the larger area surrounding it in which grizzly bears may be anticipated to occur as part of the same population (USFWS 2022, Species Status Assessment).
PCA	Primary Conservation Area. As used in the GYE and NCDE CSs, these are the geographic RZs, renamed as PCAs in the event that delisting occurs, intended "to be managed as a source area for the grizzly bear population."

Term	Meaning
RZ	Federally defined grizzly bear Recovery Zone (as articulated in the Federal Recovery Plan). RZs are predominantly public lands, where habitat protections are in place to support stable-to-increasing grizzly bear populations.
SDM	Structured Decision Making. A formal process to help identify issues and make decisions, especially in uncertainty.
USDA	United States Department of Agriculture.
USDA WS	USDA Wildlife Services.
USFS	United States Forest Service.
USFWS	United States Fish and Wildlife Service.
USGS	United States Geological Survey (under which the Northern Rocky Mountain Science Center operates).

Other terms—specific to bears and bear management

Generally, this document adopts the definitions of terms suggested by Hopkins et al. (2010), as listed below. A single asterisk (*) denotes an exception, while a double asterisk (**) denotes terminology not addressed by Hopkins.

Aggressive behavior: Bear behavior (defensive or offensive) that is threatening to people. Defensive behaviors can be associated with a bear's defense of itself, its young, or its food—often during surprise encounters. Offensive behaviors can be related to a bear's overt attempts to obtain anthropogenic foods in the presence of people or active predation on people.

Aggressive bear: A bear that has displayed aggressive behavior and is a public safety concern.

Anthropogenic attractant: Any food or other attractant having a human origin.

** Augmentation: Deliberate movement of a grizzly bear into a population, with the intent of increasing that population's abundance, genetic diversity, or both.

** Attractant: Anything that attracts a bear to a site [from NCDE Subcommittee 2019].

Aversive conditioning: A learning process in which deterrents are continually and consistently administered to a bear to reduce the frequency of an undesirable behavior.

Bear attack: Intentional contact by a bear resulting in human injury.

** Bear deterrent: An agent administered to bears to cause pain, avoidance, or irritation [from Lackey et al. 2018].

** Boneyard: A site used for disposing of multiple animal carcasses [from NCDE Subcommittee 2019].

Conditioning: Learning triggered by receiving a reward or punishment for a given response to a given stimulus. Rewards of unsecured anthropogenic foods can lead to food conditioning in bears, whereby they learn to associate humans or their infrastructure with food. Although usually used in a binary sense (i.e., either conditioned or not) because we typically lack sufficient knowledge of a bear's behavior and intentions, and also because we lack a nuanced vocabulary for describing both, this trait almost surely exists along a continuum (from mild to severe).

Conflict bear: A bear involved in human–bear conflict (see below).

** Conflict prevention: Strategies and actions that aim to deter or prevent bears from obtaining anthropogenic foods, killing or injuring livestock, damaging property, or injuring people.

** Connectivity: The ability for animals from one population to interact physically with those from a different population. May also be referred to as "linkage." In this document, the term "connectivity" is synonymous with the term "linkage" and a "connectivity zone" is synonymous with a "linkage zone." "Genetic connectivity" refers to situations in which neighboring populations exchange individuals and gene flow is achieved through reproduction of immigrants (and their descendants). In grizzly bears, genetic connectivity is often achieved through dispersal movement by males, which typically involve longer

distances than females, who can mate with females in the target population, in essence, moving genetic material between populations. "Demographic connectivity" refers to situations in which neighboring populations exchange individuals and immigrants (and their descendants) contribute significantly to population dynamics. In grizzly bears, demographic connectivity may be achieved through the residency of females and males in the areas between sub-populations because female bears typically disperse shorter distances than males. Demographic connectivity can often be achieved by moving females. By default, demographic connectivity also achieves genetic connectivity (Costello 2020).

Control: In this context, hazing, moving, or euthanizing a grizzly bear.

** Core: In this document, FWP uses the term "core" (or "population core" or "cornerstone population") to refer to the four focal areas entirely or partially in Montana that have been termed "grizzly bear ecosystems" since the early 1980s. Core includes the recovery zones and associated demographic monitoring areas. These are populations that are either biologically recovered (in the case of NCDE and GYE) or identified by the USFWS as requiring recovery (in the case of CYE and BE). Note that this usage of "core" is different from its meaning in some USFS Forest Plans that use it to mean large, contiguous blocks of landscape devoid of motorized human use. FWP notes, however, that large, remote landscapes have allowed these populations to persist, and we expect that importance to continue in the future.

** Corridor: The term "corridor" is sometimes used when referring to connectivity among core portions of a population's geographic range. In this document we do not use the term "corridor," preferring to use the term "connectivity" (which we also synonymize with "linkage"). The term "corridor" can be misleading because i) it suggests the animals using such areas do so out of specific intention to move from one core area to another (which may not be the reason they are present within the "corridor"); and ii) it suggests that animals within the corridor are present only temporarily while moving through, and that these areas provide only what is needed for such movement rather than for normal requirements of obtaining food, shelter, or mates. We prefer the more general and expansive term "connectivity" because, while individual grizzly bears may use connectivity areas briefly while dispersing or finding a new home range, they may also use them during their entire lives. Connectivity areas may, by definition, contain breeding aggregations of grizzly bears, although they are likely to be at lower densities than within areas we call "population cores" or "population cornerstones."

** Denning season: The typical time period during winter months in which most grizzly bears are hibernating in dens [from NCDE Subcommittee 2019S].

** Depredation: An action generally associated with the killing of domestic livestock animals.

Ecosystem: A term used to define the six recovery areas designated in the Recovery Plan [USFWS 1993]. Use of this technical term recognizes the complex and sometimes unique interactions of many living and non-living components within each of these large landscapes. In this document, reference to an Ecosystem refers to the general area occupied by the resident grizzly bear population and not specifically to the RZ or DMA. Ecosystems are generally considered to be the larger area surrounding the recovery zones in which grizzly bears may be anticipated to occur as part of the same population" (USFWS 2022, Species Status Assessment).

Extirpate: In population biology, this term typically means to eliminate locally. An entire species could be said to be "extinct" (e.g., the passenger pigeon, *Ectopistes migratorius*); in contrast, we'd characterize grizzly bears in California has having been "extirpated."

Food-conditioned bear: A bear that has learned to associate people, human activities, human-use areas, or food storage receptacles with food. Although usually used in a binary sense (i.e., either food-conditioned or not), the learning process usually means that an individual falls within a continuum from mildly to severely food-conditioned. (See definitions for Conditioning and Habituation.)

Habituation: The waning of an innate response to a stimulus after repeated or prolonged presentations of that stimulus. Bears that are continually exposed to humans, with no negative consequences, can lose their innate avoidance behavior and become habituated—or, more precisely, human-habituated. Although usually used in a binary sense (i.e., either habituated or not) because we typically lack sufficient knowledge of a bear's behavior and intentions and we also lack a nuanced vocabulary for describing both, this trait almost surely exists along a continuum (from mild to severe).

Hazing: A technique in which deterrents are administered to a bear to immediately modify the bear's undesirable behavior.

* Human–bear conflict: An interaction between a grizzly bear and human in which a bear either does, or attempts to, damage property, kill or injure livestock, damage beehives, injure people, or obtain anthropogenic foods, attractants, or agricultural crops [adapted from NCDE Subcommittee 2019]. In the field, the specifics of each situation are reviewed by an inter-agency team, bears are not necessarily "branded" as being "conflict" or "non-conflict" animals based solely on this definition and chosen responses can vary in their aggressiveness based on a comprehensive review.

** Hyperphagia: An increase in bears' appetite and food consumption during the fall, associated with the need to gain adequate fat reserves for hibernation [from NCDE CS].

Management removal: Lethal or non-lethal removal of a bear from the population by or at the direction of management personnel.

Nuisance bear: FWP follows Hopkins et al. (2010) in considering this term poorly defined and susceptible to multiple interpretations, so its usage is avoided in this document. We note, however, that it was still in common usage in the mid-1980s when IGBC (1986) was finalized, so it appears in that guidance as well as some older technical literature.

Occupied range. When capitalized, an Occupied range is the area within a boundary produced using standardized, objective algorithms to differentiate the area where grizzly bear populations are verified to have colonized, from the area where only scattered observations (perhaps of dispersing individuals) are known. The outermost boundaries of Occupied range are revised biennially, using newly obtained data and the standardized algorithms.

Onsite release: A management method that consists of releasing a captured bear back to its original site of capture.

Preemptive capture: Capturing a bear deemed to be at significant risk of future conflict (often due to nearness to human infrastructure), even though no conflict has yet occurred.

Relocation: The terms "relocation" and "translocation" are often used interchangeably. In this document, FWP uses relocation to describe the capture and subsequent transport of a bear from the site of capture to another location in association with attempts to mitigate human–bear conflicts.

** Removal: Capture and removal of a bear, either lethally or by placement in an authorized zoological or research facility.

Translocation: The terms "relocation" and "translocation" are often used interchangeably. In this document, FWP uses translocation to describe the capture and subsequent transport of a bear for purposes unrelated to human–bear conflict, such as demographic or genetic augmentation of another population.

** Transplant/Transplantation: Transplantation is defined in MCA 87-5-702(11) as "the release of or attempt to release, intentional or otherwise, wildlife from one place within the state into another part of the state." For purposes of this plan, to "transplant" means to move a bear outside of its home range into an area generally understood as different from the area of its origin. The word "transplant" generally is used in reference to a new population becoming resident in the new area as a result of human-assisted movements (e.g., in the case of a transplanted population).

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Part I: Introduction to This Plan

Scope of this document and of decisions to be made

This document provides the foundation for Montana Fish, Wildlife, and Parks' (FWP) decisions regarding conservation and management of grizzly bears at the state level. It is not intended as a compendium of all aspects of grizzly bear conservation or management in Montana, because some decisions and commitments are incorporated in existing plans or agreements. These other documents are referenced and briefly reviewed herein, but for the sake of brevity, are not repeated in their entirety. That said, adoption of this plan will serve to recommit FWP to the existing plans and strategies to which it is a party.

Purpose and need

Grizzly bears are listed under the Endangered Species Act (ESA) of 1975 as a threatened species throughout the entire lower 48 states. Management authority rests with the U.S. Fish and Wildlife Service (USFWS) for recovering the species. That said, federal, state, and tribal authorities typically work cooperatively and very few day-to-day management activities are conducted by field staff of the USFWS. Rather, states, tribes, and other agencies conduct most work "on the ground" under authority permitted by the USFWS.

States, tribes, and other federal agencies are expected to produce, and have in the past produced, management plans that explain and guide their priorities and resource allocations. Potential changes in status of grizzly bear populations within Montana also must be considered in this statewide plan.

In 1993, the USFWS recognized six areas, four of which are partly or wholly within Montana, with recovering grizzly bear populations. The 1993 USFWS Grizzly Bear Recovery Plan (GBRP) identifies a recovery objective of delisting each of the populations sequentially as they achieve the recovery targets, along with continued ESA protection of each population until its specific recovery targets are met.

At present, in two of the recovery areas that are partly or entirely located within Montana (NCDE and GYE), USFWS has found that grizzly bears have met existing recovery criteria. In 2007 and again in 2017, the USFWS designated the GYE population as a Distinct Population Segment (DPS) for the purpose of delisting, and also delineated a geographic boundary within which this designation applies and within which delisting would occur. Because the delisting rule was vacated in 2007 and 2017, the DPS designation was also vacated. To delist the NCDE population, the USFWS may similarly designate it as a DPS and delineate a DPS boundary.

Delisting of the GYE and NCDE populations could occur within the time frame typically considered for FWP management plans (generally not less than 10 years), in which case federal oversight of state activities would cease within each of those designated DPS boundaries after a five-year mandatory post-delisting monitoring period during which the USFWS will have an oversight role. Federal oversight would continue outside the DPS boundaries for these populations until targets outlined in the Recovery Plan (1993) are met and those recovered populations are delisted. This potential multi-jurisdictional future provides an additional rationale for a comprehensive, statewide plan for Montana.

Grizzly bears have expanded in abundance and distribution in Montana in recent years (see Figures 3 and 4), enhancing long-term prospects for population sustainability by increasing the likelihood of biological connectivity. However,

because grizzly bears can damage property and injure or kill people, their closer proximity to human habitation poses new challenges for Montanans beyond those anticipated by existing plans and agreements.

Figure 3. Main areas of Montana with estimated occupied range of grizzly bears (2023)

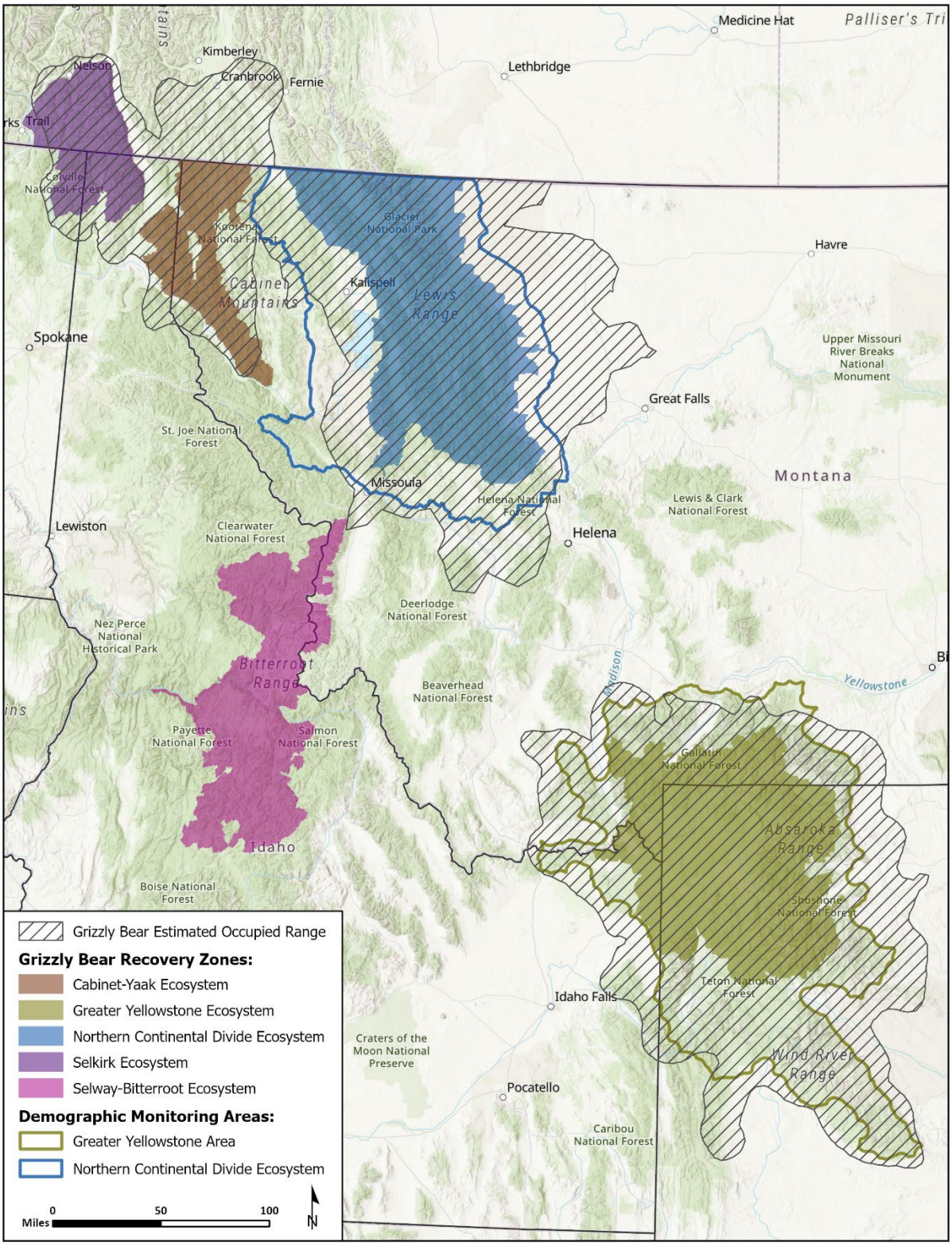


Figure 4. Other areas where grizzly bears "may be present" (2023)

According to USFWS (July 2023), blue shading is where grizzly bears "may be present." This term includes individuals that may be scattered or dispersing, and does not necessarily indicate a meaningful assemblage of bears in all outlying areas.

Species List Areas (or "may be present" map) help federal agencies determine where effects to listed species should be considered for consultation from actions they carry out, fund, or permit to meet requirements under Section7(a) of the Endangered Species Act (ESA). As grizzly bears expand their range, the SLA is intended to be spatially inclusive of all areas that meet the "may be present" methodology for grizzly bears. The "may be present" methodology is derived from current estimated occupied range and verified location data outside of current distributions; not all areas that are designated as "may be present" meet the criteria to be included in estimated occupied range. Local evaluation is needed by federal Level 1 ESA Streamlining Teams to determine potential effects of agency actions where grizzly bears "may be present." Identifying locations where grizzly bears "may be present" will facilitate project planning activities that promote grizzly bear conservation and recovery. The grizzly bear SLA is updated with any new verified sightings every 90 days. Although we receive sighting information throughout the year, there can be a lag between receipt of the information, verification of grizzly bear, and updating the map. To provide the most up-to-date information for Section 7 consultation pending those updates, we will notify the relevant federal agency personnel when any new HUCs are added. We will continue to supply an updated verified map to all partners through PAC.Last updated July 19, 2023 with data from 2013 to July 19, 2023.

This draft plan reflects these updated biological and social conditions, and updates and incorporates two existing plans. It takes advantage of recommendations and perspectives previously provided by the Governor's Grizzly Bear Advisory Council (GBAC), as well as a recently completed survey of Montanans' knowledge, beliefs, and attitudes toward grizzly bears (survey questions and results are available online at: https://www.cfc.umt.edu/research/humandimensions/news/human-dimensions-grizzly-bear.php). The plan also reflects existing laws, regulations, and policies, as well as intergovernmental commitments made by FWP and by the Commission. It will guide FWP activities consistent with ESA listed status, but also will guide management should delisting of recovered populations occur in the future.

Sidebar 1. FWP process and ESA delisting

FWP recognizes that many citizens have great interest in the listing status of the grizzly bear under the Endangered Species Act (ESA). ESA listing and delisting are federal processes. Petitions from the states of Montana and Wyoming to remove grizzly bears from the list of threatened and endangered species in the NCDE and GYE areas (and from Idaho to delist all populations south of Alaska) were submitted in 2022.

This FWP process recognizes the current federal status of the grizzly bear and anticipates policy under a possible future change in that status. However, this document is not a delisting plan. Removing a species from the list of threatened

and endangered species requires not only documentation that recovery criteria have been met, but also documentation that the state has in place adequate regulatory mechanisms to ensure that listing will not be necessary in the future.

Montana's grizzly bear management plan illustrates Montana's aptitude and commitment to successfully manage the species, both now and in the future. In doing so, FWP demonstrates the adequacy of its regulatory and management mechanisms, in accordance with the listing and delisting criteria set forth in Section 4 of the ESA.

Context and background of this document

This draft plan, presented here as the Preferred Alternative, is written in the context of two existing FWP plans (cited above) and public processes that are considered to have fulfilled the scoping requirements of MEPA. Each is briefly summarized here.

Recognizing that grizzly bears are expanding in geographic range, that conflicts with humans appear to be increasing, and that populations of both grizzly bears and humans are likely to keep increasing in the immediate future, FWP realized new planning guidance may be necessary for grizzlies. A structured decision-making (SDM) process resulted in decisions to work with the Governor to empanel an independent citizens' council to examine these issues and, following that, to replace existing management plans with one statewide plan. The SDM process also developed a problem statement, strategic objectives, fundamental objectives, and constraints/sideboards; these are reiterated in the Sidebar 2.

Sidebar 2. FWP problem statement, resulting from 2019 structured decision-making process

"Grizzly bears in Montana are native, iconic carnivores that have high value to people and cultures across the state and the world and play important roles in Montana ecosystems. At the same time, they can and do injure or kill people and livestock, and cause property damage and economic loss, which may disproportionately affect certain individuals. Their potential presence is both valued and feared. While the benefits of grizzly bear population recovery are accrued broadly across society, the costs associated with increasing grizzly bear populations tend to be focused on communities and the public that directly live with grizzly bears.

After 40 years of hard work by all Montanans, grizzly bear populations have reached and surpassed federal recovery goals in the GYE and NCDE. Densities of grizzly bears are increasing, and they are now expanding into areas where they haven't been for decades, including connectivity areas between recovery zones. These areas include a greater percentage of working private lands and places where the human population s expanding, creating a greater potential for conflicts. Existing management plans and agency communications plans built public expectations on where bears would occur and do not reflect recent changes to bear distribution.

Montana remains committed to maintaining the long-term viability of grizzly bears, consistent with our long history of wildlife conservation. The challenge is balancing conflicting values and addressing diverse needs, especially in newly recolonized areas. Federal protected status currently governs Montana's ability to address distribution and abundance. However, many challenges would remain even if delisted. These are likely to intensify with time, including the likely establishment of more bears in more areas, adding to the complexity. Currently, FWP lacks adequate resources and public support to meet this challenge where bears currently exist, much less in areas where they may recolonize.

The time is right for Montana to address its statewide strategy and approach to grizzly bear conservation. Timely and continued engagement with Montanans is essential for success.

Strategic objectives

1. Ensure grizzly bear population viability over the long term.
2. Maximize human safety.
3. Maximize effective response to conflicts involving grizzly bears.
4. Maximize effective grizzly-related outreach and conflict prevention.
5. Maximize intergovernmental, interagency, and tribal coordination.

Fundamental objectives

1. Maximize engagement among people with diverse and competing values.

2. Maximize public confidence and ownership in grizzly bear management.
3. Maximize transparency of grizzly bear planning processes.
4. Maximize clarity of grizzly bear management objectives in all parts of the state.
5. Maximize clarity of guidance for making time-sensitive management decisions.
6. Minimize financial costs of grizzly bear management.
7. Maximize public agreement on the role of hunting at appropriate locations, levels, and times.
8. Maximize management flexibility within the confines of the ESA.

Constraints / sideboards
Maximize considerations of existing grizzly bear management objectives and existing commitments. Honor intra and interagency commitments already in place."

On July 24, 2019, then-governor Steve Bullock signed Executive Order 9-2019 (see Appendix D), creating a Grizzly Bear Conservation and Management Advisory Council (GBAC) consisting of 18 Montana citizens[2]. In setting up the need and rationale for this council, the Executive Order included a preface which is worth repeating here (note: the "Whereas" preceding each line has been deleted).

> Grizzly bears are valued by people and cultures across Montana and around the world, yet are also feared and can affect people's livelihoods and safety. Their numbers in Montana continue to increase and have expanded into areas where they have not been for decades, including places key to connecting their populations. Despite this success, long-term coexistence of people and grizzly bears across the landscape will remain a challenge.
>
> Existing management plans did not fully anticipate grizzly bear distribution across the landscape and as Montana's human population continues to grow, we can expect conflicts between bears and people to increase in frequency and complexity.
>
> As "threatened" under the federal Endangered Species Act (ESA), grizzly bears are currently managed by the U.S. Fish and Wildlife Service—in cooperation with the Montana Department of Fish, Wildlife and Parks (FWP), the U.S. Forest Service, the National Park Service, the Bureau of Land Management, the Blackfeet Tribe, and the Confederated Salish and Kootenai Tribes. In the Grizzly Bear Recovery Plan, the U.S. Fish and Wildlife Service identifies six recovery areas, and four of those exist wholly or partly within Montana. Recent litigation has created uncertainty about the delisting of grizzly bears from the ESA's "threatened" list.
>
> It is timely that Montanans work together to determine how the state and its partners will collectively manage and conserve grizzly bears. It is important to recognize existing grizzly bear management objectives and existing intra-agency and inter-agency commitments already in place, including conservation strategies, monitoring protocols, recovery plan criteria, and forest plans. The future of grizzly bear management in Montana must maintain scientific integrity, and balance diverse interests and values.
>
> Montana remains committed to maintaining the long-term viability of grizzly bears and balancing their needs with those of people. It is important for the public to have ownership and confidence in grizzly bear management in Montana. To ensure its citizens have a voice in the future of grizzly bears, Montana must provide meaningful opportunities for people to engage in a public discussion around grizzly bear management, recovery, and conservation. It is in the best interests of all Montanans to bring stakeholders and experts together to recommend statewide strategies for conserving and managing grizzly bears for today and for the future.

Citizens' recommendations from Governor's Grizzly Bear Advisory Council (GBAC)

In August 2020, the GBAC[2] submitted to Governor Bullock its final report —which contained a vision statement, guiding principles, and specific recommendations—along with advice about resources required to implement them. The GBAC report provides an indispensable foundation for considerations made in this draft document and plan, as well as for final decisions on policy and strategy. Additional public input, received as part of the GBAC process, also has been incorporated. The complete GBAC report, posted online at https://fwp.mt.gov/gbac, is included in this document as Appendix E.

Summary of GBAC report (2020) – including its Guiding Principles and Council Recommendations

The vision statement of the GBAC is as follows: "We envision fully recovered grizzly bear populations in the four identified recovery areas in Montana and landscapes in-between that accommodate grizzly bear presence and connectivity while maintaining the safety and quality of life of those that live, work, and play in Montana."

In Guiding Principle 1, the GBAC advised that "all those living in or visiting Montana should expect the potential presence of grizzly bears on the landscape…." In Guiding Principle 2, the GBAC advised that "the identification of areas between established recovery zones that best contribute to genetic and demographic connectivity is necessary to prioritize resource allocation, focus outreach and education efforts, build social tolerance, and proactively engage local communities and landowners." In Guiding Principle 3, the GBAC advised that "as expansion occurs outside the four recovery Ecosystems and the landscapes in-between them in Montana, FWP and relevant agencies will have to balance this expansion with the need to prioritize resources that support both public and private lands." In Guiding Principle 13, the GBAC advised that "both genetic and demographic connectivity are important to the long-term sustainability, persistence, and resiliency of grizzly bears. Connectivity areas will exist in diverse social and environmental settings. Not all these settings are conducive to permanent habitation but should be managed to promote genetic and demographic connectivity in biologically suitable habitat, being mindful that biologically suitable does not always mean acceptable."

After "Guiding Principles" came "Council Recommendations," with subheadings.

Under the subheading of "Grizzly bear distribution, relocation, and connectivity," the GBAC stated that "genetic and demographic connectivity among Montana's four recovery zones is important to the long-term viability of grizzly bear populations in the continental United States" and added that the intent of their recommendations was to "balance the continued importance of public lands with the need for the involvement of private lands to support our vision for an interconnected metapopulation of grizzly bears in Montana."

Under that same subheading, a few of the Recommendations were as follows. In Recommendation 19 the GBAC advised that "FWP should continue to allow natural movement to new areas between all four identified recovery zones in Montana." In Recommendation 20, the GBAC advised that "FWP and all relevant agencies should clearly define the 'landscapes in-between' the four recovery zones in Montana that are important for genetic and demographic connectivity and the long-term sustainability of the grizzly bear." Finally, in Recommendation 21, the GBAC advised that "FWP, in coordination

[2] Alphabetically, members of the GBAC (and their locations) were: Brett Barney (Wyola), Chad Bauer (Missoula), Darrin Boss (Havre), Jonathan Bowler (Condon), Trina Jo Bradley (Valier), Caroline Byrd (Bozeman), Michele Dieterich (Hamilton), Erin Edge (Missoula), Nick Gevock (Helena), Lorents Grosfield (Big Timber), Kameron Kelsey (Gallatin Gateway), Robyn King (Troy), Kristin Kipp (Browning), Cole Mannix (Helena), Heath Martinell (Dell), Chuck Roady (Columbia Falls), Greg Shock (St. Ignatius), and Anne Schuschke (East Glacier). Facilitators were Shawn Johnson and Heather Stokes Center for Natural Resources and Environmental Policy, University of Montana.

with relevant agencies and through a public process, should evaluate and identify those landscapes that can reasonably be considered important for grizzly bear recovery and connectivity from those that cannot, and clearly distinguish these in its management plan. Such a distinction is necessary for determining appropriate relocation sites between the four recovery zones, as well as for prioritizing resources for outreach and education, transportation upgrades, and conflict prevention, reduction, and response efforts. These decisions should be in accordance with current Conservation Strategies."

In Guiding Principle 5, the GBAC offered that "strategies and tools aimed at proactively preventing or reducing conflicts are often effective and can be less expensive than compensating for conflict after the fact." In Guiding Principle 10, the GBAC advised FWP to "strive to cultivate social tolerance through sound management decisions and conflict prevention measures."

Also in Council Recommendations, under the subheading of "Conflict prevention and reduction," the GBAC stated the following: "Preventing conflicts with grizzly bears is essential to the development of social acceptance and the continued conservation of grizzly bears. Proactive, inclusive efforts to mitigate conflict can engage communities, protect private property, maintain human safety, and be an efficient use of limited resources, while minimizing associated bear mortality."

Under that same subheading, the Recommendations included the following points.

In Recommendation 11, about human–bear conflicts in and around developed areas, the GBAC advised FWP to:

- provide guidance for "land use planning to prevent human/grizzly conflicts;"
- recommend actions to "governing bodies on how to minimize grizzly bear conflicts;"
- help local communities "identify and use available local grants for conflict prevention;" and
- prioritize the "research, development, and funding of new and innovative tools and techniques for conflict prevention and aversive conditioning…."

In Recommendation 12, about conflicts related to agriculture, the GBAC advised FWP to:

- "research and make recommendations on best management practices that help reduce depredations on livestock and non-livestock commercial losses;"
- "integrate technology to allow for timely reporting of agricultural conflicts to neighboring farms and ranches;" and
- "increase and diversify partnerships, funding, and support for community-based groups and other organizations" working on preventing or reducing human–bear conflicts.

Additionally, under the subheading of "Education and outreach," in Recommendation 3 the GBAC advised FWP to "provide residents and landowners with accurate information on the effective use of non-lethal methods to haze grizzly bears."

Under the subheading of "Conflict response and protocols," the GBAC stated that "timely and consistent conflict response is necessary to build and maintain relationships between FWP and the communities where grizzly bears exist. Building these relationships prior to conflict will help to promote open communication and sharing of information if the need for response should occur."

Under that same subheading, in Recommendation 15, the GBAC advised FWP to:

- "make bear management specialists Full Time Equivalent (FTE) positions included in permanent base funding, provide each specialist with a year-round technician, and create more of these fully funded positions as needed;"
- "clarify management protocols for conflict bears and continue to share them with landowners, livestock producers, and communities to maximize transparency;" and

- "periodically review inter-agency Memorandums of Understanding (MOUs) for opportunities to improve efficiency and capacity for conflict response."

And under the subheading of "Grizzly bear distribution, relocation, and connectivity," in Recommendation 23 the GBAC advised FWP to "expedite work with landowners, agricultural producers, and communities to prioritize the creation of new suitable relocation areas inside and between recovery Ecosystems which further the conservation, connection, and recovery of grizzly bears in Montana while ensuring existing land uses are supported."

In Guiding Principle 1, the GBAC advised that "All those living in or visiting Montana… should have access to education, assistance, and resources involved with coexisting with grizzly bears."

Returning to Council Recommendations, under the subheading of "Education and Outreach," the GBAC stated that "Education and outreach should engage all Montanans and visitors in the shared responsibility of grizzly bear conservation."

More specifically, under that same subheading, the GBAC advised FWP as follows:

- in Recommendation 2, to "provide easy access to education about hunting safely in grizzly bear country for resident and non-resident hunters in Montana;"
- in Recommendation 3, to "provide residents and landowners with accurate information on the effective use of non-lethal methods to haze grizzly bears;"
- in Recommendation 5, to "create open and accessible communication channels between bear managers and the public to encourage communal efforts around bear awareness and conflict prevention;"
- in Recommendation 6, to work with other agencies to "create consistency and timeliness around public access to grizzly bear mortality data across recovery Ecosystems;"
- in Recommendation 7, to "explore ways to inform, promote, and incentivize Bear Aware programs in communities;"
- in Recommendation 8, to "support educational efforts to build a common understanding of perspectives between agricultural producers and urban communities;" and
- in Recommendation 9, to "create and use consistent messaging around the use and effectiveness of bear spray."

Finally, in Recommendation 10, the GBAC supported the creation of "a full time and permanent Grizzly Bear Information, Education, and Outreach Coordinator to support and contribute to the broader efforts of FWP's Wildlife Stewardship Outreach Specialist."

The GBAC reported to the Governor that "substantial deliberation was given to the role of hunting; however, because of the diversity of interpretations of available science, backgrounds, values, and opinions individually held by Council members, we cannot reach consensus that hunting has a role in grizzly bear management." Further considerations were contained in a non-consensus section of the GBAC document.

Statewide survey of Montanans' attitudes toward grizzly bears

FWP and human dimension researchers Holly Nesbitt, Alex Metcalf, and Elizabeth Metcalf (of the University of Montana) designed and administered a survey of Montanans' general views about grizzly bears and attitudes toward their management. Questionnaires were sent to 5,350 randomly selected adults (aged 18+) within Montana in early November

2019, with follow-up mailings in late November 2019 and early January 2020. A total of 1,758 responses were received. To account for possible non-response bias, responses were weighted to account for differences between the sample and the adult population of Montana in terms of age, gender, educational level, and geographic location (rural vs. urban, within or outside grizzly bear range). See https://www.cfc.umt.edu/research/humandimensions/news/human-dimensions-grizzly-bear.php for the full questionnaire and results (Nesbitt et al. 2020).

Below is a summary of key survey results relevant to FWP developing a statewide grizzly bear management plan.

- Most Montanans (92%) agree that grizzly bears have a right to exist in Montana, and 86% find it acceptable for bears to live in primarily forested areas that are publicly owned. When asked if grizzly bears do not belong where people live, the responses were more evenly divided: 35% agreed or strongly agreed, and 43% disagreed or strongly disagreed with this statement.
- Most Montanans (57%) disagree that their recreational opportunities are limited by grizzly bears; however, 23% agree or strongly agree.
- When asked about their emotional response to seeing a grizzly bear from a distance while walking, more Montanans reported they would be nervous, scared, or upset than those that reported they would be relaxed, not scared, or pleased.
- A minority of Montanans agree that their personal safety is threatened by grizzly bears (19%) or that grizzly bears pose a safety risk to people they care about (28%).
- About 60% of Montanans agree that people should learn to live with grizzly bears near their homes, while 20% disagree. When asked about taking actions to reduce human–bear conflict on their own property, respondents' willingness was high for securing attractants, but lower for actions related to livestock.
- Almost all Montanans (94%) report they have or would be willing to carry bear spray while recreating or hunting.
- About 49% of Montanans support enough hunting to manage grizzly bear population size; 30% support a very limited season that would not affect the population size; and 4% support as much grizzly bear hunting as possible. About 17% believe grizzly bears should never be hunted in Montana.

Nesbitt et al. (2023) found that residents with positive attitudes and emotional dispositions toward grizzlies or who trusted the agency were more likely to believe populations were low. Residents who believed hunting should be used to manage conflict, were themselves hunters, had vicarious wildlife experience with property damage, believed grizzly populations were expanding, or were older were more likely to believe populations were too high. Satisfaction with grizzly bear management peaked when people perceived that the wildlife population levels were neither too high nor too low (Nesbitt et al. 2023).

Existing statutes, regulations, plans, and agreements

The grizzly bear is currently listed under the ESA as threatened throughout its range in the contiguous United States. As such, the ESA and its implementing regulations provide direction and, in some cases, restrict actions that can be taken. The Recovery Plan (USFWS 1993) and its supplements (USFWS 1997, 2007, 2017, and 2018) outline recovery goals and methods pursuant to populations in Montana. Where not superseded by federal law or regulation, the Montana Code Annotated (MCA, Table 2) provides direction to FWP and the Commission regarding the management of grizzly bears. Under

the authority of the MCA, the Commission develops more detailed regulations governing grizzly bear management in the Administrative Rules of Montana (ARM).

Two existing FWP management plans currently guide discretionary activities regarding grizzly bears: 1) the Grizzly Bear Management Plan for Western Montana: Final Programmatic Environmental Impact Statement 2006-2016 (cited hereafter as Dood et al. 2006); and 2) the Grizzly Bear Management Plan for Southwestern Montana 2013: Final Programmatic Environmental Impact Statement (cited hereafter as FWP 2013). Upon its adoption, this current document will supersede those two prior plans.

Additionally, the State of Montana, represented by FWP, is a signatory to two separate documents called Conservation Strategies (CS): the 2016 Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem [Yellowstone Ecosystem Subcommittee 2016]—hereafter called the GYE CS; and the 2019 Conservation Strategy for the Grizzly Bear in the Northern Continental Divide Ecosystem [NCDE Subcommittee 2019]—hereafter called the NCDE CS. The NCDE CS is currently being reviewed and updated. The GYE CS is pending revision and will incorporate the use of the IPM as the population estimator, other related population, habitat, and management information, and revised Tri-state MOA. The revision of the GYE CS is expected to be finalized in 2024 and will be reviewed periodically thereafter. These two CS documents do several things for their respective Ecosystems (GYE and NCDE, Sidebar 3):

- Both CSs provide comprehensive, inter-jurisdictional guidance on how grizzly bears would continue to be conserved and managed if they were to be delisted in the two respective Ecosystems (GYE and NCDE).
- Both CSs summarize and describe strategies, standards, and guidelines to be coordinated among state, federal, and tribal entities for managing grizzly bear populations, conflicts, and habitats in the event that federal protection (under the ESA) is removed in each Ecosystem.
- Both CSs simultaneously prefigure management after delisting, and support delisting by documenting regulatory mechanisms that assure species conservation and avoid future relisting.

However, neither CS provides explicit guidance to FWP for managing and conserving grizzly bears between the ecosystems they define.

The majority of the NCDE grizzly population is expected to occupy the Recovery Zone (RZ)—which, should delisting occur, would be renamed the Primary Conservation Area (PCA)—as well as a buffer surrounding it called Management Zone 1; the two of these together form the Demographic Monitoring Area (DMA). Two Demographic Connectivity Areas (DCAs) are intended to provide sufficient security for female grizzly bear occupancy, potentially providing a demographic “stepping stone” from the NCDE to the CYE (via the Salish DCA) and to the Bitterroot Ecosystem (via the Ninemile DCA). The NCDE CS also identifies a Management Zone 2, which is intended to provide sufficient habitat protection to allow for occasional occupancy and movement of male bears toward the GYE.

The NCDE CS provides documentation and cross-referencing of FWP’s Grizzly Bear Management Plan for Western Montana (Dood et al. 2006), while the GYE CS provides documentation and cross-referencing of FWP’s Grizzly Bear Management Plan for Southwest Montana (FWP 2013). Both CS documents include Memoranda of Understanding (MOUs), in which each agency agrees to use its authority to implement the measures for conservation, monitoring, and cooperation, while respecting statutory responsibilities that differ among signatories.

The demographic objectives of the NCDE CS were formally adopted by the Commission in ARM 12.9.1403. At the time of this writing, FWP anticipates similar ARM commitments for the GYE.

For a map and a summary of these two Ecosystems and their related conservation strategies, see Figures 3, 4 and 5 and Sidebar 3.

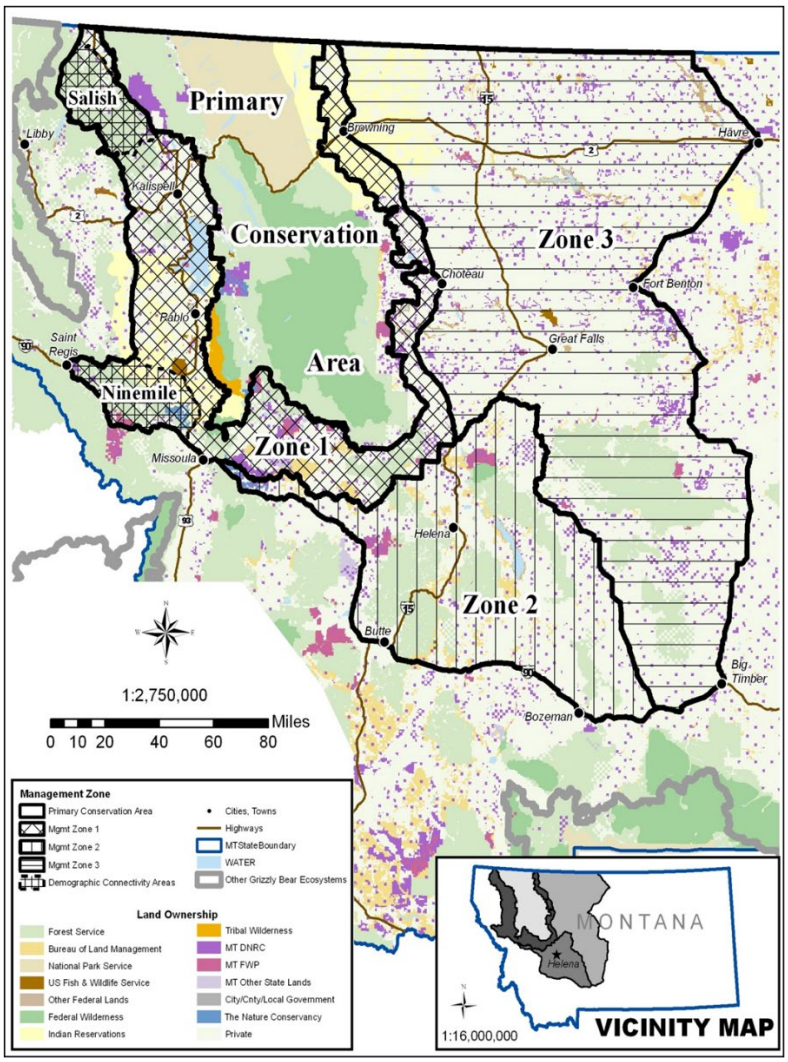
Sidebar 3. Summaries of both (NCDE and GYE) existing Conservation Strategies

The NCDE Conservation Strategy (NCDE 2020)—and by reference its signatory agencies—stated that its goal is to "maintain a recovered, genetically diverse grizzly bear population throughout the Demographic Monitoring Area (DMA: the Primary Conservation Area (PCA) and Zone 1) while maintaining demographic and genetic connections with Canadian populations and providing the opportunity for demographic and/or genetic connectivity with other ecosystems (Cabinet-Yaak, Bitterroot, Greater Yellowstone)."

The GYE Conservation Strategy—and by reference its signatory agencies—stated that it was "developed to be the document guiding management and monitoring of the GYE grizzly bear population and its habitat upon recovery and delisting." Its vision is that the Primary Conservation Areas (PCAs, called Recovery Zones under listed status) would be a "secure area for grizzly bears, with population and habitat conditions maintained to ensure a recovered population is maintained for the foreseeable future and to allow bears to continue to expand outside the PCA. Outside of the PCA, grizzly bears will be allowed to expand into biologically suitable and socially acceptable areas… [but the objective outside the PCA] is to maintain existing resource management and recreational uses and to allow agencies to respond to demonstrated problems with appropriate management actions."

Figure 5. Map of NCDE existing Conservation Strategy zones

Management zones and Demographic Connectivity Areas (DCAs) identified by the NCDE Conservation Strategy. Management Zone 1 surrounds the Recovery Zone (RZ), which after delisting would be called the Primary Conservation Area (PCA). The two DCAs have less restrictive habitat standards but are meant to allow for occupancy of adult female grizzly bears. Management Zone 2 is meant to allow for movement of male grizzly bears toward the southeast for genetic exchange. No specific habitat protections are developed for Management Zone 3, where occupancy may be incompatible with human presence and management is expected to focus on conflict prevention and response.


Salish
Primary
Libby
Kalispell
Browning
Havre
Conservation
Zone 3
Choteau
Fort Benton
Pablo
Saint Regis
Great Falls
Area
Ninemile
Zone 1
Missoula
Helena
Zone 2
Butte
Big Timber
Bozeman
1:2,750,000
0 10 20 40 60 80
Miles
Management Zone
Primary Conservation Area
Mgmt Zone 1
Mgmt Zone 2
Mgmt Zone 3
Demographic Connectivity Areas
Cities, Towns
Highways
MTStateBoundary
WATER
Other Grizzly Bear Ecosystems
Land Ownership
Forest Service
Bureau of Land Management
National Park Service
US Fish & Wildlife Service
Other Federal Lands
Federal Wilderness
Indian Reservations
Tribal Wilderness
MT DNRC
MT FWP
MT Other State Lands
City/Cnty/Local Government
The Nature Conservancy
Private
MONTANA
Helena
1:16,000,000
VICINITY MAP

Part II: Issues and Alternatives

Issues identified and considered

Regarding grizzly bear management, FWP has identified a list of broad themes in which FWP decisions and input will have substantial effects on the species' status and on the lives of Montanans. These themes, which provide structure for FWP's decision-making, have emerged from years of inter-agency collaboration on grizzly bear conservation, previous state and inter-agency plans, routine interactions with the public during FWP's day-to-day management and research, the GBAC process and associated public input, and the University of Montana Attitudes Survey. The themes are listed below.

- **Status and role of grizzly bears in Montana.**

What do FWP and Montanans see as the status and role of grizzly bears in Montana? How does FWP view the future of the state when thinking about the advantages and disadvantages of sharing it with these animals?

- **How many grizzly bears should live in Montana?**

Should FWP identify statewide numeric objectives for the species, and if so, what should those be?

- **Distributional objective and population connectivity.**

Over the long term, where in Montana will grizzly bears live, and what is their biological role in species conservation and management within their U.S. Northern Rocky Mountain distribution? Although inherent topographic and biological characteristics dictate much of the answer to this question (and commitments under the ESA and associated Conservation Strategies constrain its decision space), FWP—through its own management activities as well as those of federal, state, tribal, and non-governmental partners—influences where grizzly bears will live in Montana and, very roughly, at what densities.

- **Human safety.**

Grizzly bears are large, powerful animals that can sometimes act aggressively in defending cubs, food resources, or their sense of personal space. Although many potential interactions are resolved by bears moving away (often well before any human is even aware of their proximity), they can and do injure people. Although FWP cannot control the behaviors of individual bears, actions taken by FWP (in conjunction with partners) can often reduce the risk to human safety.

- **The role of private lands in the future of grizzly bear conservation and management.**

Grizzly bears are increasingly found on private lands. While this discovery creates increased opportunities for biological connectivity between population cores, it increases the potential for conflict with humans as grizzly bears compete for resources, damage property, and threaten human safety.

- **Conflict prevention.**

Humans have limited ability to alter grizzly bear behaviors, which result from natural selection and encoded genetic instructions. However, FWP can greatly reduce the chances that bears' biological drives to obtain food and shelter will lead to conflicts with humans. In recent decades an entire sub-field of conflict prevention has emerged and a variety of technical approaches can be attempted to reduce or prevent conflicts—especially concerning the securing of attractants. If human-related food supplies (garbage, pet foot, bird feeders, beehives, fruit trees, spilled grain, livestock, etc.) are more easily obtainable than natural ones, bears tend to overcome their wariness of people to access those supplies. Such attractants set the stage for property damage and for habituation or conditioning of bears. However, when attractants are secured so that there is no nutritive reward for the bears' natural curiosity, the probability of conflict is reduced substantially.

- **Conflict response.**

Human–bear conflicts can be reduced but cannot be eliminated entirely. There will always be a need to respond to circumstances in which an individual bear has damaged property or threatened human safety or is very likely to do so. For any threatened species under the ESA, federal guidance and approval is required if any action more intrusive than hazing is considered. That said, even under listed status there remains considerable flexibility for how any given situation is handled.

FWP's initial response to most conflict situations is to reduce or eliminate the conflict source (e.g., attractants). In some cases, however, FWP recommends to USFWS the capture of a bear. Captured bears, in turn, can be i) released onsite for further monitoring, ii) relocated a short distance from the site, iii) relocated a long distance from the site, or iv) euthanized.

As of March 2022, FWP can no longer move federally listed grizzly bears that are involved in conflict and captured outside Recovery Zones; however, FWP can move federally listed bears not involved in conflict outside RZs to sites previously approved for that purpose by the Commission. This restriction does not preclude FWP from providing conflict response and working toward conflict resolution, but it does significantly limit FWP's ability to address especially persistent conflicts involving federally listed grizzly bears outside RZs. Legislation passed during the 2023 Montana legislation session provides livestock owners with limited flexibility to lethally remove a grizzly bear attacking or killing livestock following federal delisting (87-5-301 and 87-6-106, MCA).

- **Public certainty vs. agency flexibility in responding to human–bear conflict.**

In conflict responses, two goals are in tension: i) flexibility for state (and federal) managers to balance conservation objectives while ensuring safety for humans and property; and ii) the public benefit of consistent, predictable conflict response. FWP sees no option for simultaneously optimizing both goals. Increasing agency flexibility to tailor conflict responses does unavoidably reduce the ability to predict (in a programmatic plan, or on a finer spatiotemporal scale) what that response will be. Similarly, providing increased certainty to the public does unavoidably constrain managers in ways that could force them to make sub-optimal decisions. This plan attempts to partially address this tension by outlining different management strategies in different management areas—such as in RZs, areas that connect RZs, and areas that do not connect populations or RZs.

- **Destinations of bears captured in conflict situations.**

An option often considered by managers when dealing with a human–bear conflict is to capture the bear in question and move it to another location with the intention of providing it an alternative, conflict-free habitat while working to reduce the attractiveness of its original conflict location. Sometimes a grizzly bear is captured in anticipation of conflict (i.e., a preemptive capture), while at other times a bear that is not the presumed offender is captured incidentally (i.e., a non-target capture). In all cases, the decision of where to release the captured bear is complex and reflects both short-term contingencies and longer-term strategic objectives. As of March 2022, FWP can only move federally listed bears involved in conflicts if captured within RZs (although federal authorities can move them if captured outside RZs). At its February 4, 2022, meeting the Commission approved a list of sites to which grizzly bears (including non-conflict bears) could be moved by FWP over the next five years (Appendix G). The list of approved sites will be updated in 2027.

- **Moving bears to initiate new or to support existing populations.**

The action of moving grizzly bears from one population to another to increase the latter's abundance, genetic diversity, or both is known as augmentation.

Since 2005, FWP and USFWS have cooperatively augmented the CYE by moving in an average of 1.2 bears per year from the NCDE, a program many credit with saving the CYE population. The idea of similarly augmenting the GYE has

been discussed for almost 40 years. Some citizens view animals that are brought into new areas by people very differently than they would view the same animals who arrived on their own. Also, agencies typically have been reluctant to move an animal that has the potential to cause conflicts in its new home.

At their meeting of December 14, 2021, the Commission approved an augmentation program to move several grizzly bears from the NCDE to the GYE. A more detailed protocol document has been drafted (Appendix I) to articulate the purpose and need of the augmentation program and to provide guidance to field staff regarding the type of bear, circumstances of its capture, time of year, and likely release areas. This protocol document has been finalized by both the GYE and NCDE subcommittees of the Inter-agency Grizzly Bear Committee (IGBC).

In June, 2024, the USFWS updated it's ESA Section 7 Biological Opinion on the Issuance of Recovery Permits for actions involving grizzly bears in the NCDE and the GYE. Recovery permits would be issued pursuant to section 10(a)(1)(A) and section 6(d) of the ESA. While such authorized take for purposes of enhancing the conservation of listed species and carrying out recovery action may adversely affect individual grizzly bears, it is not likely to jeopardize the continued existence of the grizzly bear as a species. FWP has applied for and received a recovery permit to translocate grizzly bears from the NCDE to areas within the GYE for the purposes of genetic augmentation to address future threats associated with isolation of the GYE grizzly bear population. With an estimated population of more than 1,100 grizzly bears, the NCDE grizzly bear population has achieved biological recovery. Any bears captured within the DMA in the NCDE for translocation to the GYE would count against the NCDE mortality threshold. Decisions to capture bears for this purpose would consider the current status of mortality and if the total NCDE mortalities are high and approaching the threshold, FWP could decide not to do the translocation that year. For these reasons, the capture and removal of 2 to 4 bears every ten years will have no significant environmental impacts. The northern range of the GYE is 60 miles from the southern end of the NCDE. The GYE contains more than 1,000 grizzly bears and has also achieved biological recovery. Releasing 2 to 4 grizzly bears into the GYE ecosystem will have no significant environmental impacts (Appendix J).The USFWS has formally proposed reintroduction to move bears from other areas into the two established Recovery Zones lacking populations (the Bitterroot, and the North Cascades in Washington State), but neither proposal has been implemented.

- **Orphaned cubs.**

Occasionally an adult female grizzly bear is killed and her offspring come into FWP possession. Offspring older than one year of age can be treated similarly to other bears, but orphaned cubs under that age pose a particular challenge because they face much lower odds of survival if left to fend for themselves. The question of how to address such situations deserves considerable thought and planning before they occur.

- **Conflict management operational structure.**

Minimizing and responding to human–bear conflicts requires considerable resource commitments, including specialized staff, equipment, materials, and the funding necessary to acquire and maintain these operational components.

- **Prioritizing information, outreach, and communication efforts.**

For Montanans to live their lives with minimal human–bear conflicts, certain steps are required. However, living safely around grizzly bears is not something Montanans know intuitively. Targeted and well-planned educational programs are required to enhance the public's level of knowledge before people can effectively avoid conflict. As with decisions on how, when, and where to deploy staff, FWP must decide how to prioritize information, outreach, and communication efforts.

- **Population research and monitoring.**

In cooperation with federal and tribal partners, FWP conducts ongoing monitoring of grizzly bear populations to understand trends in abundance, distribution, and habitat use, as well as ancillary information that helps direct management. Most such efforts are guided by inter-agency agreements currently in place. In brief, inter-agency biologists focus their ongoing monitoring efforts on four areas: Greater Yellowstone, Northern Continental Divide, Cabinet-Yaak, and Selkirk (the last of which does not overlap Montana). FWP is committed to continuing its participation in these monitoring efforts. To date, very few resources have been expended to better understand the status of bears outside of these four core areas.

- **Resources required.**

Because this plan is programmatic and FWP budgets are ultimately controlled by the Montana legislature, only a rough estimate of resources required is provided here. FWP would anticipate expending resources similarly to those currently expended to further conservation, management, and educational efforts related to grizzly bears. In fiscal year 2024, there were 20.61 full-time equivalent (FTE) FWP personnel working on grizzly bears. The total funds estimated to support the grizzly bear program was approximately $2.32 million. Of that amount, about 70% went toward personal services (e.g., salaries and benefits), 28% toward operating costs, and 2% toward equipment.

- **Values and beliefs associated with hunting grizzly bears.**

State laws and regulations in Montana consider the grizzly bear a species for which hunting seasons may be authorized by theCommission, should the species be delisted under the ESA. However, the issue of hunting grizzly bears elicits strong reactions from many members of the public.

Many proponents of hunting feel that if a population is considered to be “recovered,” that means it should have animals available for hunting. Some proponents feel that hunting may increase social tolerance for bears by people or that hunting may help bears become warier of humans; others feel that hunting is a preferred population management tool for regulating the population and potentially addressing bears involved in conflicts. Many opponents, on the other hand, consider grizzly bear hunting to be trophy hunting. Other opponents are concerned that the populations will be overharvested; they would rather see “excess” animals used for expanding distribution into other areas. Many opponents simply do not support harvesting an iconic and, for some, spiritually significant animal. The potential for hunting is a key reason some grizzly bear advocates oppose delisting. Additional background is provided in Part III.

- **A potential grizzly bear hunt: functions, expectations, and regulations.**

If delisting occurs during this plan’s implementation and a decision is made that recreational hunting has a role to play, there remains significant discretion to consider the magnitude, objectives, geographic scope, and other constraints that would direct such a hunt. The Commission would ultimately make such decisions in a separate public process that would respect the conservation objectives in this plan. FWP has committed in ARM that it will not propose a hunt for at least five years after a population is delisted.

Sidebar 4. Geography and specialized terminology

As formalized in statute and rule, the State of Montana is committed to managing and conserving grizzly bears so that they are “recovered”—i.e., they no longer require ESA protection. Thus, FWP recognizes a particular responsibility toward bears in the four identified areas (USFWS 1993): Northern Continental Divide, Greater Yellowstone, Cabinet-Yaak, and

Bitterroot (all termed “Ecosystems” by USFWS 1993). However, this document does not always reference the USFWS designations “NCDE,” “GYE,” “CYE,” and “BE” and avoids excessive focus on these terms, for the following reasons:

1) This is not a “delisting plan” per se. ESA listing decisions are made by federal agencies, not by FWP.

2) In recent years, grizzly bears have increasingly used areas beyond the boundaries that USFWS identified for these four Ecosystems and this document acknowledges that fact.

3) This usage of the term “ecosystem” itself, though widely adopted after the 1982 Recovery Plan, is a shorthand term that is inconsistent with the term’s usage in ecology (for details, see the above Definitions section). Ecosystems are generally considered to be the larger area surrounding the recovery zones in which grizzly bears may be anticipated to occur as part of the same population” (USFWS 2022, Species Status Assessment).

4) If and when delisting occurs, conservation strategies for the NCDE and GYE call for these areas to transition from “Recovery Zones” (RZs) to “Primary Conservation Areas” (PCAs) over a period of years. In the future, the PCA designations themselves may become less and less useful.

5) In the future, FWP expects the boundaries around these areas to be seen as increasingly artificial and arbitrary, yet acknowledges that: a) the current NCDE and GYE will, for the foreseeable future, function as population cornerstones; b) the BE has the potential to sustain the next largest contiguous grizzly bear population; and c) the current CYE will, for the foreseeable future, be a focus for grizzly bears in Northwestern Montana.

Table 2. Relevant statutes and administrative rules

Montana Statutes – (MCA) Title 87 Fish and Wildlife	**Description**
87-1-201	Powers and duties of the Department
87-1-214	Disclosure of information -- legislative finding -- large predators
87-1-217	Policy for management of large predators -- legislative intent
87-1-233	Compensation for damage caused by animal held in captivity
87-1-301	Powers of the Commission
87-1-303	Rules for use of lands and waters
87-1-304	Fixing of seasons and bag and possession limits
87-1-511	Sale of confiscated birds and animals – disposition of seized grizzly bears
87-1-601	Use of fish and game money
87-2-101	Definitions – "Game animals"
87-2-701	Special Licenses
87-2-702	Restrictions on special licenses – availability of bear and mountain lion licenses
87-2-814	Auction or lottery of grizzly bear license (Effective on concurrence of contingency)
87-3-131	Regulation of grizzly bear parts
87-4-702	Possession of game by merchants, hotelkeepers, or restaurant keepers
87-4-801	Definitions – "Wild Zoo menagerie"
87-5-102; 87-5-103; 87-5-107; 87-5-108; 87-5-109; 87-5-110; 87-5-111; 87-5-112	Endangered Species Statutes
87-5-301	Grizzly bear – findings – policy
87-5-302	Commission regulations on grizzly bears
87-5-716	Consultation with departments of Agriculture, Public Health and Human Services, and Livestock
87-5-725	Notification of transplantation or introduction of wildlife
87-6-106	Lawful taking to protect livestock or person
87-6-202	Unlawful possession, shipping, or transportation of game fish, bird, game animal, or fur-bearing animal
87-6-205	Waste of game animal, game bird, or game fish
87-6-206	Unlawful sale of game fish, bird, game animal, or fur-bearing animal
87-6-207	Unlawful use of a boat
87-6-216	Unlawful supplemental feeding
87-6-401	Unlawful use of equipment while hunting
87-6-413	Hunting or killing over limit
87-6-701	Failure to report or tattoo
87-6-906	Restitution for illegal killing, possession, or waste of certain wildlife
Montana Statutes – Non FWP	
1-1-508	State Animal
2-15-3110	Livestock loss board – purpose, membership, and qualifications
2-15-3111	Livestock loss reduction program
2-15-3112	Livestock loss mitigation program – definitions
2-15-3113	Additional powers and duties of livestock loss board
81-1-110	Livestock loss reduction and mitigation accounts
81-1-111	Livestock loss reduction and mitigation trust fund
Montana Administrative Rules – Title 12 Fish, Wildlife and Parks	
12.3.514	Animals Unfit for Human Consumption
12.6.1901	Definitions - "Bear"
12.8.806	Food Storage
12.9.1401[2]	Grizzly Bear Policy
12.9.1403[2]	Grizzly Bear Demographic Objectives for the Northern Continental Divide Ecosystem

Montana Administrative Rules – Title 36 Department of Natural Resources and Conservation

36.11.403	Definitions
36.11.421	Road Management
36.11.432	Grizzly Bear Management and Programmatic Rules

2 Current ARMs 12.9.1401 and 12.9.1403 address state management of grizzly bears. Senate Bill (SB) 295, passed during the 2023 Legislative Session, would further clarify how Montana will manage delisted grizzly bears relative to human safety, conflict with livestock, and genetic exchange. SB295 also requires the Fish and Wildlife Commission (Commission) to adopt rules prior to delisting. The Montana Secretary of State (SOS) defines and implements the ARM development and amendment process, including process steps and timeline. This includes opportunities for public participation. At their June 8, 2023, meeting, the Commission approved the initiation of ARM rule making and at the Aug. 17, 2023 meeting, the Commission edited draft rule language proposed by FWP. This edit indicates that, following delisting, the removal by a livestock producer of a grizzly involved in threatening livestock on public land could occur only if the producer had in place a plan for implementing nonlethal means. With the adjusted language, SB295 was approved by the Commission and the rule making process can begin.

Alternatives considered in detail

Below is an expansion of the two Alternatives, issue by issue, that were tabulated above under Executive Summary.

Alternative A: No action (status quo)

- **Role of grizzly bears in Montana.**

Grizzly bears would continue to be the "official state animal of Montana" (1-1-508, MCA; a depiction of a grizzly bear head is part of the FWP logo and adorns FWP staff uniforms). The grizzly bear would continue to be categorized as a game animal (87-2-101, MCA) but also as a large predator (87-1-217, MCA). As a species listed as threatened under the ESA, hunting is precluded. However, state laws and regulations provide authority for a hunting season (subject to Commission authorization) should delisting occur. Other laws and regulations address discrete issues with grizzly bear conservation (e.g., prohibiting commerce in grizzly bear parts, providing for increased penalties for illegal killing). State regulations (ARM 12.9.1401) recognize the importance Montana plays nationally in grizzly bear management, as well as management challenges posed by the species. As such, grizzly bears have increased in both numeric abundance and geographic distribution over the past two decades. However, as articulated in the FWP "problem statement" from the 2019 SDM process, the Governor's Executive Order establishing the GBAC, and the GBAC's final recommendations, the way to manage this increasing number of bears, particularly in areas other than identified RZs, has remained a topic of contention. Although people would likely continue to vary in how they view grizzly bears and their role in Montana, the lack of an integrated and accepted approach has caused difficulty both for agency managers and for the public, particularly in geographic areas outside of established RZs and DMAs.

- **Numerical objectives.**

As a signatory to both the Greater Yellowstone CS and the Northern Continental Divide CS, FWP has committed to the population objectives contained therein, as both a criterion for delisting and as a long-term, post-delisting objective. For both the GYE and NCDE, a population threshold is identified which ensures those populations remain above recovery levels. In the NCDE, FWP has committed to manage mortalities from all sources to support an estimated probability of at least 90% that the grizzly bear population within the [NCDE] DMA remains above 800 bears. This means the population will likely be about 1,000 bears, at least, in the NCDE DMA. In the GYE, an integrated population model (IPM) was recently adopted and recalibrated to incorporate the latest best available science to estimate and monitor the population. With the adoption of the IPM, the IGBST has recalibrated prior year population estimates so they are comparable over time. Additionally, vital rates and demographics for the GYE population may now be reviewed annually so that managers are able to make appropriate adjustments to mortality rates. In conjunction with the IGBST, the signatory parties of the Tri-sate MOA (Appendix H) agree to apply annual mortality rates to maintain the population in the DMA within or above a range of 800-950 grizzly bears ($0.98 \leq \lambda \leq 1.02$). Should the population exceed 950 individuals, signatory parties will manage to maintain or reduce the population and use the IPM to determine mortality limits for population stability or decrease ($0.95 \leq \lambda \leq 1.00$). The revised Tri-state MOA uses the IPM to identify limits for discretionary mortality and allocation among the three states. The premise of the demographic criteria will remain in that FWP and signatory parties will agree to maintain the population above recovery thresholds and above 800 individuals, and will agree to mortality limits to ensure that.

These objectives are sufficient to assure the demographic sustainability of the two areas but leave uncertainty regarding how bears elsewhere are to be managed. Numerical objectives in the two other USFWS-designated ecosystems partly within Montana are more general. In the CYE, demographic recovery criteria are i) maintaining 6 females with cubs over a running 6–year average both within the recovery zone and within a 10–mile area immediately surrounding it (excluding areas within Canada), ii) 18 of the 22 bear management units occupied by females with young from a running 6–year sum of verified evidence, and that iii) known, human-caused mortality not exceed 4% of the population estimate based on the most recent 3–year sum of females with cubs, of which no more than 30% shall be females. In the BE, demographic recovery criteria are 14 females with cubs over a running 6–year average, and ii) after at least 90 grizzly bears are established, a mortality limit (known, human-based deaths) of no more than 4% of a minimum population size estimate, with no more than 30% of that being females.

At present, FWP is not attempting to estimate numbers of bears between recovery areas, but continues to collect data on observations, which contribute to estimation of occupied range and understanding of general trends. FWP has hired several grizzly bear specialist and technicians to work in areas outside of recovery areas to proactively work on conflict prevention and to respond to conflicts if and when they occur.

- **Grizzly bear distributional objective.**

The NCDE and GYE CSs and the Recovery Plan outline objectives for occupancy of females with offspring to ensure that grizzly bears are well distributed within core ecosystems. Throughout Montana, no explicit distributional objective has been identified. Existing FWP planning documents focus on maintaining populations in the CYE, NCDE, and GYE, but articulate the desirability of long-term connectivity among them (as well as south toward the BE), acknowledging that human–bear conflicts would likely be more common in these relatively less-wild areas. A goal of the NCDE CS is to provide opportunity for connectivity with other ecosystems in Montana, but no explicit objective is articulated. In the GYE, FWP has committed under the GYE CS to allow for populations outside of the federally designated DMA "where biologically suitable and socially acceptable" but no further guidance is provided either internally to FWP staff or externally to other agencies or the general public. The existing augmentation program in which grizzly bears are occasionally moved from the NCDE to the CYE would continue until USFWS and FWP biologists should deem it no longer necessary.

- **Human safety.**

FWP would continue efforts to maintain and enhance public safety. It does so primarily through prevention and response to human–bear conflicts (see below), as well as through educational efforts.

- **Role of private lands in grizzly bear conservation and management.**

FWP would not articulate an explicit direction regarding grizzly bears on private lands but would acknowledge the pivotal role of private landowner support in broader recovery—and the significant contribution private lands already have made in providing habitat for grizzly bears.

- **Conflict prevention.**

FWP would continue to expend considerable resources working with the local citizenry to prevent and minimize human–bear conflicts and to respond to conflicts that do occur. Bear specialists would continue to be focused on the CYE,

NCDE, and GYE. At least one bear manager would continue to focus on the geography east of the NCDE, north of the GYE, and in the BE.

FWP staff would continue to prioritize conflict prevention (as detailed in Part III). Specific actions would depend on the nature of potential human–bear conflicts. Typically, "site conflicts" (e.g., access to garbage or pet / livestock feed, depredation on chickens) predominate west of the Continental Divide, whereas livestock conflicts predominate east of the Continental Divide. Boneyards and/or livestock carcasses near human residences or animal pastures can be attractants for grizzly bears. FWP would continue programs that encourage landowners to phase out boneyards. Over the past few decades, FWP has adopted and/or supported both livestock carcass removal and livestock carcass redistribution as alternative means ways to dispose of these attractants.

- **Conflict response.**

FWP staff would continue to respond to human–bear conflicts, both within and outside of RZs. Additional detail on current practice is provided in Part III.

FWP bear managers would continue to record bear conflicts in a standardized, inter-agency database, with data entry typically completed no later than the end of each calendar year. The database will be a valuable resource moving forward, to better understand human–bear conflicts, as well as the agency's success in minimizing them. It may allow for future detailed analyses of human–bear conflicts and agency responses. However, because the number of conflicts each year is subject to many variables (e.g., number of human residences and potential attractants near grizzly bears, size of grizzly bear population, abundance of naturally occurring foods), FWP would not necessarily consider changes or trends in the number of conflicts as a measure of the success or failure of prevention efforts.

- **Public certainty vs. agency flexibility on conflict response.**

Because no additional statewide guidance would be provided, considerable discretion (within the parameters of IGBC 1986) would continue to characterize conflict responses. Case-by-case flexibility in decision making increases the likelihood that the response will match the individual situation—but also makes it more difficult to predict, for the public, what will occur.

- **Destinations of bears involved in conflicts (captured inside RZs) when moving them is planned.**

When a decision is reached with USFWS regarding grizzly bear relocation, the animal would be moved to an area where the probability of additional conflict is low (see Appendix G). Since 2009, 84% of destinations have been in FWP Region 1 and 72% have been in Flathead County.

- **Moving non-conflict bears (captured outside RZs) whose origin is uncertain.**

Sometimes, in a conflict setting, a bear is captured that was not itself involved in the conflict. At times a decision is made to capture a bear proactively (i.e., preemptively) because its presence in the area predisposes the animal to future conflict. In such cases, generally it is not possible to know how long the animal has been present near the site, nor from which core population it may have originated. Lacking additional direction that would be provided by FWP's Preferred Alternative, considerable uncertainty would continue to characterize decisions on where to move such animals. Typically, they would be moved to the presumptive (albeit not definitively known) population core of origin.

- **Moving non-conflict bears outside of Occupied habitat.**

There may be situations where it is desirable to move a non-conflict bear into an area that is not currently designated as Occupied habitat, such as in a connectivity area or an unoccupied portion of a recovery zone. If a situation arises and there

is a desire to move a bear into unoccupied habitat to facilitate recovery or connectivity, FWP would first complete an environmental analysis of the impacts of such a transplant and would require approval by the Commission before such movement could occur. This situation would require advanced planning and public input and would not be applicable to decisions needing an immediate resolution.

- **Orphaned cubs.**

Generally, cubs orphaned after September 1 of each year would be left in the wild. Taking younger orphans to Montana Wildlife Rehabilitation Center (MWRC) is discouraged by existing policy and must follow MWRC intake guidelines because i) acceptable permanent captive situations are very difficult to find however FWP has sent young cubs to captive facilities in the past, and ii) re-release into the wild is only permitted with a pre-approved plan and release area, none of which exist currently.

- **Conflict management organizational structure.**

As currently, bear managers would continue to be based in or near Anaconda, Bozeman, Chouteau, Conrad, Hamilton, Kalispell, Missoula, and Red Lodge.

- **Prioritizing information, outreach, and communication efforts.**

FWP would continue its current efforts aimed at people living, working, and recreating in grizzly bear habitat, targeting both new and long-term residents. As currently, a communication specialist in FWP's Communication and Education Division would plan, disseminate, and coordinate information, outreach, and education programs regarding grizzly bear biology, management, conflict prevention, and safety. Regionally based communication officers would, as now, vary in how they communicated to the public regarding human–bear conflicts, the resolution of those conflicts, recommendations regarding human safety, unlawful take incidents, and other newsworthy events regarding grizzly bears.

- **Population research and monitoring.**

As stated within the "Issues identified and considered" section: In cooperation with federal and tribal partners, FWP conducts ongoing monitoring of grizzly bear populations to understand trends in abundance, distribution, and habitat use, as well as ancillary information that helps direct management. Most such efforts are guided by inter-agency agreements currently in place. In brief, inter-agency biologists focus their ongoing monitoring efforts on five areas: Greater Yellowstone, Northern Continental Divide, Cabinet-Yaak, Bitterroot, and Selkirk (the last of which does not overlap Montana). FWP is committed to continuing its participation in these monitoring efforts.

FWP would continue its existing research and monitoring efforts, as articulated by the GYE and NCDE CS documents. The GYE monitoring effort would continue to be conducted by the Inter-agency Grizzly Bear Study Team (led by USGS), which includes FWP as a member (see Van Manen et al. 2022 for the most recent report [available online at: https://igbconline.org/grizzly-bear-study-team/], as well as IGBST 2021 for an update on improved population estimators). The NCDE monitoring effort would continue to be led by FWP and would incorporate efforts made by the biological staff of Glacier National Park and the CSKT and Blackfeet Tribe (see Costello and Roberts 2021 for the most recent report and Costello et al. 2016b for details on methods).

- **Resources required.**

In order to further conservation, management, and educational efforts related to grizzly bears, FWP would anticipate expending resources similar to those currently expended. In fiscal year 2024, there were 20.61 full-time equivalent (FTE) FWP

personnel working on grizzly bears. The total funding estimated to support the grizzly bear program was approximately $2.32 million, of which about 70% went toward personal services (e.g., salaries and benefits), 28% toward operating costs, and 2% toward equipment. These funds came from the federal Pittman-Robertson tax on arms and ammunition (54%), hunting license revenue (19%), federal agency sources (19%, primarily USFWS), and various private sources (8%).

- **Hunting of grizzly bears: values and beliefs.**

Grizzly bears would continue to be classified by the State of Montana as a game animal, i.e., one that potentially could be subject to a regulated, recreational hunt should the Commission authorize one through its season setting process that includes public engagement. However, hunting would be an available option only for grizzly bears in a population that previously had been federally delisted (i.e., reverted to authority of the State of Montana from current status as threatened under the ESA). Neither of the two existing state grizzly bear plans includes details of how such a hunt might occur in future, but both indicate that a long-term goal would include limited, regulated hunting. No existing plans discuss with any depth the systems of human values that would be presupposed by such a hunt, nor do any plans detail Montanans' diversity of values regarding grizzly bear hunting.

- **A potential grizzly bear hunt: Functions, expectations, and regulations.**

If delisting occurs, hunting would be implemented within a scientifically sound framework that would maintain a viable and self-sustaining population to garner additional public support and to maintain positive and effective working relationships with stakeholders. Existing plans provide no additional details regarding how FWP might propose to the Commission that a hunt be managed and regulated. However, in 2017, as a requirement for delisting of the Greater Yellowstone DPS, the USFWS required the states of Montana, Wyoming, and Idaho to adopt hunting regulations they could point to as adequate regulatory mechanisms to ensure hunting would not jeopardize the delisted population. These are detailed in Part III.

- **Expected consequences if this Alternative is adopted.**

If this Alternative is adopted, little would change compared with the current situation. FWP expects grizzly bears to slowly continue expanding their geographic distribution and increasingly moving through both public and private lands, including areas far from people and areas closer to residences, farms, ranches, and businesses than in previous years. It is increasingly probable that grizzly bears originating in one core area will mate with grizzly bears in other core areas—but whether, or when, such interactions might occur cannot be known for certain. Similarly, grizzly bears may gradually become more common in and around the Bitterroot Mountains, but whether they will become established as a population is unknown.

Under this Alternative, FWP would expect a gradual increase in human–bear conflicts, and in the need for conflict reduction and response. Uncertainty and inconsistency would continue in how FWP views, and ultimately responds to, grizzly bears in newly colonized areas. We expect public discourse on grizzly bears to become increasingly contested.

Additionally, FWP staff will only relocate conflict-involved grizzly bears within RZs to areas pre-approved by the Commission. The restriction on where such grizzly bears can be released would not apply to federal authorities as long as grizzly bears are federally listed under the ESA, should they become involved in such relocations. Thus, we expect additional uncertainty about where these animals may be released.

FWP would expect continued uncertainty, both internally and externally, regarding our approach and responses to grizzly bears located in areas not mapped by either of the existing CS documents (Figure 6).

Figure 6. Occupied range—with recovery zones and NCDE management zones

Dark brown outlines are FWP- and USFWS-verified Occupied ranges (2020); orange shading is the four RZs that fall partly or wholly in Montana; and blue outlines are NCDE zones 1, 2, and 3, as identified in NCDE CS document.

Alternative B: FWP preferred

In contrast to the above Alternative A, which would preserve the status quo and take no action, Alternative B is the one preferred and recommended by FWP.

- **Role of grizzly bears in Montana.**

Grizzly bears would continue to occupy a primary role in Montana's cultural heritage as the "official state animal of Montana" 1-1-508, MCA). The grizzly bear would continue to be categorized a game animal, but also as a large predator. As a species listed as threatened under the ESA, hunting is currently precluded. If delisting occurs, Montana state law provides some authority to the Commission to implement a hunting season. Proposed ARM rules, if adopted, would require a minimum of five years of state management of any delisted grizzly bears prior to proposing any hunting season. Other laws and regulations address discrete issues with grizzly bear conservation (e.g., prohibiting commerce in grizzly bear parts, providing for increased penalties for illegal killing, see below). State regulations (ARM 12.9.1401) recognize Montana's importance nationally in the management of grizzly bears, as well as management challenges posed by the species.

Grizzly bears would be seen as a valued part of Montana's fauna, a species that is both "conservation-reliant" and "conflict-prone." Conservation-reliant means the threats grizzly bears face can never be eliminated, only managed (Goble et al. 2012). Due to their need for large areas and limited interaction with humans, FWP expects the core portions of their distribution to coincide with the four Ecosystems identified by the USFWS. However, grizzly bears at low density in some areas between these cores will facilitate connectivity. As those bears will live closer to people they will likely have a higher

probability of human-caused mortality. There must be efforts in place to reduce human-bear conflicts and human-caused bear mortality. Where connectivity with a population core is not likely, grizzly bear presence would not be an objective, and individual bears would be tolerated only to the extent that they do not conflict with human safety or human uses of the landscape.

- **Numerical objectives.**

As a signatory to the GYE and NCDE Conservation Strategies, FWP has committed to population objectives contained therein, which function both as a criterion for delisting and as a long-term, post-delisting objective. In brief, the GYE CS standard is to maintain the population in the DMA within or above a range of 800-950 grizzly bears ($0.98 \leq \lambda \leq 1.02$) as estimated by the revised and recalibrated Integrated Population Model (IPM). The adoption of the IPM was adopted by the Interagency Grizzly Bear Study Team (IGBST) as the population estimator for the Greater Yellowstone Ecosystem. With the adoption of the IPM, the IGBST has recalibrated prior year population estimates so they are comparable over time. Additionally, vital rates and demographics for the GYE population may now be reviewed annually so that managers are able to make appropriate adjustments to mortality rates. Should the estimated population within the DMA decline to 800 bears, any recreational hunting that had been authorized by any of the states after delisting would be closed. In the NCDE, FWP would continue to manage mortalities from all sources to support an estimated probability of at least 90% that the grizzly bear population within the NCDE DMA remains above 800 bears. This means the population is likely be about 1,000 bears, at least, in the NCDE DMA. There would be no additional and/or explicit population objectives. However, when compared to the No Action Alternative, FWP would anticipate a higher statewide population of bears because of the objective to maintain a low density of bears in connectivity areas. Grizzly bear monitoring and reporting systems are central to managing healthy grizzly populations. This should include estimating population size and trends, as well as monitoring and reporting vital rates such as adult female survival in core populations. Monitoring range expansion, dispersal events, and grizzly bear presence in connectivity areas may also occur.

At present, FWP is not attempting to estimate numbers of bears between recovery areas, but continues to collect data on observations, which contribute to estimation of occupied range and understanding of general trends. FWP has hired several grizzly bear specialist and technicians to work in areas outside of recovery areas to proactively work on conflict prevention and to respond to conflicts if and when they occur.

- **Grizzly bear distribution and connectivity.**

Grizzly bear presence would be an objective in RZs and DMAs, and management objectives in the NCDE and GYE would follow existing Conservation Strategies. The NCDE and GYE CSs and the Recovery Plan outline objectives for occupancy of females with offspring to ensure that grizzly bears are well distributed within core ecosystems. Throughout Montana, no explicit distributional objective has been identified. Grizzly bear density in these cornerstone areas would be high enough to provide occasional dispersers. In areas between core populations (i.e., between RZs) and where natural bear movement is likely or is already occurring, an objective would be to manage for connectivity. FWP expects that connectivity will be accomplished over time by a low density of bears that are able to live with minimal conflict in these areas. When evaluating a specific response to an individual bear, FWP would consider the importance of the individual bear to the distribution and connectivity objectives in this management plan. But the importance of a single bear to the distribution and

connectivity of the species does not obviate the duty of FWP to work with the local community and partners to craft appropriate solutions in each circumstance.

The Preferred Alternative recognizes that human–bear conflicts and bear mortalities would be greater in areas between population cores. Management decisions for any bears found outside of core areas will be guided by the likelihood that the bear will contribute to the long-term persistence and connectivity of populations. Where that likelihood is low, FWP will be quick to recommend (or implement, if appropriate) control when conflicts arise. FWP would use available discretion to remove or relocate grizzly bears involved in conflicts with humans.

The existing augmentation program, in which grizzly bears are occasionally moved from the NCDE to the CYE, would continue until USFWS and FWP biologists should deem it no longer necessary. In addition, FWP would translocate bears with no history of conflict from the NCDE core area to pre-selected and pre-approved areas within the GYE for genetic exchange. Areas chosen for release in the GYE would be areas where habitat is suitable, where conflict potential is low, and where the translocated bear is most likely to breed. Depending on cooperation from other jurisdictions, release areas may or may not be in Montana. Trapping would be conducted to capture and move bears as resources allow. The frequency of such actions would be unpredictable and would vary annually. The expectation is that approximately 2 to 4 candidate bears would become available and be moved every ten years. There would be no additional expectations or requirements for the timing beyond that. For example, depending upon circumstances, there could be no bears moved for a few years, or there could be more than 1 bear moved in a single year.

This magnitude of capturing and moving bears would result in approximately 3 to 6 bears being moved to GYE per grizzly bear generation. If one-half of translocated bears moved stayed in the GYE, survived long enough to reproduce, and generated a cub that survived to adulthood, approximately 1.5 to 3 effective migrants per generation would gradually be added to that population. New FTE positions as approved by the legislature may be established for transfer of bears between ecosystems and does not focus on unoccupied habitat. The 2023 Montana Legislature approved two additional FTE to focus on capturing and moving non-conflict grizzly bears from the NCDE to the GYE for genetic exchange.

As a cooperative effort of the IGBST, the parties of the Tri-State Memorandum of Agreement will continue to conduct genetic sampling of GYE grizzly bears (i.e., biological samples will be acquired from grizzly bear captures, mortality investigations, or other methods), and will analyze these samples to evaluate genetic diversity and connectivity with other grizzly bear populations. Samples will be collected from captured and dead bears in areas outside the GYE as possible for genetic fitness monitoring. The NCDE Conservation Strategy (2019) articulates an objective to “monitor demographic and genetic connectivity among populations,” including estimating the spatial distribution of the NCDE population biennially, and identifying the population of origin for individuals sampled inside and outside of the DMA to detect movements of individuals to and from other populations or recovery areas. In the CYE and SE, the monitoring team continues to estimate population of origin and document movements using population genetics and pedigree analyses. To date, movements of individuals among the NCDE, CYE, and SE populations have been documented, but no interbreeding of grizzly bears from different ecosystems has been observed (except for individuals moved for Cabinet Mountain augmentation). The Department will continue to conduct genetic sampling, as necessary, when handling bears, will analyze those samples to evaluate genetic diversity and connectivity between populations and the need for continued efforts.

- **Human safety.**

FWP would continue efforts to maintain and enhance public safety. It would do so primarily through prevention of, and response to, human–bear conflicts (see below), as well as through educational efforts. FWP would use available discretion to remove or relocate grizzly bears involved in conflicts with humans, particularly in areas where connectivity among population cores is unlikely.

- **Role of private lands in grizzly bear conservation and management.**

The importance of private lands in providing connectivity (where biologically likely) would be acknowledged, with commensurate aid to landowners to minimize or prevent conflicts.

- **Conflict prevention.**

FWP would continue to spend considerable resources working with the local citizenry to prevent and minimize human–bear conflicts, and to respond to conflicts that occur. Bear specialists would continue to be focused on the CYE, NCDE, and GYE. One bear manager would continue to focus on the geography east of the NCDE and west of the GYE. Additionally, one bear manager would continue to work on bear-involved conflicts in the BE.

FWP staff would continue to prioritize conflict prevention (as detailed in Part III), with specific actions depending upon the type of conflict. To the west of the Continental Divide, most such conflicts of concern are "site conflicts" (e.g., access to such anthropogenic food sources as garbage, pet food, livestock food, or chickens)—while to the east of it, one of the greatest conflict concerns is livestock depredation. FWP would prioritize conflict prevention activities in the four cores areas and also the in-between areas where low-density populations for improved connectivity may appear feasible.

Moving forward, FWP will continue to encourage, support, and administer (where appropriate) livestock carcass removal programs as a generally recognized best practice. For long-term disposition of carcasses, composting programs are recognized as the best solution; however, where composting is impractical, secured landfills may suffice. Such programs reduce the risk of bear-involved conflicts, while supporting the general goal of minimizing the bears' option to obtain food from human-related sources.

The FWP livestock carcass redistribution program in Region 4 has been gradually phasing out in recent years. FWP would continue to reduce and ultimately end this program and would discourage activities that facilitate grizzly bears accessing livestock carcasses, even far from people. FWP would work with individual livestock producers to craft site-specific programs for reducing the likelihood of conflicts over livestock carcasses. FWP's operating principle would be that, ideally, grizzly bears should consume natural foods only (acknowledging that it is impossible to totally eliminate the possibility of a grizzly bear finding and consuming a livestock carcass somewhere). Where livestock producers operate their own carcass redistribution sites, FWP would encourage an adaptive management approach, facilitating learning about the effectiveness (or lack thereof) of individual operations in reducing conflicts, as well as how phasing them out would alter the dynamics of human–bear conflict. Given the complexity of possible objectives and consequences of carcass redistribution, Kubasiewicz et al. (2016) suggested that an SDM approach would be useful in assessing whether these sites ameliorate, exacerbate, or have no effect (Steyaert et al. 2014) on human–bear conflicts

- **Conflict response.**

FWP staff would continue to respond to human–bear conflicts, both inside and outside of RZs. Additional detail on current practice is provided in Part III. FWP would continue to document bear conflicts in a standardized, inter-agency database, with data entry completed as promptly as possible. Moving forward, the database will be a valuable resource to

better understand human–bear conflicts, as well as all agencies' success in minimizing them. It may allow for future detailed analyses of human–bear conflicts and agency responses. However, because the number of conflicts each year is subject to many variables (e.g., number of human residences and potential attractants near grizzly bears, size of grizzly bear population, abundance of naturally occurring foods), FWP would not necessarily consider changes or trends in the number of conflicts as a measure of the success or failure of prevention efforts.

Generally, when conflicts occur on or near private lands rather than in remote settings, the responses would be more aggressive. In situations allowing discretion, FWP would discourage removal in areas where connectivity between core populations is likely and would encourage removal in areas where it is unlikely. Under 87-5-301 and 87-6-106, MCA, a livestock owner or other authorized person may lethally take a delisted grizzly at any time without a permit or license from FWP when a grizzly bear is attacking or killing livestock. Under 87-5-301 and 87-6-106, MCA, FWP may issue a permit to the livestock owner or authorized person to kill the delisted grizzly bear.

- **Public certainty vs. agency flexibility on conflict response.**

Compared to the present, under this Alternative the public would have more certainty about how human–bear conflicts would be resolved, as the interests of bears would be given slightly more weight within population core areas, some weight (albeit a bit less) where connectivity among population cores is likely, and less weight elsewhere.

- **Destinations of bears involved in conflicts (captured inside RZs) when moving them is planned.**

Conflict-involved bears would be moved to sites where the probability of additional conflict is low (Appendix G). Since 2009, 84% of destinations have been in FWP Region 1 (72% have been in Flathead County). However, if a non-conflict bear (non-target or preemptively trapped) animal is captured, FWP would consider moving it to an area outside of that RZ where connectivity is an objective and a Commission-approved release site[3] exists. As the known range of grizzly bears changes, FWP would continue to engage with the Commission to gain pre-approval of new sites within Occupied range to which grizzly bears could be moved. If delisting occurs, bears involved in conflict outside RZs could potentially be handled in this way.

- **Moving non-conflict bears (captured outside RZs) whose origin is uncertain.**

Sometimes, in a conflict setting, a bear is captured that was not, itself, involved in the conflict. At times a decision is made to capture a bear proactively (or preemptively) because its presence in the area predisposes the animal to future conflict. In such cases, generally it is not possible to know how long the animal has been present near the site, nor from which core population it may have originated. If the situation allows, such bears would be left in place. If moving a bear is required, it

[3] As required by legislation signed into law in 2021, the Commission approved a list of sites to which grizzly bears may be released. Maps of these sites are included as Appendix G. Considerations for site selection include; 1) site is not a designated trailhead, 2) site is not a designated or known dispersed camping site, 3) site is not immediately adjacent to private land, unless that private landowner has given explicit permission, 4) site is not an active grazing allotment with livestock present, 5), site is not currently occupied by humans conducting work such as timber harvest nor is the site serving as a human encampment for such activities, 6) site is far enough from capture site as to make it less likely for the bear to return to the conflict site. Ideally, release sites are some distance behind locked gates and remote enough to prevent recurring conflict. Some designated release sites may never be used or used very infrequently.

would be moved to a Commission-approved release[4] site which provides the best chance for the bear to find life requisites and the least likelihood of conflict with humans. The site selected for release need not be located within the presumptive Ecosystem of origin, particularly if releasing the bear at the selected site would advance the interests of connectivity. Moving bears to such sites would not constitute artificial expansion of grizzly bear distribution in Montana because these sites are within areas that bears have already colonized. FWP would continue to engage with the Commission to gain pre-approval of new sites within Occupied range (as documented by FWP and/or US Geological Survey—see Appendix G) to which grizzly bears could be moved but would not seek approval of release sites beyond the most recently updated Occupied range.

- **Moving non-conflict bears outside of occupied habitat.**

There may be situations in which it is desirable to move a non-conflict bear into an area that is not currently designated as Occupied habitat, such as in a connectivity area or an unoccupied portion of a recovery zone. If the situation arises and there is a desire to move a bear into unoccupied habitat to facilitate recovery or connectivity, FWP would first complete an environmental analysis of the impacts of such a transplant and Commission approval would be required before such movement could occur. This situation would require advance planning and public input and would not be applicable to decisions needing immediate resolution.

- **Orphaned cubs.**

Cubs orphaned after September 1 of each year generally would be left in the wild. Taking younger orphans to MWRC is discouraged by existing policy and would be required to follow MWRC intake guidelines because i) acceptable permanent captive situations are very difficult to find however FWP has sent young cubs to captive facilities in the past, and ii) re-release into the wild is permitted only with a pre-approved plan and release area (neither of which exists currently). However, if an orphan cub was captured after August 1, FWP would consider moving it to another RZ, DMA, or pre-approved site where connectivity is an objective. If separate plans were approved to use some other location (not MWRC) for overwintering a cub and re-releasing it in the wild as a yearling, such an action could be considered on an experimental basis. However, again, currently there is no facility that can accommodate such an experiment.

- **Conflict management organizational structure.**

As is currently the case, bear managers would be based in or near Anaconda, Bozeman, Choteau, Conrad, Hamilton, Kalispell, Libby, Missoula, and Red Lodge.

- **Prioritizing information, outreach, and communication efforts.**

Under this heading, the response is the same for this Alternative as it was for the No Action Alternative with an exception that FWP will increase efforts to reach recreationists including black bear hunters and wolf trappers with appropriate messages.

- **Population research and monitoring.**

Under this item, the response is the same for this Alternative as it was for the No Action Alternative. In addition, if it becomes feasible and necessary to estimate grizzly bear abundance or trends in between any of the Occupied core areas, FWP would prioritize attempts to do that. FWP would also increase efforts to understand grizzly abundance and population trends in areas outside of established RZs and DMAs, particularly where biological connectivity is likely. This could be accomplished through live-captures and radio-marking, noninvasive surveys, or hunter observation surveys.

- **Resources required.**

FWP anticipates requiring somewhat more resources than the current baseline to stay ahead of human–bear conflicts that may arise as bears expand in their geographic distribution (see this section under the No Action Alternative).

- **Hunting of grizzly bears: values and beliefs.**

Grizzly bears would continue to be classified by the State of Montana as a game animal (87-2-101, MCA) —i.e., one that potentially could be subject to a regulated, recreational hunt should the Commission authorize one. However, hunting would be an available option only in a grizzly bear population that had been federally delisted and was under state management. Because this Alternative prioritizes biological connectivity among population cores, hunting of any delisted grizzly bears would most likely be focused on (although not necessarily restricted to) areas where connectivity is unlikely. In these areas, the values of those who are and those who are not comfortable with a sustainable harvest of grizzly bears would be variously represented.

- **A potential grizzly bear hunt: Functions, expectations, and regulations.**

Ultimately, the Commission would make any decisions on a grizzly bear hunt through a separate public process. FWP believes it useful to take advantage of this current planning effort to consider, with the public, various alternative ideas of how hunting might occur. As outlined in Part III, hunting approach 1, 2, or 3 would be considered for any delisted grizzly bears, while hunting approach 4 would be considered for areas with little chance of providing connectivity between population cores. FWP has recommended that no hunting occur for at least five years after the bears to be hunted are delisted.

- **Expected consequences if this Alternative is adopted.**

A long-term operational plan of moving bears from the genetically diverse and well connected NCDE to isolated and/or smaller populations (along with some track record of those bears surviving and successfully breeding with resident bears), superimposed on an objective of connectivity fostered by a low density of bears between population cores, should facilitate the case that adequate regulatory mechanisms were in place other than those implemented by the USFWS.

Although FWP can reasonably expect members of the public to disagree with portions of any plan ultimately adopted, we would expect greater acceptance of the FWP Preferred Alternative than of the No Action Alternative, because the Preferred Alternative offers two advantages: i) it would update our knowledge and intentions; and ii) it would reduce uncertainty regarding how to address conflict situations.

Alternatives considered but not carried forward

The following alternatives were considered but were not carried forward for various reasons, as explained below.

1) FWP could consider an alternative approach in which grizzly bears would not be welcome in the state or were considered an undesirable pest species (such as, for example, feral swine, Sus scrofa). This approach would run contrary not only to such federal laws as the ESA, but also to state law and to FWP's vision. Thus, this plan does not carry forward such an alternative for further analysis.

2) FWP could consider an alternative approach under which grizzly bear recovery within USFWS-designated RZs would be an objective, but outside of those zones grizzly bears would not be tolerated (i.e., would be removed when possible) regardless of their behavior or conflict status. Similarly, there would be no attempt to provide for connectivity among RZs through movement or low-density occupancy of areas between them. Should delisting occur, hunting could be used as a tool to discourage grizzly bear distribution from expanding beyond the RZs. Although such an approach could arguably be viewed

as strictly consistent with numeric standards under the ESA and the two existing Conservation Strategies to which FWP is a signatory, it would be contrary to the clear intent of the USFWS Recovery Plan, to the intent of those two Conservation Strategies, and to FWP's interpretation of its responsibilities under its various mandates. It would also tend to hinder, rather than to facilitate, eventual transfer of management from federal to state authority through delisting. Thus, this plan does not carry forward such an alternative for further analysis.

3) FWP could consider an alternative approach under which grizzly bears' presence would be an objective wherever they are found in Montana. Under such an approach, individual bears involved in conflicts with humans would still be controlled (i.e., hazed, moved, or euthanized, depending on circumstances), but the larger geographic context would not constitute an important part of the decision-making. Rather, the bears themselves would be considered to have indicated, by their presence, where they chose to live. FWP would not emphasize population stability within existing cores, nor would it explicitly prioritize connectivity among those cores (although, if successful, connectivity could occur indirectly). Rather, this approach would view all grizzly bears in Montana as members of an undifferentiated statewide population. Under this alternative, the safety and security of humans and their property would continue to be a high priority for FWP. However, since grizzly bears would be controlled only when conflicts arose, they would likely become more common in areas close to homes, farms, ranches, and other human infrastructure, including parts of the state (especially east of the main Rocky Mountain chain) that grizzly bears historically occupied but have not occupied for over a century. The risk to human safety and security would be higher than in other Alternatives.

Although this alternative would theoretically create the most certainty that grizzly bears would thrive indefinitely in Montana, FWP considers this approach naïve, costly, biologically unnecessary, and irresponsibly dangerous to humans and livestock. The existing grizzly bear population cornerstones are large enough that, with the appropriate level of long-term connectivity, there is no biologically based justification for the larger population that such an alternative would envision. A critical element of FWP's responsibility is to prioritize human safety, and a growing grizzly bear population in increasingly close association with homes and businesses fails that test. Thus, this plan does not carry forward such an alternative for further analysis.

4) FWP could consider an alternative approach in which human–bear conflicts are always resolved in the most favorable way for the individual bear involved, regardless of the cost to human livelihood or safety. Although such an approach could result in increased grizzly bear population, expanded geographic distribution, and quicker and more certain biological connectivity between cores, it would go against Montana law indicating that FWP's first priority in managing large predators (a classification that includes grizzly bears) is to protect humans and livestock. Thus, this plan does not carry forward such an alternative for further analysis.

Issues considered but not differentiated by alternatives

The following issues were considered but were not differentiated by alternatives, as explained below.

- **Motorized access.**

As detailed in Part III, high road density is associated with lower usage of those areas by grizzly bears, and lower survival of bears that do use them. For this reason, public land managers have committed, via Forest Plans, Conservation Strategies, and Habitat Conservation Plans to various limitations on motorized access, primarily within core population areas.

FWP holds a small proportion of the public lands that provide grizzly bear habitat, and many roads in or around its land do not fall under FWP jurisdiction. Previous FWP grizzly bear plans (Dood et al. 2006, FWP 2013) have recommended that land management agencies (including FWP) manage for open-road densities of 1 mi/mi^2 or less where grizzly bears might use the habitat and that this matches FWP's statewide approach to managing motorized access for multiple species (e.g., elk). FWP would anticipate maintaining this approach regardless of which Alternative is chosen here.

- **Transportation accommodation.**

As in existing plans (Dood et al. 2006, FWP 2013), FWP remains interested in minimizing the disruptive and demographic effects that highways create for grizzly bears. Because we know that grizzly bears are likely to use only the largest and most open types of crossing structures (Ford et al. 2017) and these are generally the most expensive, careful planning will be required to avoid making a large investment in a structure that provides little benefit to grizzly bears. FWP staff will assist and inform the development of proposals for highway crossing structures or other wildlife accommodations, and may ultimately lead the development of proposals. FWP staff are actively partnering with the Montana Department of Transportation (MDOT), local community organizations, and NGOs on priorities and placement. FWP is increasingly engaged in transportation projects to improve the chances that grizzly bears and other wildlife can cross roads safely (Costello et al. 2020).

In March 2020, a Memorandum of Agreement (MOA) between FWP and MDOT on coordination of wildlife and transportation issues was finalized and signed. This high-level MOA provides an umbrella structure under which work groups can share information and coordinate efforts related to reducing the negative effects of Montana's highway system on wildlife. The MOA specifically names one organization, Montanans for Safe Wildlife Passage, as an additional cooperating partner in this effort.

- **Climate change.**

FWP's understanding of how grizzly bears are likely to be affected by climate change is summarized in Part III of this document. The effects would be similar regardless of the management direction under consideration in this document.

- **Approach to public information on grizzly bear conflicts, relocations, and mortalities.**

What happens when there is a grizzly bear conflict, relocation, or mortality? Should FWP regions make individual decisions regarding the public dissemination of information about such events? Or should FWP adopt more consistency across the state regarding whether, when, or how such information is disseminated? The same approach would be applied regardless of management direction under consideration in this document.

Required goals, objectives, and strategies

Below are goals, objectives, and strategies that are viewed as required, and thus not subject to additional planning consideration.

Legal requirements for ESA-listed threatened species

By law, FWP is required to operate as permitted by USFWS when dealing with federally listed grizzly bears. More detailed guidance is provided in the two Conservation Strategies to which FWP is a signatory (see below Sidebar 3), as well as in regulations promulgated by the USFWS regarding mortality of grizzly bears (see Appendix A).

Commitments made under the two Conservation Strategies

FWP is a signatory to the inter-agency MOU implementing the NCDE CS (NCDE Subcommittee 2019), which serves as an inter-agency management plan for the NCDE and surrounding lands. This CS is not a regulatory or statutory document, but rather is a summary of commitments and regulatory mechanisms made by each government entity that would take formal effect upon delisting of grizzly bears within the NCDE DPS and is considered a requirement for eventual delisting by the USFWS. If delisting occurs, the ESA requires the USFWS, in cooperation with the State of Montana, to monitor grizzly bears for at least five years afterwards to assure that recovery is sustainable (a separate post-delisting monitoring strategy would be developed by the USFWS). The CS, unlike USFWS post-delisting monitoring, is not considered to be time-limited, but rather to be in effect indefinitely—although reviewed and potentially revised by participants at five-year intervals.

The NCDE CS categorizes the commitments made by each signatory towards Demographic Monitoring and Management (i.e., population management), Habitat Management and Monitoring, and Conflict Prevention and Response. FWP is primarily involved with the first and third of these and tangentially involved with the second. FWP commitments that relate to Demographic Monitoring and Management (which apply within the NCDE DMA) are formalized by a public process and written into rule by the Commission in ARM 12.9.1403. Additional detail on the NCDE CS is provided in Part IV of this document.

Because the Montana legislature has previously made the finding (87-5-301, MCA) that grizzly bears are a recovered population that is best served under state management and the local, state, tribal, and federal partnerships that fostered recovery and because both Conservation Strategies are considered components of any future delisting rule for the populations, FWP policy should continue to support the commitments made in both the GYE CS and the NCDE CS. Thus, in brief, FWP is committed (including through the Commission-adopted ARM 12.9.1403) to the grizzly bear population objectives contained in the two Conservation Strategies and both of the Alternatives articulated herein reflect that commitment.

In the NCDE, this means FWP, working with partners, will:

a) Maintain a well-distributed grizzly population within the NCDE DMA; specifically, that females with dependent offspring will be documented as present in at least 21 of the 23 bear management units (BMUs) and six of the seven occupancy units will be documented at least every six years. Adherence to this objective will be evaluated by monitoring the presence of females with offspring (cubs, yearlings, or two-year-olds) within defined geographic units of the NCDE.

b) Manage mortalities from all sources, including but not limited to hunting and the loss of grizzly bears by translocation out of the NCDE, to support an estimated probability of at least 90% that the grizzly bear population within the demographic monitoring area remains above 800 bears, considering the uncertainty associated with all of the demographic parameters and further manage mortality against a 6-year running average within the following threshold objectives.

c) Monitor demographic and genetic connectivity among populations.

Additionally, should the NCDE population be delisted and a hunting season be authorized by the Commission:

d) If the probability of that population remaining over 800 (within the DMA) falls below 90%, hunting would cease and would not resume until the probability is 90% or greater.

e) If mortality thresholds—as outlined in https://rules.mt.gov/gateway/ruleno.asp?RN=12%2E9%2E1403 for ARM 12.9.1403 (b)(ii) or (b)(iii)—should be exceeded in any given year, then hunting would not be allowed the next year.

In the GYE, this means FWP, working with partners, will:

a) Maintain the population in the DMA within or above a range of 800-950 grizzly bears ($0.98 \leq \lambda \leq 1.02$) as estimated by the recently adopted and recalibrated IPM. Should the estimated population within the DMA decline to 800 bears, any recreational hunting that had been authorized by any of the states after delisting would be closed.

b) Maintain a well-distributed grizzly population within the GYE DMA; specifically with a target of at least 16 of 18 BMUs within the PCA occupied at least one year in every six, and no two adjacent BMUs can be unoccupied over any six-year period.

c) Monitor all sources of mortality for independent females and males (>2 years old) and dependent young (<2 years old) within the GYE DMA and limiting mortality to annual mortality limits based on an annual population size estimate using an integrated population model and in coordination with Idaho and Wyoming per the Tri-State MOA.

Additionally, should the GYE population be delisted and a hunting season be authorized by the Commission:

d) Limit mortality to agreed-upon thresholds to maintain the population above recovery levels and 800 individuals. Should the estimated population within the DMA decline below established thresholds, any recreational hunting that had been authorized by any of the states post de-listing would be closed.

Irreversible and irretrievable resource commitments

A resource commitment is considered irreversible when impacts from its use create limitations to future use options. Irreversible commitments apply primarily to nonrenewable resources, such as fossil fuels or minerals, and to those resources that are renewable only over long timespans, such as soil productivity. A resource commitment is considered irretrievable when the use or consumption of the resource is neither renewable nor recoverable for use by future generations. In essence, irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the proposed action or preferred alternative. Such commitments include expenditure of funds, loss of production, or restrictions on resource use.

The programs considered under FWP's Preferred Alternative do not result in any irretrievable commitment of resources. If expansion of bears proves untenable in some areas, FWP has demonstrated the ability to remove bears. Similarly, habitat programs, hunting seasons, and access management can be reversed or revised if needed. Because removal of individual grizzly bears can be regulated or eliminated on an annual basis, or even on a short-term basis (if data indicates such action is prudent), the management program poses no threat to the species.

Conversely, because grizzly bears and other wildlife are a major factor in Montanans' quality of life, contributing to the attraction of new residents and an expanding human population, western Montana's human population has increased rapidly. Subdivisions, energy development, and other developments are slowly but steadily altering grizzly habitat. While FWP can moderate this loss somewhat by allowing grizzly bears to expand into currently unoccupied habitats to meet their needs, it cannot control human population growth.

Finally, grizzly bears are large and potentially dangerous animals. By their presence, they pose some risk to Montana's human inhabitants and visitors. Considering all of the people and activities that currently occur in grizzly habitat, and the comparatively few injuries or deaths, the risk level is low. In addition, the programs outlined in this plan should allow for management and further minimization of the risks of living with grizzlies. Through education, understanding, and science-based wildlife management, we expect to be able to minimize risks of injury and/or death from grizzlies.

Part III: Context and Background

Geographic setting: Thirty counties in Western Montana

The geographic setting of this plan consists of the thirty counties of Western Montana (Figure). Although possible, it is unlikely that counties further east would be affected, so they are not discussed here. Together, these counties constitute 74,158 mi^2 (192,068 km^2), about 51% of Montana's total area.

Figure 7. Western Montana counties covered by this plan

Montana, highlighting the 30 western counties that are the focus of this plan.

Most counties in this area are characterized by one or more river valleys divided by rugged mountain ranges. Elevations range from 1,820 ft. (555 m) where the Kootenai River enters Idaho near Troy, Montana, to 12,799 ft (3,904 m) on top of Granite Peak in the Beartooth Mountains. Major river drainages in Montana west of the Continental Divide include the Kootenai (which flows into the Columbia River in British Columbia), and the Bitterroot, Blackfoot, and Flathead (all of which flow into the Clark Fork, which itself flows into Lake Pend Oreille in Idaho, and from there into the Columbia River near the Washington/British Columbia boundary). East of the Continental Divide, major drainages in Montana include the Bighorn, Clark's Fork, and Tongue Rivers (all of which flow into the Yellowstone River), and the Beaverhead/Bighole (Jefferson), Gallatin, Judith, Madison, Marias, Musselshell, Sun, and Teton Rivers (all of which flow into the Missouri River). Additionally,

the Belly, St. Mary, and Waterton Rivers, which originate in Glacier National Park, are tributaries of the Saskatchewan River system, ultimately flowing into Hudson Bay.

Lower elevation habitats below 6,000 ft. (1,829 m) vary greatly and include large areas of shortgrass/sagebrush prairie, mountain foothills, intensively cultivated areas (grain and hay field agriculture), natural wetlands/lakes, riparian plant communities ranging from narrow streambank zones to extensive cottonwood river bottoms, manmade reservoirs, small communities, and sizeable towns and cities.

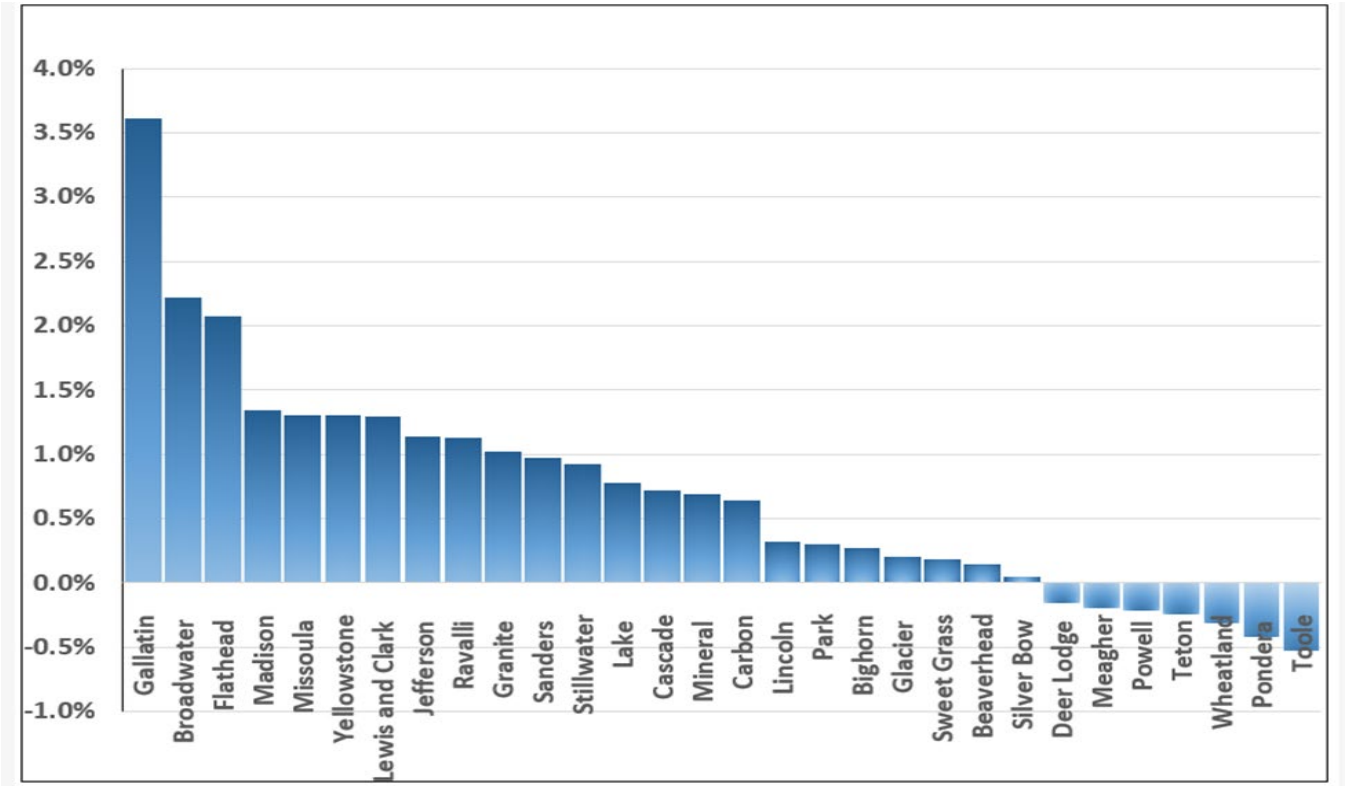
In these thirty counties, the mountainous portion above 6,000 ft. (1,829 m) contains all, or portions of, forty-four mountain ranges, including the Absaroka, Anaconda-Pintler, Beartooth, Beaverhead, Big Belt, Bitterroot, Blacktail, Boulder, Bridger, Cabinet, Castle, Centennial, Coeur d'Alene, Crazy, East Pioneer, Elkhorn, Flathead, Flint Creek, Gallatin, Garnet, Gravelly, Henry Lake, Highland, John Long, Lewis, Lewis and Clark, Little Belt, Livingston, Madison, Mission, Nevada, Ninemile-Reservation Divide, Purcell, Rattlesnake, Ruby, Sapphire, Salish, Sawtooth, Snowcrest, Spanish Peaks, Swan, Tendoy, Tobacco Root, and West Pioneer ranges. Mountainous habitats are dominated by coniferous forest (Douglas fir, lodgepole pine, Engelman spruce, western cedar, hemlock, whitebark pine, limber pine, ponderosa pine, juniper), and rocky subalpine/alpine communities found above timberline.

Human population

As of 2021, an estimated 950,071 people lived in the 30-county area of Montana; despite having only slightly more than half Montana's area, these counties comprised almost 89% of Montana's population. The 2021 estimate also reflected a population increase of nearly 24% since the year 2000. During the years 2000–2019, population growth was highest in Gallatin, Broadwater, and Flathead counties; population declined modestly in seven counties (Figure 8 and Table 3).

Figure 8. Western Montana counties: Annual population growth

From 2000-2019.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Gallatin
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Flathead
Madison
Missoula
Yellowstone
Lewis and Clark
Jefferson
Ravalli
Granite
Sanders
Stillwater
Lake
Cascade
Mineral
Carbon
Lincoln
Park
Bighorn
Glacier
Sweet Grass
Beaverhead
Silver Bow
Deer Lodge
Meagher
Powell
Teton
Wheatland
Pondera
Toole

Table 3. Western Montana counties: Population, area, and population density

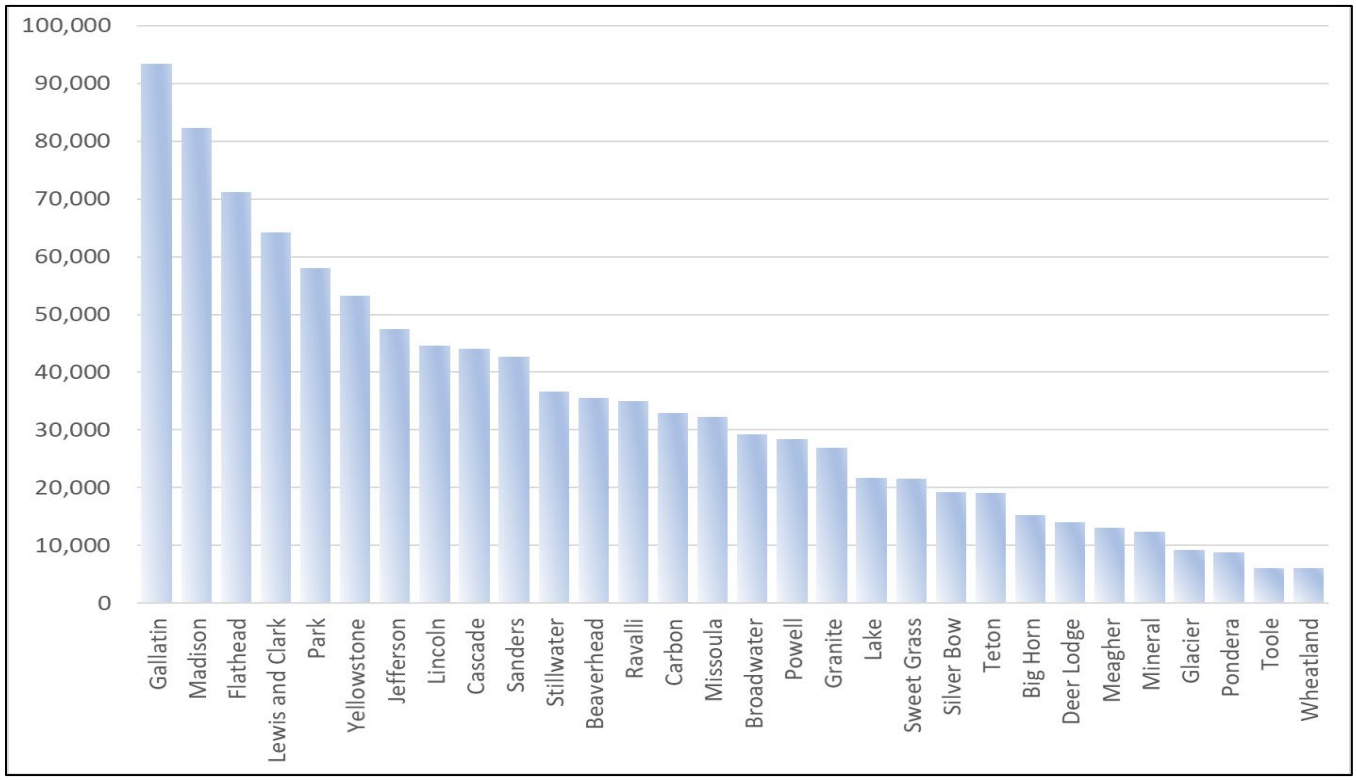
From Montana.gov (2021 January 25). Counties are listed in descending order by 2021 population.

County	Population, 2000	Population, 2021	Annual growth rate, 2000–2019	Area in miles (excluding large water bodies)	Population density
Yellowstone	129,352	161,300	1.30%	2,635	61.21
Missoula	95,802	119,600	1.31%	2,598	46.04
Gallatin	67,831	114,434	3.62%	2,608	43.88
Flathead	74,471	103,806	2.07%	5,099	20.36
Cascade	80,357	91,366	0.72%	2,688	33.99
Lewis and Clark	55,716	69,432	1.30%	3,459	20.07
Ravalli	36,070	43,806	1.13%	2,394	18.30
Silver Bow	34,606	34,915	0.05%	718	48.63
Lake	26,507	30,438	0.78%	1,493	20.39
Lincoln	18,837	19,980	0.32%	3,619	5.52
Park	15,694	16,606	0.31%	2,802	5.93
Glacier	13,237	13,753	0.21%	2,991	4.60
Bighorn	12,671	13,319	0.27%	4,995	2.67
Jefferson	10,049	12,221	1.14%	1,657	7.38
Sanders	10,227	12,113	0.97%	2,761	4.39
Carbon	9,552	10,725	0.65%	2,047	5.24
Stillwater	8,195	9,642	0.93%	1,790	5.39
Beaverhead	9,202	9,453	0.14%	5,542	1.71
Deer Lodge	9,417	9,140	-0.15%	731	12.50
Madison	6,851	8,600	1.34%	3,587	2.40
Powell	7,180	6,890	-0.21%	2,326	2.96
Broadwater	4,385	6,237	2.22%	1,189	5.25
Teton	6,445	6,147	-0.24%	2,271	2.71
Pondera	6,424	5,911	-0.42%	1,626	3.64
Toole	5,267	4,736	-0.53%	1,916	2.47
Mineral	3,884	4,397	0.70%	1,220	3.60
Sweet Grass	3,609	3,737	0.19%	1,855	2.01
Granite	2,830	3,379	1.02%	1,727	1.96
Wheatland	2,259	2,126	-0.31%	1,422	1.50
Meagher	1,932	1,862	-0.19%	2,392	0.78

Although still sparsely populated by national standards, the human population of Western and Central Montana and its associated developmental footprint has expanded greatly in recent decades. In 2016 the 30-county area contained an estimated 292,548 single family homes, with approximately 109,206 (over 37%) built since 1990. Almost 1,025,000 acres (414,803 hectares) of previously open space—slightly more area than Glacier National Park—was estimated to have been converted to residences during this quarter-century. Counties with the largest acreage of open space converted included Gallatin, Madison, Flathead, and Lewis and Clark (see Figure 9 open space to housing), though all counties contributed.

Figure 9. Western Montana counties: Acres of open space converted to housing

For 1990–2016. From 2020, https://headwaterseconomics.org/economic-development/montana-home-construction/.



Economics

In 2010, the median per capita income in the United States was $27,334, and the median household income was $51,914. In Montana, median per capita income was somewhat lower, at $23,836, with median household income of $43,872. All but one of the 30 counties in Western Montana ranked below the U.S. median per capita income in 2010, and all but two ranked below the U.S. median household income. Twenty of the 30 counties in Western Montana ranked below the Montana-wide median for per capita income, and 22 of 30 ranked below the Montana-wide median for household income (Table 4).

Table 4. Western Montana counties: Income – per-capita, median, below poverty line

Data from 2021. Counties are listed in descending order of median household income[4]

County	Median household income	Poverty rate (%)
Gallatin	$78,910	9
Stillwater	$75,820	8
Yellowstone	$69,182	11
Jefferson	$68,128	7
Lewis and Clark	$67,702	9
Broadwater	$66,307	9
Flathead	$65,835	10
Missoula	$65,682	13
Carbon	$62,841	9
Madison	$62,516	9
Sweet Grass	$61,454	10
Ravalli	$60,030	10
Teton	$59,787	13
Park	$59,113	10
Cascade	$57,085	13
Beaverhead	$53,776	13
Granite	$52,984	12
Silver Bow	$52,495	13
Lake	$50,978	17
Mineral	$50,327	14
Sanders	$50,270	15
Toole	$49,297	15
Lincoln	$48,156	17
Pondera	$47,900	17
Powell	$47,687	17
Big Horn	$47,179	26
Deer Lodge	$45,725	15
Meagher	$45,391	15
Glacier	$44,777	25
Wheatland	$42,431	17

[4] "Montana Income and Poverty: Small Area Income and Poverty Estimates (SAIPE). U.S. Census Bureau 2021.

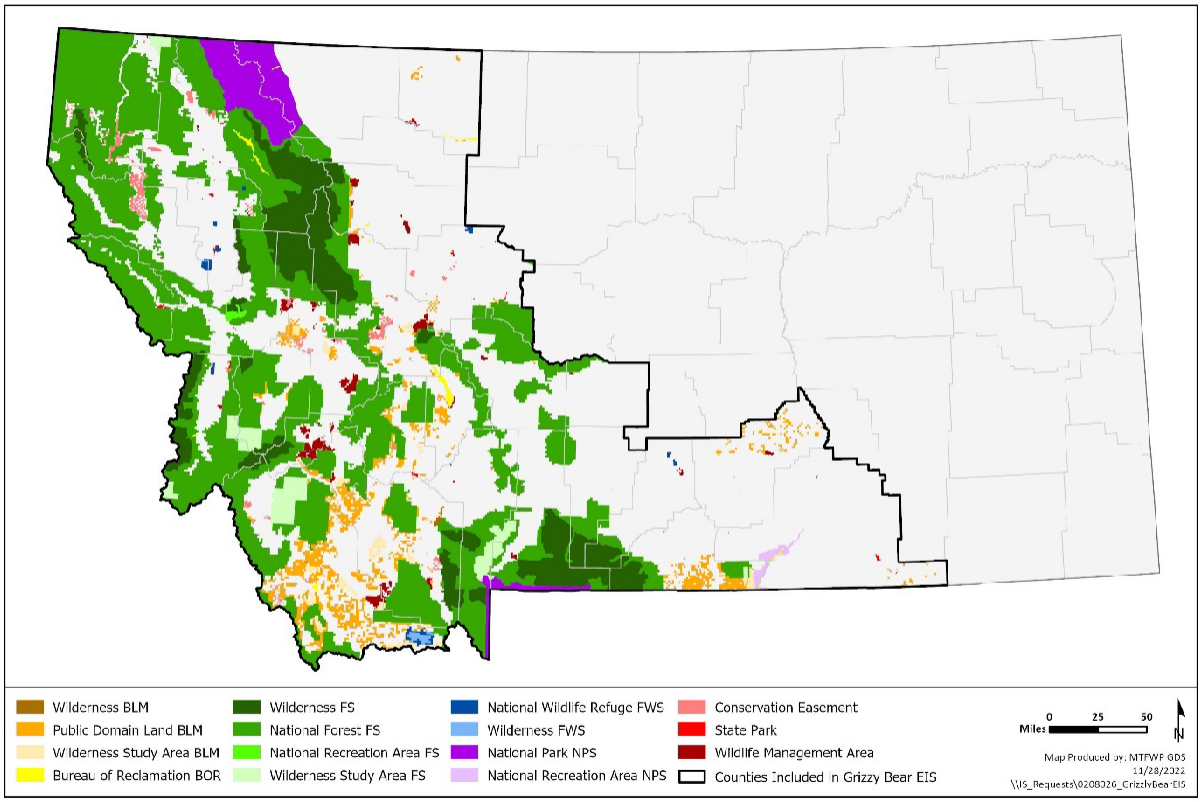
Land ownership

The majority of mountainous habitat (above 6,000 ft., 1,829 m) is located within publicly owned National Forests, corporate timber lands and Glacier and (the Montana portion of) Yellowstone National Parks. Approximately 36% of the 30-county area is managed by USFS, and just over 2% by NPS. All, or portions of, the Bitterroot, Custer-Gallatin, Deer Lodge-Beaverhead, Flathead, Helena-Lewis and Clark, Kootenai, Kaniksu (part of the Idaho Panhandle National Forest complex), and Lolo National Forests lie within this 30-county area. The Bureau of Land Management (BLM) manages just under 3% of lands in the area (Table 5, Figure 10). A small portion (just over 1%) of mountainous habitat is in state ownership (Montana Department of Natural Resources and Conservation [DNRC]). The Blackfeet Indian Reservation constitutes over 3% of total lands, and the Flathead Indian Reservation constitutes an additional 2.6%. Smaller amounts are managed specifically for wildlife by USFWS and FWP. Other lands are in private ownership, including private subdivisions, ranches, land trusts, ski resorts and timber company lands. Communities of various sizes also occupy several thousand acres of low-elevation river-valley habitat.

Table 5. State and federal protected land acreage within the 30-county project area.

State or Federal Protected Lands	Acres
Bureau of Reclamation (BOR)	84,480
National Forest (USFS)	14,018,560
National Park (NPS)	1,173,920
National Recreation Area (USFS and NPS)	115,200
National Wildlife Refuge (USFWS)	76,804
Bureau of Land Management (BLM)	1,376,640
Wilderness (BLM, USFS, and USFWS)	3,300,480
Wilderness Study Area (BLM and USFS)	807,040
State Parks (FWP)	29,440
State Wildlife Management Areas (FWP)	413,440

Figure 10. State and federal protected land acreage within the 30-county project area.



Land Use

Agriculture

The 30-county area supports a large agricultural economy. In 2017, there were an estimated 16,993 farms and ranches in the 30-county area (Table 6). By far the most common activities of these farms and ranches were raising beef cattle, growing forage (hay) for cattle, and growing grain crops (wheat, oats, barley).

Table 6. Western Montana counties: Agricultural characteristics

Data from 2017, https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Montana/cp30001.pdf.

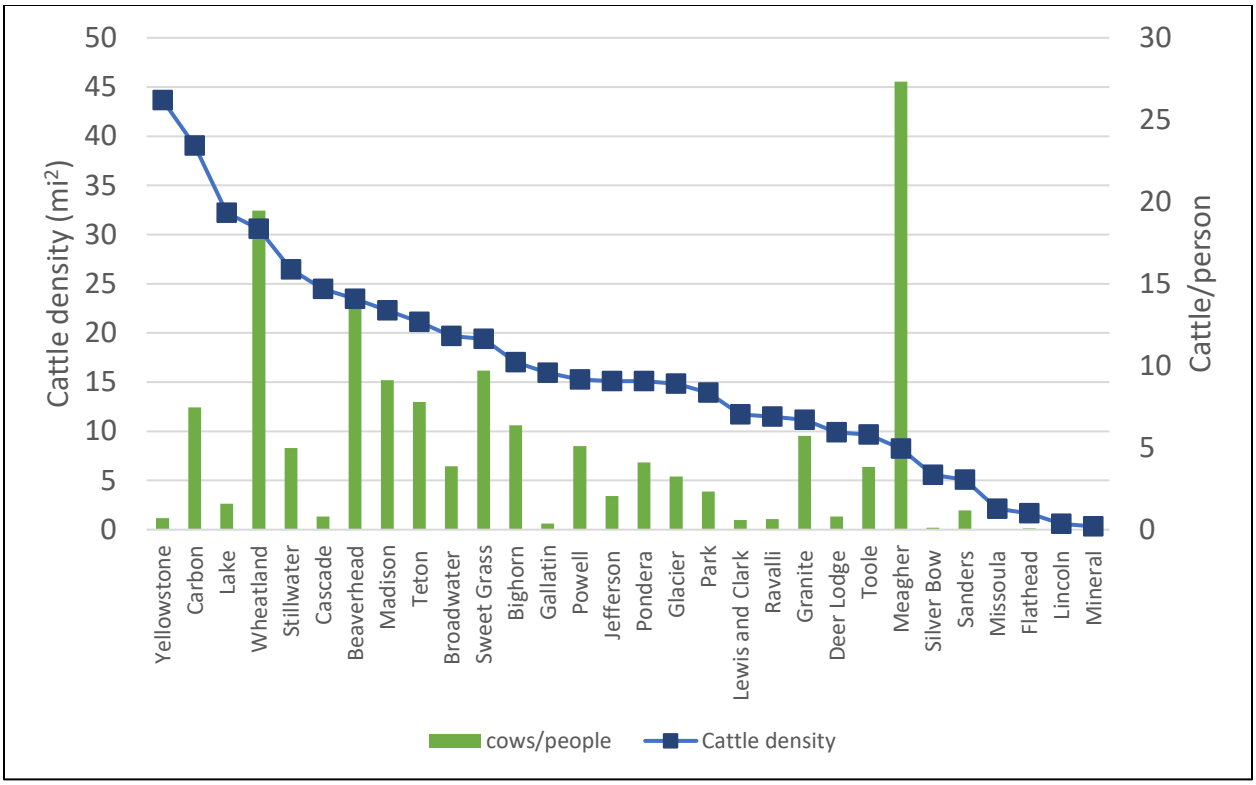
County	# of ranches / farms (2017)	Average # of acres	Total # of acres in agriculture	% of land in crops	% of land in pasture
Bighorn	353	9,032	3,188,296	7	82
Yellowstone	1,314	1,220	1,603,080	19	76
Cascade	1,027	1,237	1,270,399	33	61
Beaverhead	494	2,498	1,234,012	13	86
Glacier	637	1,862	1,186,094	42	56
Toole	362	3,025	1,095,050	67	31
Madison	605	1,526	923,230	16	80
Teton	686	1,294	887,684	52	46
Meagher	145	6,084	882,180	10	83
Wheatland	174	4,944	860,256	16	80
Sweet Grass	301	2,745	826,245	7	90
Carbon	725	1,125	815,625	17	78

Pondera	486	1,656	804,816	69	30
Lewis and Clark	707	1,132	800,324	10	81
Stillwater	562	1,357	762,634	23	72
Park	575	1,238	711,850	16	76
Gallatin	1,123	624	700,752	30	63
Sanders	521	1,233	642,393	7	29
Lake	1,170	548	641,160	15	39
Powell	254	2,253	572,262	10	62
Broadwater	296	1,577	466,792	24	69
Jefferson	370	952	352,240	16	78
Granite	151	1,892	285,692	10	71
Missoula	576	452	260,352	8	16
Ravalli	1,576	153	241,128	22	53
Flathead	1,146	159	182,214	51	24
Deer Lodge	77	962	74,074	16	73
Silver Bow	142	425	60,350	6	74
Lincoln	345	139	47,955	26	27
Mineral	93	198	18,414	30	13

Sheep, hogs, and dairy cattle were also being raised in smaller numbers. Sheep and beef cattle were grazed on privately owned grassland and on publicly owned (USFS, BLM, DNRC) grazing allotments. Some of these allotments occurred in high elevation habitats occupied by grizzly bears. In 2020, an estimated 1,211,000 cattle (including calves) grazed in the 30-county area, as well as some 92,200 sheep (including lambs). The largest populations of cattle were in Beaverhead (~ 130,000) and Yellowstone (~ 115,000) counties, and the largest number of sheep were in Silver Bow (~ 12,000), Beaverhead (~ 12,000), and Wheatland (~ 11,500) counties. Cattle density was highest in Yellowstone and Carbon Counties; cattle outnumbered people by the greatest proportion in Meagher, Wheatland, and Beaverhead counties (Figure 11).

Figure 11. Western Montana counties: Density of cattle and ratio of cows to people

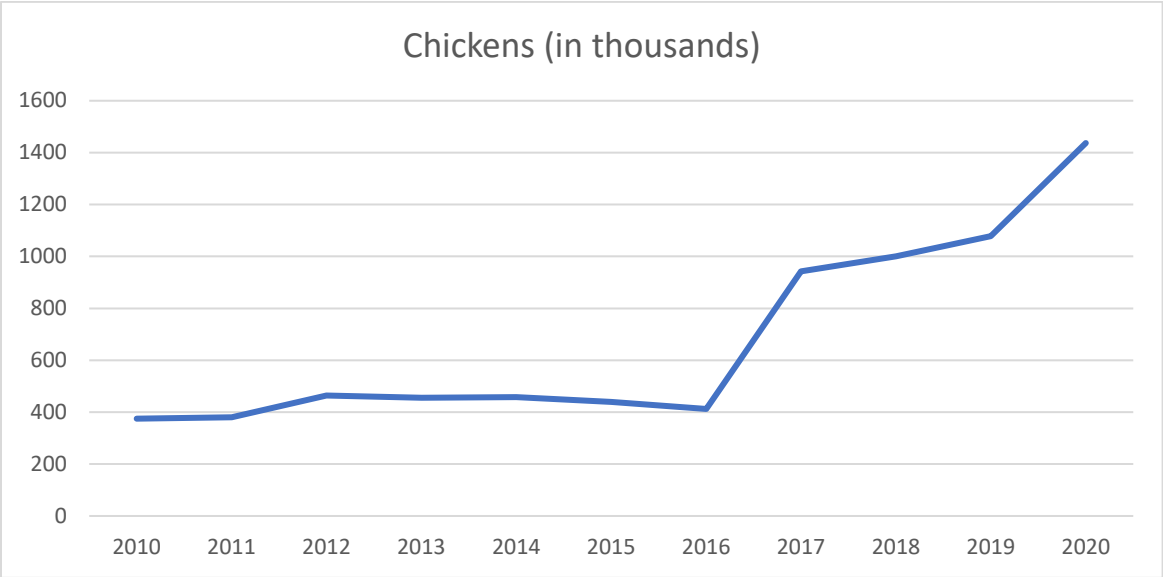
Density of cattle (blue squares) and ratio of cows to people (green bars) in the 30 counties considered in this document.



Although Montana is not known particularly for producing poultry, the number of chickens reported as being raised in Montana has increased in recent years, with a notable increase beginning in 2017 (Figure 12). Most chicken producers are small scale, but even a few chickens can attract grizzly bears, resulting in conflicts.

Figure 12. Chickens raised in Montana

From USDA 2020. Chickens reported as raised in Montana during 2010–2020.



Mining

Large mineral deposits, ranging from talc to gold, are located throughout Western Montana. Of these, metallic minerals provide the largest share of Montana's non-fuel mining income, with copper, palladium, and platinum leading the list of important metals (these 2 being mined nowhere else in the United States). In 2012, there were a total of 53 mines in production, development, standby permitting, or reclamation status, all but 7 of which were located within the 30-county area (these 7 were predominantly coal mines; http://www.mbmg.mtech.edu/pdf/2012ActiveMines.pdf).

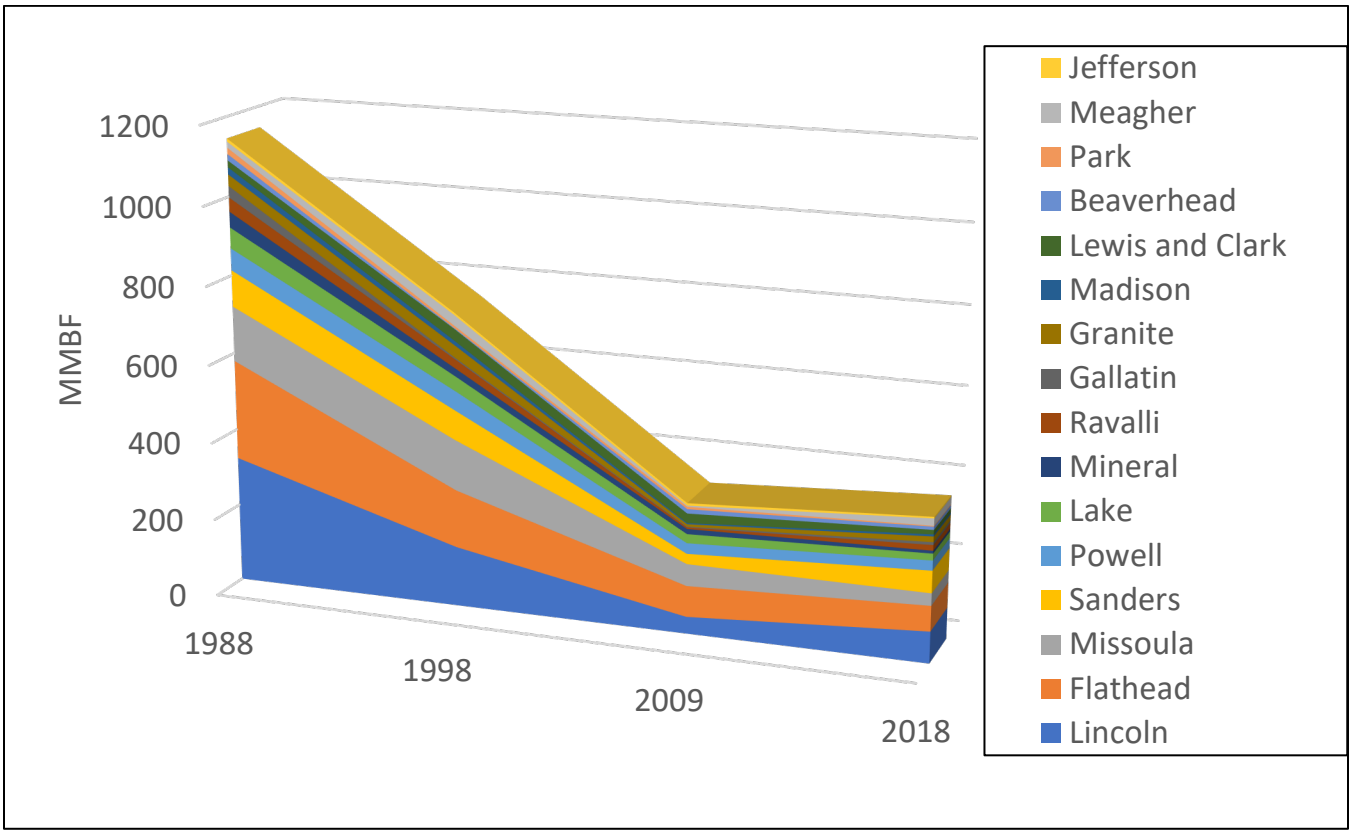
Wood products

The majority of Montana's forested lands (23 million acres) are located within the western part of the state. Nearly 4 million acres of these forest lands are permanently reserved as either wilderness areas or National Parks. Eleven million acres of the remaining forested land is administered by the USFS, with 5.2 million acres of this public estate designated by current forest plans as suitable for timber production. Private forest lands occupy approximately 6 million acres, with 2 million owned and managed by large timber companies. Another four million acres of private forest lands are owned by some 11,000-plus private individuals.

Timber production in the 30-county area has declined since the late 1980s (http://www.bber.umt.edu/fir/s_mt.asp). In 1988, an estimated 1,163 million board feet (MMBF) were produced; this declined to approximately 352 MMBF in 2009, before recovering slightly to 367 MMBF in 2018 (Figure 13).

Figure 13. Wood products – gross output from primary producing counties, all in Western Montana

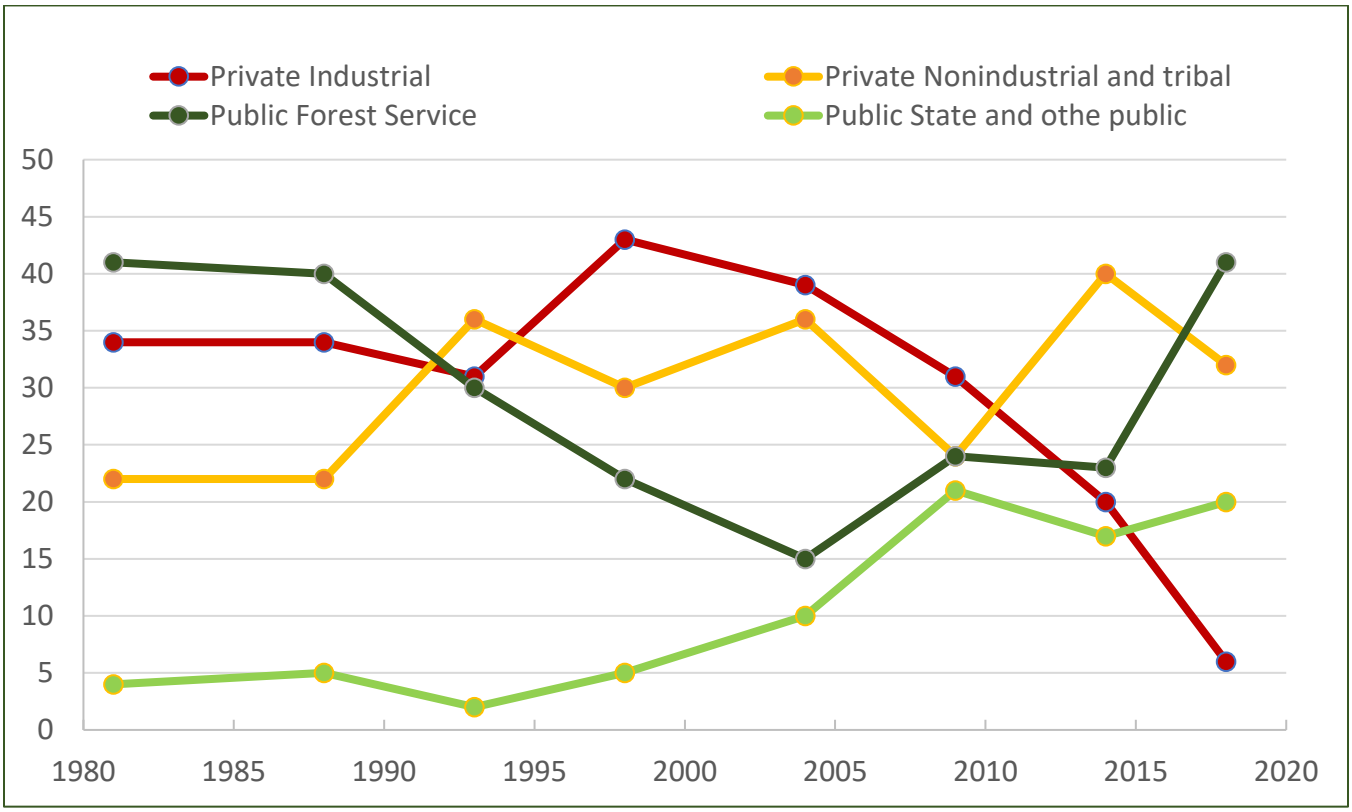
From 1988-2018. Gross output from top sixteen wood-producing counties in Western Montana, in million board feet (MMBF) per year.



Sources for wood products, categorized broadly into public (USFS; state and other public), and private (corporate industrial timber lands; private, non-industrial and tribal) forestlands, has varied over time (Figure 14). During the 1980s, most production came from U.S. Forest Service lands, being almost matched by private industrial forests, with very little coming from state lands. As production on USFS lands declined in the 1990s, the proportion coming from non-industrial and tribal lands increased (briefly becoming dominant in 1994). The relative contribution from private industrial lands peaks in about 1998 as USFS lands continued to decline, but other public lands made up some of that. However, the proportion contributed by private industrial lands has declined markedly in the past 20 years, with the other sources increasing in importance.

Figure 14. Percentage of wood products from four categories of forest producing lands

Data (1985–2020) from University of Montana Bureau of Business and Economic Research (BBER) 2020, http://www.bber.umt.edu/pubs/forest/fidacs/MT2018%20Tables.pdf.



In 2018, the University of Montana Bureau of Business and Economic Research (BBER) estimated that Montana's forest industry accounted for just under 8,000 jobs in direct employment, and an additional 13,300 jobs indirectly associated with wood products. This was up somewhat from employment ca. 2010, but lower than the late 1990s (Morgan et al. 2018).

Recreation

Outdoor recreation and tourism are major components of the economy in the 30-county area. Western Montana is nationally renowned for its high-quality fishing, hunting, camping, hiking, river floating, skiing, snowmobiling, wildlife viewing and sightseeing opportunities. Glacier and Yellowstone National Parks, Flathead Lake, and other public lands attract large numbers of people to the area every year. Many of these outdoor activities are made possible by public ownership of large tracts of mountainous habitat and additional access provided by many private landowners.

Recreationists have largely unhindered access to millions of acres of undeveloped land. Some of this land is currently, or based on documented trends of increasing distribution will be, occupied by grizzly bears. As bear numbers and distribution increase and the number of outdoor enthusiasts grow, contact and interaction with people engaged in outdoor activities is likely to increase. As part of FWPs conflict prevention efforts there are targeted messaging campaigns for hikers, cyclists, campers and hunters. Messages have been designed to reach black bear hunters and wolf trappers. Maps of grizzly bear distribution will be routinely updated.

Value orientations of Montanans relevant to grizzly bear management

Although largely rural (only the Billings and Missoula areas are considered "metropolitan" by the U.S. Census Bureau), and ethnically more homogenous than most states (88.6% white, 6.4% Native American), and older than most (23.2% 62 years or older) Montana's 1,062,300 people in 2021 contained a populace with diversity of values and attitudes toward wildlife. Based on a large-scale public opinion survey in 19 western states conducted in 2004, Teel and Manfredo (2009) developed a typology of value orientations they termed "traditionalists," "mutualists," "pluralists," and "distanced." Those with a "traditionalist" orientation tended to score high on such measures as valuing use of animals and hunting, tending to emphasize the wildlife should be used and managed for the benefit of people. Those with a "mutualist" orientation scored higher on measures such as social affiliation and caring, tending to view wildlife as part of their extended social network. Those categorized as "pluralists" scored high on both sets of measures, with context and situations controlling which might dominate in any given issue. Those categorized as "distanced" scored low on both sets of measures, i.e., were more apathetic generally about wildlife.

Based on a nationwide follow-up survey conducted during 2016-18, 28% of U.S. respondents were categorized as "traditionalists," 35% as "mutualists," 21% as "pluralists," and 15% as "distanced" (Manfredo et al. 2018). Montana had a greater percentage of respondents categorized as "traditionalists" than the national average (38.5%), but this was down considerably from the 47% estimated in 2004. Montana had a lower percentage of respondents categorized as "mutualists" than the national average (26.5%) but this was up considerably from the 19% estimated in 2004. Montana had among the highest percentage among the 19 western states categorized as "pluralists" (27.5%), almost unchanged from 2004. Of note is that Montana had among the lowest percentage of respondents among western states categorized as "distanced" (7.5%). In short, Montanans don't all share the same value orientation toward wildlife, but very few are apathetic.

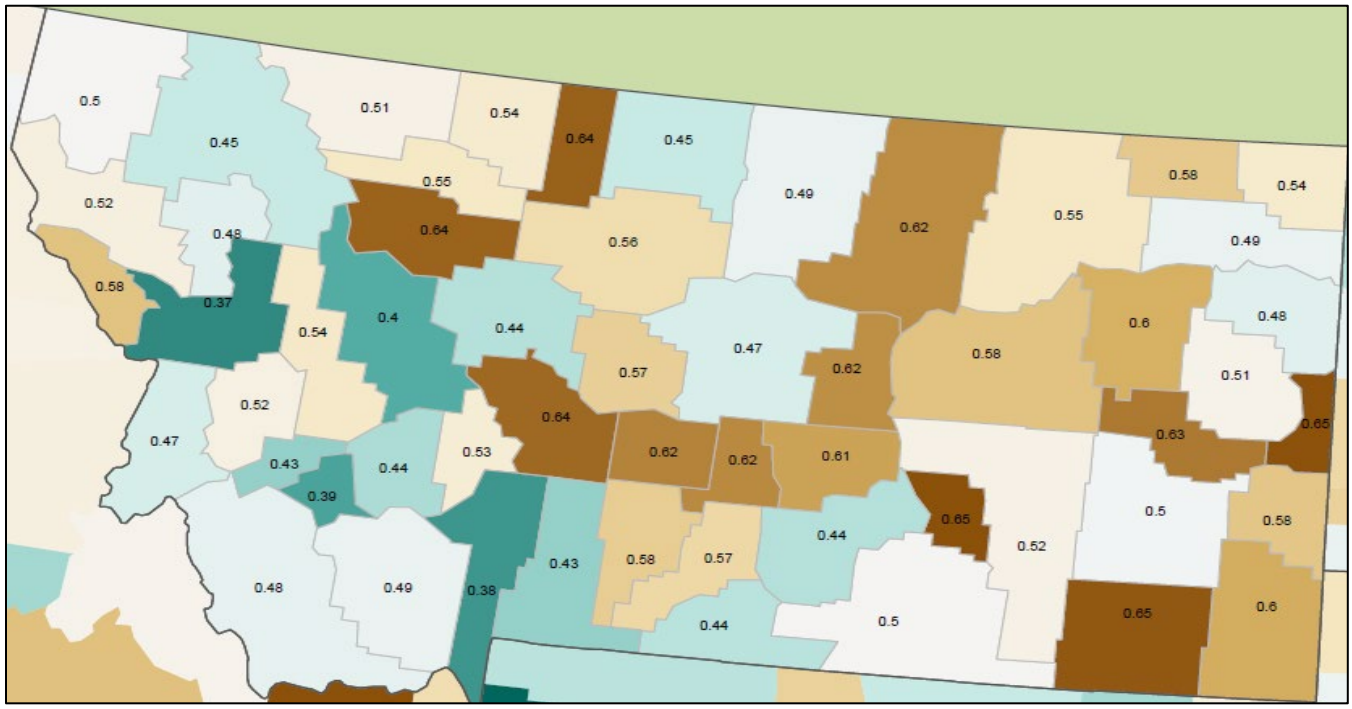
Manfredo et al. (2018) also found that, among all 50 states, only Alaska (62.9%) and Wyoming (62.1%) exceeded Montana's 60.8% of respondents agreeing that local communities should have more control than they currently do over management of fish and wildlife by the state. Montana was among 6 states with the highest percentage of respondents agreeing that wolves that kill livestock should be lethally removed by state managers (Manfredo et al. 2018). In contrast, Montana clustered close to the mean of all states in percentage of respondents agreeing that a black bear attacking a person should be lethally removed by the state. (The questionnaire did not address grizzly bears specifically, probably because they are present in only 5 of the 50 states). In a somewhat surprising finding, given that FWP's funding is largely provided by hunters and anglers, and that "traditionalists" outnumber "mutualists," Montana ranked highly among states in percentage of respondents who prefer a funding model which includes public state taxes (albeit not a funding model that prioritizes public state taxes). Just under 75% of Montana respondents preferred including some public taxes in wildlife funding, similar to percentages in Washington, Arizona, and Michigan, but higher than percentages in Wyoming, the Dakotas, Colorado, or Utah. Almost 14% of Montana respondents reported being active hunters, the 11th highest among the 50 states. Thirty-seven percent of Montana respondents reported being active wildlife viewers, a percentage exceeded only by the 40.7% in Alaska. Montana, Alaska, and Wyoming stood apart as states with high percentages of active wildlife viewers while also having high percentages of "traditionalists" (who might otherwise be assumed to hunt wildlife but not watch it; Manfredo et al. 2018). However, Montana also had the largest decrease in the proportion of self-identified active hunters from 2004 to 2018.

Nationwide, Manfredo et al. (2018) found that trust in state wildlife agencies in 2018 (64%) far exceeded trust in state government generally (41%) or the federal government (25%).[5] "Traditionalists" tended to trust state wildlife agencies more (65%) than "mutualists" (54%), although pluralists were the most trusting of state wildlife agencies (72%). In Montana, trust in the state wildlife agency was higher than the national average among both "traditionalists" (71.5%) and "mutualists" (62.3%), and was 69% among all respondents in 2018. In contrast, trust in the federal government among Montana respondents declined from 41% in 2004 to just 22% in 2018.

At FWP's request, Dr. Michael Manfredo (Colorado State University, Ft. Collins, CO) examined county-level attitudes of Montanans toward lethal control of black bears that attack humans, regardless of circumstances, as well as county-level indices of support for "traditionalist" vs "mutualistic" values. Respondents in Gallatin, Missoula, Lewis and Clark, and Butte-Silver Bow Counties were predicted to be negatively disposed toward lethal control of black bears (Figure 15).

Figure 15. County-level support for lethal control of black bears that attack humans

Predicted by a statistical model using data from a nationwide survey. See also Manfredo et al. (2021).

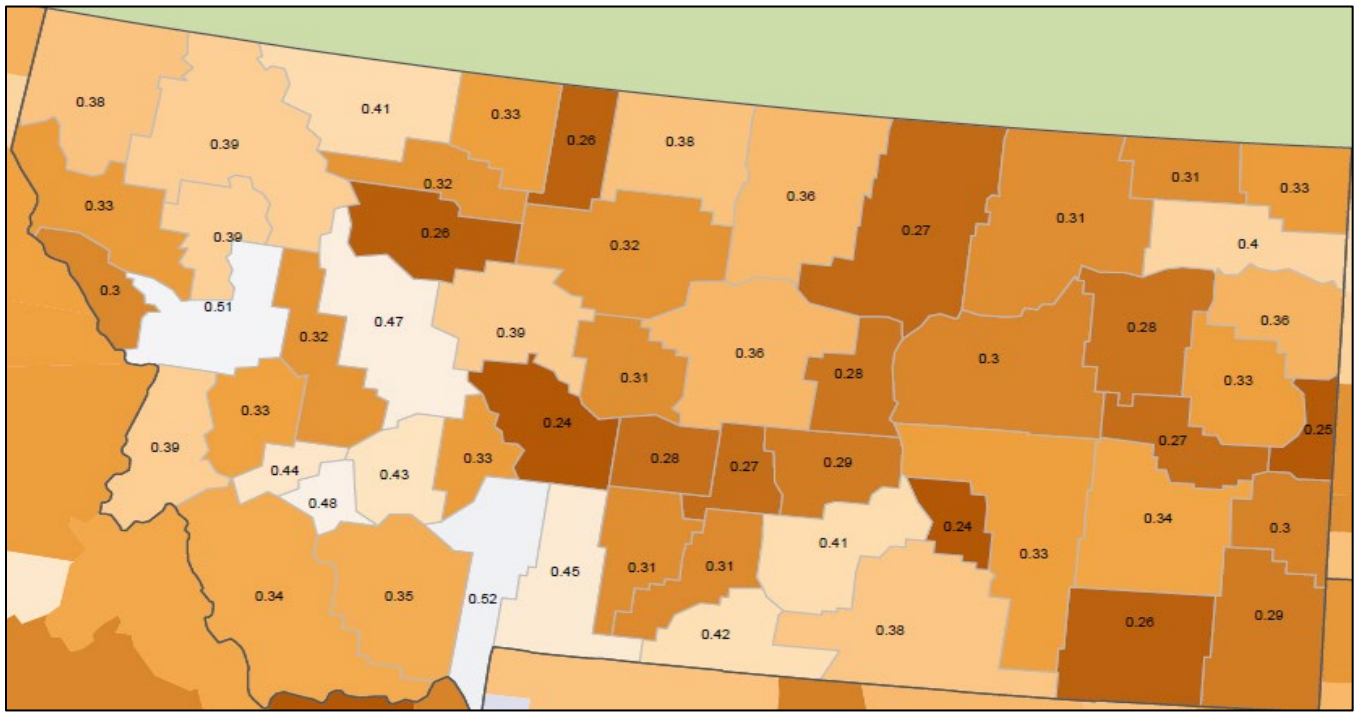


Respondents in Yellowstone, Carbon, Park, Cascade, Flathead, Deer Lodge, and Jefferson counties were predicted to be neutral. Among Western and West-central Montana counties, the most support for lethal control of black bears was found in Meagher, Teton, and Liberty counties, with support also being seen in Mineral, Powell, Toole, Pondera, Sweet Grass, and Stillwater Counties.

[5] Nesbitt et al. (2020) did not use the orientation typology of Manfredo et al. (2018), nor were they able to contrast public attitudes toward FWP with attitudes toward other government entities. However, they obtained data specific to Montanans' trust regarding FWP grizzly bear management. Over 70% either agreed or strongly agreed they trust FWP "knows how to effectively manage grizzly bear populations," over 76% either agreed or strongly agreed they trust FWP "knows how to respond to grizzly bear-human conflict," 80% either agreed or strongly agreed they trust FWP to "provide the public with the best available information on how to reduce grizzly bear-human conflict," and over 67% either agreed or strongly agreed that FWP "tells the truth about grizzly bears and their population status."

Figure 16. County-level social-habitat index

Predicted by a statistical model using data from a nationwide survey. Values exceeding 0.5 indicate a higher percentage of mutualists than traditionalists; values under 0.5 indicate a higher percentage of traditionalists than mutualists. See also Manfredo et al. (2021).



At the county level, support for lethal control of dangerous bears appeared to be highly correlated with (r = -0.95) the "social-habitat index" (i.e., whether values tended more toward mutualistic or traditionalistic; see Figure 16). Mutualistic values were greater than traditionalistic only in Missoula and Gallatin counties. Among western Montana counties scoring as most traditionalistic were Meagher, Teton, Mineral, Powell, Granite, Sanders, Broadwater, Beaverhead, and Madison.

Manfredo et al. (2017) argued that values, such as summarized above, are resistant to rapid change, at least in the absence of large-scale shifts in people's life circumstances, but that congruence of values is not necessarily a prerequisite to facilitating adaptive behavioral changes that can support long-term conservation. Pointedly (given Montanan's generally high regard for FWP's ability to manage human-grizzly bear conflict), Hughes et al. (2020) argued that "the challenges to grizzly bear conservation success are more about decision-making processes and issues of legitimacy, power, trust, and respect rather than people's attitudes toward bears."

Summary of grizzly bear biology

This summary of grizzly bear biology is not intended to be exhaustive; focus is primarily on aspects influencing their conservation and management status in Montana, as well as current and possible future management responses by FWP and other management entities. Other aspects of grizzly bear biology are not considered in depth here; readers interested in learning more can consult references cited herein, and in Part IV under the summary of science used.

Species and evolutionary history

The Eurasian brown bear and the North American grizzly are considered the same species (Ursus arctos). A number of sub-species are typically recognized within Eurasia (Garshelis 2009), and in earlier days, a number of North American subspecies were also recognized Pasitschniak-Arts (1993). More modern practice has been to accept only 2 subspecies in North America (based on skull analyses by Rausch 1963): the Kodiak subspecies (*U. a. middendorffi*) and all others in North America (*U. a. horribilis*). For purposes of this plan, we simply refer to grizzly bears, Ursus arctos, recognizing that adaptive differences with a genetic component may exist within grizzly bears in the Northern Rockies.

Current theory holds that this species developed its large size, aggressive temperament, flexible feeding habits, and adaptive nature in response to habitats created by intermittent glaciations (Herrero 1972). It is believed that early grizzly bears migrated to North America from Siberia across a land bridge at the Bering Strait at least 50,000 years ago (Schwartz et al. 2003, Miller et al. 2006). As the continental ice sheet receded about 10,000 years ago, the species began to work its way south over post glacial North America.

In North America, grizzly bears originally inhabited a variety of habitats from the Great Plains to mountainous areas, from central Mexico to the Arctic Ocean. European explorers encountered grizzly bears throughout most of the American West. It is not known exactly how many grizzly bears lived in the U.S. before 1700, but based on historical sightings and modern-day densities, it is estimated that around 50,000-100,000 bears lived in parts of 17 states.

Physical characteristics

Grizzly bears are generally larger than black bears and can be distinguished by longer, curved front claws, humped shoulders, and a face that appears concave (Schwartz et al. 2003, Garshelis 2009). A wide range of coloration from light brown to nearly black is common. Guard hairs are often paled at the tips; hence the name “grizzly” (Sidebar 5). Spring shedding, new growth, nutrition, and climate all affect coloration.

Sidebar 5. On what we call this animal

The term “grizzly bear” may be an unfortunate choice, because the word “grizzly” is often confused with the word “grisly.” The bear’s name, based on the word “grizzled” (from Middle English “grisel,” meaning “gray-colored"), refers to its “grizzled” appearance—an appearance caused by its outer fur typically being dark with light-colored tips. The similar-sounding but unrelated word “grisly” (from Old English “grislic,” meaning “to fear”), is a close synonym for gruesome, ghastly, frightful, hideous, horrifying, macabre, repulsive, or monstrous; it is most often used when describing a bloody scene or a murder. In many minds, the two words have become confused and the “grizzly bear” has come to be seen as a “grisly” animal. (In Eurasia and coastal Alaska, the most common name for Ursus arctos is simply “brown bear,” although not all are brown in color.)

Grizzly bears are certainly powerful and sometimes aggressive animals that can and do injure or kill people, yet typically they shy away from humans. Remembering that grizzly bears are named for their distinctive grizzled appearance, not for being monstrous, might help people maintain perspective on how to live near them.

In the lower 48 states where few grizzly bears have extensive access to salmon, mean weights of adult grizzly bears are 150-250 kg (330-550 lbs.) for males and 110-150 kg (240-330 lbs.) for females (Schwartz et al. 2003). Variation in body mass is affected by age at sexual maturity, samples from within the population, season of sampling, and reproductive status.

Grizzly bears are relatively long-lived; animals in captivity and in the wild have been documented as living as long as 34 years (Schwartz et al. 2003) or even longer. In general, the oldest age classes are listed at 28 years for males and 23 years for females, although individuals can live longer. More pertinent to conservation and management than maximum longevity are estimates of survival rates among sex/age classes of grizzly bears (see below).

Social organization and behavior

Except when caring for young or breeding, grizzly bears are generally solitary. Strict territoriality is unknown, with intraspecific defense limited to specific food concentrations, defense of young, and surprise encounters (Schwartz et al. 2003, Garshelis 2009).

In contrast to their generally solitary nature, grizzly bears of all ages will congregate readily at plentiful food sources and form a social hierarchy unique to that grouping of bears. Except at concentrated food sources, mating season is the only time that adult males and females tolerate one another, and then it is only during the estrous period. Other social affiliations are generally restricted to family groups of mother and offspring, siblings that may stay together for several years after becoming independent, and an occasional alliance of sub-adults or several females and their offspring (Schwartz et al. 2003, Garshelis 2009).

Individual grizzly bears evidently differ in their tolerance to close approaches by other bears or by people. Surprise is an important factor in many confrontations involving grizzly bears and humans. A female with young exhibits an almost reflexive response to any surprise intrusion or perceived threat to her “individual distance” or that of her cubs. Defense of a food supply is another cause of confrontation between humans and bears. Grizzly bears may defend a kill or carrion out of perceived need.

Predaceous attacks on humans by grizzly bears are exceedingly rare (although they have been documented). Although grizzly bears are the more aggressive species and more likely to cause injury to people, predaceous attacks on people, although still rare, are more common among black than grizzly bears (Herrero 2002). Importantly, grizzly bears are much more likely to become aggressive toward people (with attendant risk of serious injury) if they have first become

habituated (Albert and Bowyer 1991, Gunther and Wyman 2008, Gunther et al. 2018), or worse, become conditioned to seek out human food sources or other attractants of human environments (Mattson et al. 1992b, Herrero 2002, Herrero et al. 2005).

Habitats: biophysical characteristics

Grizzly bears do not use forested stands highly for foraging (Mace and Waller 1996, Mattson 1997b, Apps et al. 2004, Milakovic et al. 2012), finding most of their preferred forage in relatively open areas. They will use forested cover for resting (particularly in otherwise open areas, Blanchard 1983), and typically avoid open areas that are far from shrub, forest, or topographic cover. At a finer scale, some studies have shown grizzly bears to use edges between forested and open areas preferentially (Mattson 1997c, Stewart et al. 2013). Numerous studies have shown that grizzly bears tend to use burned areas and areas of high vegetation diversity, including avalanche chutes and areas characterized from remote sensing platform by what has been termed "greenness" (Waller and Mace 1997, Ramcharita 2000, Serrouya et al. 2011). Apps et al. (2004) documented preference for relatively high elevation, steep slope, rugged terrain, and low human access and linear disturbance densities. These landscapes also were comprised of more avalanche chutes, alpine tundra, barren surfaces, burned forests, and less young and logged forests. Riparian zones are often used both for foraging and travel (Servheen 1983, McLellan and Hovey 2001), particularly in otherwise open habitats (Aune 1994, Phoebus et al. 2017), a habitat relationship that has implications for human–bear conflict (Wilson et al. 2005, 2006; Eneas 2020). Relationships with forest productivity and some overstory species were positive at broader scales, while associations with forest overstory and productivity were negative at the finest scale.

Although grizzly bears may avoid intensively burned areas for few years after a fire, (Blanchard and Knight 1996, Podruzny et al. 1999), most studies have shown that they use burned areas preferentially, taking advantage of improved foraging substrate (Hamer 1999, Hamer and Herrero 1987, McLellan and Hovey 2001), and availability of preferred forbs (i.e., pink hedysarum roots; Pengelly and Hamer 2006) and shrubs (i.e., globe huckleberry; Martin 1983). Other forest disturbances (e.g., logging) can also set back succession in ways that are advantageous to plants important to grizzly bears (Nielsen et al. 2004, Kearney et al. 2019, Souliere et al. 2020), but the bears' tendency to avoid humans, whose presence is typically greater where industrial timber harvest has occurred (or to suffer higher mortality if they do not) can compromise much of this advantage (Zager et al. 1983, Mace et al. 1999, Ciarniello et al. 2007, Berland et al. 2008, Nielsen et al. 2008, Apps et al. 2016, Proctor et al. 2019). Working lands where there are cleared patches of forest allow for early successional vegetation to flourish, such as shrubs, berries and grasses, thereby providing increased forage opportunities.

Habitats: human influences

Motorized access: Displacement and mortality risk

Historically, grizzly bear populations have done poorly when in close proximity to humans and have recovered in the most remote habitats (Ciarniello et al. 2007; Lamb et al. 2017, 2018). Although recent work has suggested that human infrastructure is an imperfect surrogate for actual disturbance (Corradini et al. 2020, Goodbody et al. 2021), most research has focused on the effects of motorized access on displacement of bears (Mattson et al. 1987, McLellan and Shackleton 1988, Kasworm and Manly 1990, Mace et al. 1996, 1999; Proctor et al. 2019). That said, not all grizzly bears respond to roads in the same way. High-use roads are avoided more strongly than low-use roads (Chruszcz et al. 2003, Mace et al. 1996); roads

open to unlimited use are avoided more strongly than roads open to only occasional or administrative use (Wielgus et al. 2002). Since female bears, especially those with young cubs, tend to avoid male bears and most bears (notably including males) avoid using areas near roads, some females relax their avoidance of roads in order to lessen their chance of encountering males (Mattson et al. 1987, Chruszcz et al. 2003, Graham et al. 2010, Stewart et al. 2013, Boulanger and Stenhouse 2014). Thus, they may trade one dangerous risk (meeting male bears) for another (meeting people).

Apps et al. (2004) examined detection of bears at hair traps, Upper Columbia River Basin, B.C., as a function of human presence, along with other biophysical characteristics. They found a strong association of grizzly bear detection with terrain conditions that would inhibit human access and habitation: high elevations, steep slopes, and complex topography. Later analyses at a larger scale generally confirmed these associations (Apps et al. 2016).

Studies have shown that grizzly bear survival (Mace et al. 1996, Nielsen et al. 2008, Schwartz et al. 2010, Boulanger et al. 2013, Boulanger and Stenhouse 2014, McLellan 2015, Parsons et al. 2021) or density of bears (Linke et al. 2013, Lamb et al. 2018) is negatively correlated with density of motorized access routes. A nuance more recently documented is that many grizzly bears become more nocturnal (particularly in areas that are agricultural, rural, or both) where road density is high but actual road usage is low (Northrup et al. 2012, Lamb et al. 2020). Work by Chruszcz et al. 2003, and by Roever et al. 2008a,b showed that, in some cases grizzly bears actually appeared to prefer being near low-use roads—not because they were attracted to people or traffic, but because roads were themselves associated with habitat characteristics likely to yield better foraging (e.g., early seral communities created by logging).

Ecological traps can occur if attractants near roads bring grizzly bears from secure habitats to places where their survival rate is too low to overcome the advantages those attractants provide (Lamb et al. 2017).

Highways and crossing structures

Grizzly bears, particularly males (Chruszcz et al. 2003), are hesitant to cross high-volume highways (Gibeau et al. 2002, Waller and Servheen 2005), and highways generally are known to be a source of considerable mortality for them (Benn and Herrero 2002, Kaczensky et al. 2003). In the past 30 years, within the NCDE area of Montana, grizzly bear fatalities caused by vehicles have been clustered around US Highway 93 in the Mission Valley, US Highway 2 along the southern boundary of Glacier National Park, Highway 83 in the Swan Valley near Condon, Highway 200 between Potomac and Lincoln, and to a lesser extent, along the East Front north of the Teton River (Costello et al. 2020). Sawaya et al. (2013) and Ford et al. (2017) showed that grizzly bears preferred large overpasses to under-highway structures and their use patterns took some time to develop. Females with cubs appear particularly reluctant to use highway crossings, yet solitary grizzly bears and family groups are three and five times, respectively, more likely to use overpasses compared to underpasses when correctly designed (Ford et al. 2017). Adequate fencing is crucial for effectiveness of crossings structures. Rytwinski et al. (2016) found that crossing structures are ineffective at reducing large mammal road mortalities if fences are absent or are too short in length. The Wildlife Crossing Structure Handbook (Federal Highway Administration 2011) recommends that underpasses are a minimum of 40 feet wide and 15 high for grizzly bears.

Diet

The wide historic and current distribution of grizzly bears in North America, Europe, and Asia (from the Canadian Arctic to Mexico, from Scandinavia to Greece, and from Spain to Siberia) provides a preview of the dietary flexibility of the species. Although bears do have essentially the digestive system of carnivores and they do kill or scavenge animals to eat (Mattson 1997a, Hilderbrand et al. 1999a,b; Zager and Beecham 2006), with carnivory being more pronounced among male than female grizzly bears (Jacoby et al. 1999, Milakovic and Parker 2013), grizzly bears are successful omnivores, consuming a wide variety of plants and animals (Fortin et al. 2013, Gunther et al. 2014). In some areas they are largely herbivorous (McLellan 2011). Forbs (i.e., dicotyledons, or dicots) generally provide more protein and are more digestible than graminoids (Rode et al. 2001). Small-bodied grizzly bears can subsist on a more herbivorous diet better than large-bodied bears (Welch et al. 1997, Rode et al. 2001). Grizzly bears are opportunistic feeders and will prey or scavenge on almost any available food source, including ground squirrels, ungulates, carrion, and garbage. In areas where animal matter is less available, they may eat roots, bulbs, tubers, fungi, and tree cambium to meet protein requirements. High quality foods such as berries, nuts, and fish are important in some geographic areas. But grizzly bears diets are not random assemblages of whatever items are available; animals make judicious foraging choices that vary by sex and by age-class, as well as by item availability, and these choices affect reproductive success (Mattson 2000).

Upon emergence from their dens, most grizzly bears seek lower elevations, drainage bottoms, avalanche chutes (Serrouya et al. 2011), and ungulate winter ranges. Herbaceous plants are eaten as they emerge, when crude protein levels are highest. Throughout late spring and early summer, most grizzly bears living in mountainous areas follow plant phenology back to higher elevations. Bears inhabiting prairie environments will concentrate along riparian areas, eating fruits and berries on shrubby vegetation. In late summer and fall, there is a transition to fruit and pine nut sources, as well as herbaceous materials. During late summer and fall, a period termed “hyperphagia,” grizzly bears rapidly gain weight, attaining peak body mass just prior to hibernation. Conflicts with humans can increase during this period, particularly as grizzly bears are attracted to (and some may make temporary movements to access) carcasses and/or gut-piles from hunter-harvested ungulates (Green et al. 1997, Ruth et al., 2003, Haroldson et al. 2004, Ebinger et al. 2016, Van Manen et al. 2019). Because bears rely solely on their stored energy reserves during hibernation, this pre-denning weight gain is essential for reproduction and survival. Bears metabolize fat and muscle during the denning period.

Grizzly bears must not only maximize energy intake while minimizing the costs of acquiring that energy, but must also balance the macronutrients—protein, lipids, and carbohydrates—contained in their diets (Felicetti et al. 2003, Robbins et al. 2007, Coogan et al. 2014, Costello et al. 2016a). Due to their carnivoran digestive system, one might expect grizzly bears to maximize protein sources whenever possible (Rode and Robbins 2000, Robbins et al. 2007), and it is well established that bears with more access to high protein sources—e.g., salmon and ungulate calves—do grow larger and produce larger litter sizes than those with less access to such sources (Hilderbrand et al. 1999a,b; Robbins et al. 2004, López-Alfaro et al. 2015; Costello et al. 2016a; Matsubayashi et al. 2016); although McLellan (2011) provided evidence that the proportion of meat in diets was not correlated with population density in a study area lacking salmon. However, Erlenbach et al. (2014) found that when captive grizzly bears were offered salmon, beef, and other food options, they did not maximize meat consumption but consumed diets that averaged 17% protein by total metabolizable energy (22% by dry matter intake). That is, even given a chance to consume more protein, these bears allocated their intake of the three macronutrients more similarly to humans and

mice than to other carnivores such as domestic dogs, cats, or mink. However, grizzly bears did consume lipids in higher proportions than other omnivores, and some of their preferred foods with high lipid content—e.g., whitebark (*Pinus albicaulis*) pine nuts, army cutworm moths (*Euxoa auxiliaris*)—are in decline throughout the Northern Rockies. Among wild bears in the GYE, Costello et al. (2016) found that diets tended to be higher in protein than the optimal levels suggested by Erlenbach et al. (2014), particularly in spring and particularly among males. That said, diets of female grizzly bears averaged about 20–25% protein during summer and fall periods (Costello et al. 2016a).

Erlenbach et al. (2014) also showed that bears with less access to lipid-rich diets used carbohydrate-rich diets with similar efficiency, although the time and energy required to process such small fruits as huckleberries may limit grizzly bears' body growth (Welch et al. 1997). In summary, Erlenbach et al. (2014) suggested that whenever possible, grizzly bears' food selection process tends to follow three broad rules: i) maximize energy intake while optimizing dietary protein content; ii) prefer lipids over carbohydrates in order to limit protein intake and increase energy density (lipids typically contain more calories per unit weight than carbohydrates); and iii) use digestible carbohydrates if lipids are unavailable or difficult to exploit.

Denning

Denning is the period during which a bear hibernates in its den. Generally, among grizzly bears in Montana, den entry can be from late September to early December, while den emergence can be from February to May (Haroldson et al. 2002, Graham and Stenhouse 2014). However, patterns underlying this generality have implications for conservation and management. The duration of denning is longer (starting earlier and ending later) in higher elevations and more northerly latitudes (Pigeon et al. 2016b).

Typically, the sequence of den entry and den emergence is as follows. The first to den are pregnant females, with about half having entered dens by the end of October and almost all having done so by the end of November (Haroldson et al. 2002). Other females (alone or with cubs or yearlings) follow, entering dens from mid-November to mid-December (Graham and Stenhouse 2014). Males enter dens slightly later than non-pregnant females. In spring, den emergence typically is in reverse order: Males (particularly sub-adult males) begin emerging as early as February in the Yellowstone area (Haroldson et al. 2002) and in late March farther north in Alberta (Graham and Stenhouse 2014), with almost all having emerged by late April. Females follow, with a few emerging in late March but most doing so in April. Females with newborn cubs tend to be last to emerge (Pigeon et al. 2016b), most in late April but some not until early May.

Den entry is also affected by food availability in autumn; Pigeon et al. (2016b) showed that in Alberta, grizzly bears entered dens later when berry production was high than when it was low. Den emergence in Alberta was also weakly related to spring temperatures, occurring earlier in colder springs than in warmer ones (Pigeon et al. 2016b). European brown bears subsidized by human food (in the form of feeding stations) spent considerably less time in dens than predicted given the latitude of denning (Krofel et al. 2016). The duration of hibernation in black bears is also shown to be decreasing—likely due to the lengthening growing season associated with climate change, as well as increasing provision of anthropogenic foods (Johnson et al. 2017). Combined, these studies suggest that we can expect somewhat shorter denning seasons among Montana grizzly bears in the future as the climate warms (Cross and Servheen 2010, Servheen and Cross 2010), particularly those bears with access to high-quality anthropogenic foods. That said, we expect grizzly bears in Montana to den for substantial periods annually because of the short growing season and related scarcity of foods during winter.

Population dynamics

Reproduction

Grizzly bears in Montana typically mate between May and July, and cubs are born in the den the following winter. Most litters are 1 to 4 cubs, with the average being 2. Male grizzly bears are sexually mature around 4.5 years of age, but larger, dominant males may preclude young adult males from siring many offspring. Reproductive intervals for females average 3 years (but can be longer or shorter), and animals that lose young before or during the breeding season may come into estrus and breed again that same year. The mean age when females produce their first cubs varies from as young as 4 to as old as 10 years, depending on population; in Montana, the mean has been reported as age 5.8—both in Yellowstone 1983–2001 (Schwartz et al. 2006b) and in the NCDE (Costello et al. 2016b). The mean age of when females produce their first cubs in the CYE is 6.3 years of age (Kasworm et al. 2021). Offspring typically remain with their mothers for 1 to 3 years before weaning in Montana (most typically at age 2 years), again depending on various factors. Grizzly bears are promiscuous: a male can impregnate multiple females within the same breeding season, while a female can bear offspring from multiple males within the same litter.

Survival

In the great majority of populations where survival rates and mortality causes have been studied, independent bears re most often killed by people (McLellan et al. 1999, Schwartz et al. 2003, McLellan 2015), whether by regulated hunting (where legal), by management removals, by vehicles, by self-defense, or by illegal killing. Only in the most remote populations are deaths more often natural rather than human-caused. Thus, except for these very remote areas, the probability of death is a function of proximity to humans and their infrastructure (Johnson et al. 2004; Schwartz et al. 2010; Boulanger and Stenhouse 2014; Lamb et al. 2017, 2020). However, from the perspective of population dynamics, the important question is not what kills individual grizzly bears (all die eventually), but rather how long they live before dying.

Most natural mortality occurs outside of the denning season. Among the primary sources of natural mortality among grizzly bears are other grizzly bears (McLellan 1994, Swenson et al. 1997b, 2001a,b; Schwartz et al. 2003). Adult males sometimes kill juveniles and adults are also known to occasionally kill other adults (McLellan 2005). Several authors believe some bears die during denning, especially following periods of food shortages associated with pollinator abundances and food resource availability.

Parasites and disease do not appear to be significant causes of natural mortality, but they may hasten the demise of weakened bears. Three cases of Montana grizzly bears infected with highly pathogenic avian influenza (HPAI) in the fall of 2022 have raised awareness of this potential source of mortality, but little is known about transmission routes. FWP will continue to test wild mammals that demonstrate symptoms consistent with HPAI infection. It is difficult to comment at this time on the significance of this disease to grizzly bear survival. Natural mortality during the denning period is not well documented.

Density dependence

Documenting density dependence in a long-lived, low-density species is very difficult, so it not surprising that only long-term studies have done so. That said, it is clear that reproduction and survival in grizzly bears, as in most well studied vertebrates, are negatively associated with population density. Where detailed information is available, relationships with

density are indirect, being modulated by nutrition and intra-specific competition and aggression. Litter size has been shown to increase with the mother's access to high quality foods (Hilderbrand et al. 1999b, McLellan 2015), age (Gonzalez et a. 2012), and body condition (Keay et al. 2018); and to decrease with population size or density (Miller et al. 2003, Schwartz et al. 2006b, McLellan 2015. Increasing resource competition and/or population size is associated with older ages of first reproduction (Stoen et al. 2006, McLellan 2015, Keay et al. 2018) and longer intervals between successive litters (McLellan 2015, van Manen et al. 2016). Conversely, increasing access to high quality foods is associated with younger ages of first reproduction and shorter intervals between successive litters (McLellan 2015). Growth rate of cubs was shown to be related to body fat of their mothers when initiating hibernation (Robbins et al. 2012); offspring body weight, in turn, was shown to be a predictor of lifetime reproductive success (Zedrosser et al. 2013). Dependent offspring survival has been documented as being negatively related to population density (Miller et al. 2003, Schwartz et al. 2006c, Van Manen et al. 2014, Keay et al. 2018). Adult survival has not been documented as related to population density, but general pattens among long-lived mammals would not lead to an expectation that such a relationship would be found (Eberhardt 1977, Fowler 1987, Gaillard et al. 1998).

Regarding conflicts between humans and bears (of any species), numerous studies have shown an increase in such conflicts when natural bear foods are scarce, and a decrease when natural bear foods are plentiful (Johnson et al. 2015, 2018; Garshelis et al. 2017; evidence that bears near human settlements are not necessarily food-limited, or using these areas specifically to access human foods even if they do end up accessing such foods; Elfström et al. 2014a, b; Eneas 2020).

Climate change and grizzly bears

USFWS (2021) includes a summary of expected consequences of climate change on hydrology, vegetation, and fire in the U.S. Northern Rockies, as well as anticipated effects on grizzly bears. Here we will reference but will not reiterate that work. Documented and expected effects of climate change on grizzly bear denning are summarized in the above section on denning. A discussion of effects of whitebark pine decline in the Yellowstone area on grizzly bears is included in Part IV, under the summary of science used.

The direct effects of warmer temperatures on grizzly bear behavior, movements, and habitat use are still being researched. Pigeon et al. (2016a) demonstrated that ambient temperatures affected grizzly bear habitat selection, with the bears exhibiting some use of open habitats at night but avoiding those habitats during warm summer days. Rickbeil et al. (2020) found that, post-denning, grizzly bears in Alberta tended to become active sooner in years with early snowmelt. They also found, however, that the phenology of important food plants had advanced in tandem, lessening a concern that grizzly bears active so early in the spring would lack these food resources. Climate change is expected to alter the distribution and abundance of vegetation formations that provide grizzly bear habitat for resting or foraging (Butler 2012). Climate change, directly or indirectly, will also alter the geographic distribution of many plant species used by grizzly bears (Holden et al. 2012, IGBST 2013, Roberts et al. 2014). The best studied example is the decline of whitebark pine caused by blister rust (*Cronartium ribicola*) and mountain pine beetle (*Dendroctonus ponderosae*) which has been ongoing for decades, and which is expected to be exacerbated by continued climate change-induced effects (Fortin et al. 2013, Hansen and Phillips 2015, Buotte et al. 2016, Shanahan et al. 2016).

The relevant questions here are i) what effects, if any, such changes in plant distribution and abundance will have on the nutritive state of individual grizzly bears (Lopez-Alfaro et al. 2015) and, by extension, on the ability of their populations to

remain stable; and ii) whether summer drought conditions, projected to become increasingly common, will cause grizzly bears to seek succulent forage closer to humans, thus increasing the likelihood of human–bear conflicts. Roberts et al. (2014) projected that most plant species used by grizzly bears in the Canadian Rocky Mountains will remain relatively stable or will increase in areal coverage under likely future climate change. Elevations of most species are projected to increase, but only two species known to be used by grizzly bears would "run out of room" from this elevational increase, and neither of these—grouse whortleberry (*Vaccinium scoparium*) and black crowberry (*Empetrum nigrum*)—is a preferred food for grizzly bears.

Ransom et al. (2018) studied potential grizzly bear food items in the North Cascades and projected the following effects in the event of future climate change: While some plant species—e.g., glacier lily (Erythronium grandiflorum) and horsetails (*Equisetum species*), which prefer mesic soils—would decline, such other key food items as huckleberry (*Vaccinium species*) and sweet vetch (*Hedysarum species*) would either increase in abundance, move upward in elevation (potentially drawing grizzly bears away from conflict with people), or both.

In contrast, Prevéy et al. (2020) projected a decline in habitat suitability for mountain huckleberry (Vaccinium membranaceum) within its North American distribution, although most of the decline seems to be situated on the periphery of current or prospective grizzly bear distribution in Montana.

Currently, a consensus among biologists is that, although climate change is real and its effects are uncertain, grizzly bears have the advantage of being omnivorous and adaptive, and thus well equipped for change (Cross and Servheen 2009, Servheen and Cross 2010). The primary concerns associated with climate change are whether the adaptations the animals can make will put them at greater risk of conflict with humans, a possibility that management has some ability to mitigate.

History of grizzly bears in Montana

Before 1800, grizzly bears were undoubtedly common in Western Montana. With newly acquired access to firearms by indigenous people and westward expansion of settlers, bears began to be impacted. With no mechanisms to provide protection or management, almost without exception the bears' numbers declined where humans and bears came together for any length of time. The decline of the grizzly bear took less than 60 years, from the end of the trapping era in 1840 to the turn of the century. The decline was due to a number of factors, including: a reduction of prey because of market hunting associated with gold exploration and mining; subsistence hunting associated with gold exploration and mining; construction of railroads, homesteading, and predator control; and loss of habitat related to ranching, farming, and human settlement. Much of the killing was based on the feeling, and in some cases fact, that the grizzly bear posed a threat to people and livestock.

By the 1870s, grizzly bears had disappeared from western states and by the 1880s they had been extirpated from prairie river bottoms. In fact, by the turn of the century, they had disappeared from most broad, open mountain valleys. Fifteen years later, most foothill country lacked grizzly bears.

Grizzly bears were never extirpated from Montana, but their numbers probably reached their lowest levels in the 1920s. At that time, changes were made out of concern for the future of the species including designating grizzly bears a "game animal" in 1923, the first such designation of the species in the lower 48 states. This change, together with early prohibitions on the use of dogs to hunt bears, outlawing baiting (both in 1921) and closing seasons, allowed grizzly bears to survive in portions of Western Montana.

Sidebar 6. Part A of "How many animals are enough?" Simulation models

Though we wish we could, none of us can accurately predict whether a given wildlife population will still exist at some point in the future. We can only say that, for instance, a bigger population is more likely to persist indefinitely than a smaller one. But exactly how big is big enough to attain such persistence? Answering this question would require accurate documentation of animal population sizes over at least several centuries—in other words, data that we have not yet accumulated—and since we lack such data, biologists must substitute models instead.

These models may be either computer simulations, or theoretical calculations (generally to examine the genetic consequences of small population size). In the former, populations are represented numerically and projected over long spans of time, under varying conditions, to see how long it takes before some of the simulated populations go extinct. We'd like to manage for a population large enough that these simulated extinctions are quite rare. Mark Shaffer, a pioneer of this approach, used the analogy of an industrial stress test, in which the modeled population is deliberately exposed to various conditions to see how it responds, much like an industrial product is exposed to extreme environments to see how well it lasts.

Such an approach is informative, but limited when applied to real-world wildlife management. The industrial stress-test analogy says, in effect, "Let's take this population in its current state, put it in a dark room where nobody can intercede, lock the door, run time forward for a few hundred years, and then return, open the door, and see how it did." Thinking of it this way, some characteristics of simulation modeling may become clearer.

First, the simulation results are a projection, not a prediction. In a projection, we take known current conditions, assume they will remain true for years far into the future that we cannot yet see, and—based on those assumed conditions—imagine what we believe will be some likely outcomes. However, projecting current conditions forward in time is like projecting a small bit of celluloid film onto a big movie screen: every detail is exactly what was on the original celluloid, except bigger. The screen merely enlarges the film; it cannot create any new information. By contrast, true prediction is based not on known current conditions but on unknown future ones; and since those are unknown, true prediction actually cannot be done.

Second and relatedly, a simulation procedure doesn't allow people to monitor and, if needed and feasible, adjust conditions as the population under stress varies in size or resilience. Most populations that "go extinct" in such simulations do so only after a few years in which they have been quite small. In these models, there are no simulated managers or concerned citizens who could take remedial action to save the situation before it's too late. Instead, we remain ignorant of the increased danger that (some of) the populations are exposed to until we return to the locked room years later to examine the wreckage. This is not quite the situation facing a society invested in conserving the species.

Third, there is rarely enough data about a population to be confident that the simulated version reflects reality. In particular, most models assume that, on balance, births and deaths stay in long-term equilibrium. (If births outnumbered deaths continually, even a small population would quickly increase toward infinity; while if deaths outnumbered births continually, even a large population would quickly decline to extinction. In neither case would the model address the question we're asking.) The only two ways to accomplish this equilibrium are i) to use unvarying (i.e., density-independent) birth rates that exactly balance unvarying (density-independent) death rates, such that any deviation from this finely tuned, knife-edge balance will tilt the population upwards or downwards; or ii) to devise a set of (density-dependent) birth and death rates that respond to the population's position compared with its carrying capacity. But we almost never know a population's true carrying capacity, nor exactly how its birth and death rates may change as it moves toward, or away from, abundance (it turns out both of those factors matter quite a lot).

Finally, it is sometimes claimed that such modeling, though imperfect, is at least objective and "scientific"—i.e., independent of, say, human hopes or fears regarding the population's survival. But upon close inspection, this claim also fails. This kind of simulation modelling can only tell us a probability of persistence (or, its mirror image, extinction) over some given time period, and is typically expressed by the quantitative objective "x% chance of extinction within y years." But science cannot tell us what numbers to choose for x and y. Rather, this objective attempts to articulate and quantify a value assumed by the modeler. What probability of extinction are we willing to accept? And how many years do we consider sufficient for a "stress test" type? (It is a mathematical fact that the more simulation years to which one exposes a modeled population, the more likely extinction becomes; that is, given enough simulated years, almost any population would eventually go extinct.) These are values questions that science alone can't answer.

Modelers, like the general public, are free to propose for study any given set of acceptable risks and timeframes except one: They cannot mathematically estimate the population conditions needed to render the chance of extinction zero, forever.

If we try to ignore the fact that someone's values are always an integral part of the modeling process (not necessarily a bad thing), then we don't fully understand modeling.

Sidebar 7. Part B of "How many animals are enough?" Two rules of thumb

Here we'll use genetics to revisit the question of "How many animals are enough to ensure long-term persistence?"

One approach is modeling, which we explored earlier. A second approach is to focus on minimizing the erosion of genetic diversity within a small, isolated population, since such erosion could render the population unable to evolve, if needed, to future conditions. We know that in general, larger populations have more genetic diversity — i.e., more options available from which to develop adaptations to differing conditions — than smaller ones. But how large is large enough to maintain the needed evolutionary potential? We don't have the luxury of observing a variety of wild populations, subjected to changing conditions over time, to see which ones successfully coped and which did not. Instead, we must depend on theory, augmented by well-considered simulation models. Accordingly, below we will explore what might be called "the two rules of thumb."

The first rule of thumb is the long-term rule of "500 animal effective population size. It comes from geneticist Ian Franklin, who postulated in 1980 that a population of 500 animals would be large enough to allow beneficial mutations to indefinitely balance genetic erosion (in particular, "genetic drift"), and thus was a useful response to the question of "How many are enough to retain [long-term] evolutionary potential to cope with future change?" This theory has since met some scientific dispute (Jamieson and Allendorf 2012, 2013 and Frankham et al. 2013), but FWP agrees with Jamieson and Allendorf (2013) that it can be useful in considering long-term needs for population size. Importantly, however, the 500 number refers to the "effective" population size (or "Ne" for "Number, effective"), not to the exact number of animals (or "Nc" for "Number, census"). The Ne size is defined as that which will lose genetic variability at the same rate as an "ideal" population. An "ideal" population, in turn, is defined as one which has discrete, non-overlapping generations and virtually no annual variations in size, and in which there is random distribution of each animal's genetic contribution(s) to the next generation (i.e., by what is called a Poisson distribution). In nearly all wild populations, the Ne is smaller than the Nc; thus, to satisfy Franklin's rule of thumb, more than 500 animals would be needed.

What is the relationship between Ne and Nc in grizzly bears? Harris and Allendorf (1989) reviewed various equations relating these 2 quantities and created simulations of grizzly bear populations. They concluded that—based on demographics and breeding structure—Ne was likely to be in the range of 0.24–0.32Nc, depending on assumptions used, and suggested that a population of about 1,560–2,080 was needed to meet Franklin's criterion. Since then, advances in genetics and theory have allowed better, more data-driven estimates of Ne for the greater Yellowstone grizzly bear population. Kamath et al (2015) estimated that the Ne/Nc ratio had, in recent years, been between 0.42 and 0.66 (suggesting that from 760 to 1,190 bears would be needed to satisfy Franklin's rule of thumb). Regardless, the long-term need for occasional genetic interchange between geographically discrete grizzly populations has not seriously been questioned by biologists (and is not questioned by FWP).

The second rule of thumb, "one migrant per generation" (OMPG), addresses a related question: If an isolated population is reachable by occasional migrants from another (presumably larger and more genetically diverse) population, then how many migrants are needed, and how often, for the entire assemblage to remain genetically secure and to retain any adaptive divergence.

Decades earlier, Sewell Wright (1931), one of the founders of modern conservation genetics, had proposed that under a number of simplifying assumptions, just one migrant per generation (OMPG) would be sufficient to prevent loss of heterozygosity and allelic diversity within a vulnerable subpopulation while still allowing it to respond adaptively to local conditions—and that this single migrant per generation could do the trick for a population of any size. The reason for this counter-intuitive postulation derives from fact that in a small population, one migrant would provide a relatively large infusion of genetic material, while a large population would have less need of the immigration because of its already larger gene pool. A number of simulation studies later confirmed that this OMPG rule of thumb maintained its validity under a variety of assumption violations typical of real-world populations (Mills and Allendorf 1996, Wang 2004), and thus that one migrant per generation, or maybe just over one, remained a useful long-term goal. A genetic metric to reflect the balancing between assuring that the target population would maintain its evolutionary potential while still maintaining necessary local adaptations is called FST--which under OMPG would, after a sufficient number of years, equilibrate at 0.2.

Of course, in the OMPG theory, each migrant must be "effective"—i.e., after entering the vulnerable population, it must contribute to the gene pool by breeding with a resident.

What about the 'G' in OMPG? How long is a generation for grizzly bears? Using methods similar to those used to estimate Ne for Yellowstone grizzly bears, Kamath et al. (2015) estimated a generation to be at about 14 years. The generation interval in the NCDE and CYE population is believed to be 14 years. To date, we have no evidence that any migrants, effective or otherwise, have made it from the NCDE to GYE area populations. Haroldson et al. (2010) estimated that, at the time, FST was just under 0.1; however, given the lack of migrants, it is likely that this level of similarity is the legacy

of historic connectivity.

Current status of identified grizzly bear populations in Montana

Yellowstone area – including parts of Wyoming and Idaho

Abundance

In the GYE, counts of females-with-cubs from systematic and opportunistic sightings are used to monitor population trend and these data are combined with demographic data to estimate total population size. Females-with-cubs are an easily identifiable segment of the population, and are assumed to track total population numbers, given that they represent the reproductive segment. A distance rule and individual characteristics are used to differentiate sightings into a minimum count of unique females-with-cubs and then the Chao 2 estimator is applied to observation frequencies to estimate the total number of females-with-cubs, including unobserved mothers. Total population size is extrapolated by applying ratios of females-with cubs to other sex and age categories (as estimated from population modeling with observed vital rates). Under this original "Knight-Chao" method, generous distance criteria were used to differentiate unique females, resulting in conservative estimates known to be increasingly biased low (Schwartz et al. 2008). An unbiased mark-resight approach, using marked females-with-cubs and systematic observation flights to estimate total numbers of females-with-cubs, was also used, but as it suffered from poor precision, it failed to provide good information about population trend. In 2019, the Knight-Chao method yielded an estimate of 66 total females-with-cubs, corresponding to a total population size of approximately 737 bears within the Yellowstone DMA. The mark-resight method yielded 75 females-with-cubs, corresponding to roughly 840 bears. Importantly, the mark-resight method excluded highly visible females-with-cubs feeding on aggregations of army cutworm moths, which in 2014 and 2015 numbered roughly 20% the estimate of those observed beyond moth areas. Thus, this unbiased method suggested total population size of perhaps >1,000 bears within the DMA.

In a thorough re-assessment of protocols used to estimate population sizes from observed females-with-cubs, IGBST (2021) considered both the distance rule used to differentiate "unique" females, and the statistical approaches used to obtain each years' best estimate and to infer population trends from a time series of such counts. An objective of this work was to move from an algorithm that prioritized minimizing false positive identifications of females-with-cubs (ensuring under-estimates rather than over-estimates of true abundance, but at the cost of decreasing sensitivity to changes in abundance with true population increase) to one that balanced the objectives of accuracy (thus increasing sensitivity to true population change) with minimizing the probability of over-estimation. IGBST (2021) recommended that this balancing was best achieved by revising the distance rule (by which females-with-cubs were considered unique) from 30 to 16 km. This revision reduced under-estimation bias considerably, while limiting to probability of any given year's estimate being biased substantially high to between 3% and 12%. For 2019, the point estimate of 737 grizzly bears (Haroldson et al. 2020), would be replaced with a more accurate estimate of about 1,040. In 2021, the revised Chao2 estimate for GYE DMA was 1,063 bears (Haroldson et al. 2022).

The IGBST, working with University of Montana collaborators, has developed an integrated population model (IPM) to further enhance the estimation of total population size in the GYE (IGBST 2023 – *this will be the annual report*). The IPM will replace the refined Chao2 (IGBST 2021) as the best available science for estimating the GYE population. An integrated population model mathematically integrates annual count data with a traditional population projection model that estimates the change in population size from one year to the next using sex- and age-specific survival and reproductive rates. With adoption of the IPM, the IGBST has recalibrated prior year population estimates so they are comparable over time, and vital rates and demographics for the GYE population may now be reviewed annually so that managers are able to make appropriate adjustments to mortality rates. This approach is well suited to the GYE grizzly bear monitoring program because, since 1983, the IGBST has not only obtained annual estimates of females-with-cubs (i.e., count data), but has also obtained data on survival and reproduction rates by monitoring a sizable sample of radio-marked bears. By utilizing all of these historic and ongoing data sources simultaneously, the IPM approach is expected to lead to better total population estimation and better insight into population trend. Additionally, by examining model output with and without certain data inputs, the IPM can be used to evaluate which data sources are most important for estimation of population size and trend and will allow for additional data sources or modules in the future.

We have less information about abundance of grizzly bears in the Yellowstone area beyond the DMA boundary because the surveys for females with cubs are not conducted beyond the DMA. During the years 2012–2019, the number of females-with-cubs estimated outside the DMA averaged about 7% of the number estimated within the DMA and other information suggests that males are disproportionately represented among bears outside the DMA.

Ecological status

The preponderance of evidence is that grizzly bears are in approximate equilibrium with the ability of natural habitats to sustain them within Yellowstone National Park and most of the largely wild areas in Wyoming, Idaho, and Montana surrounding it (for references, see Part IV under the summary of science used). Population growth within the 49,931 km^2 (19,278 mi^2) GYE DMA defined by the USFWS has evidently slowed from the rate estimated during the 1980s, 1990s, and early 2000s. Within the DMA, the survival rates of adult grizzly bears have approximated those during the earlier period of rapid increase. However, cub production and juvenile survival during 2002–2012 were lower than during 1983–2001. These latter vital estimates were shown to be negatively associated with estimated grizzly bear density, as was female home range size. These factors, in addition to the slowing of population growth within the DMA, have led to the consensus conclusion that proximity to long-term carrying capacity have led to density-dependent effects being observed on the population scale.

In the Yellowstone area, some of the grizzly bear's historic food resources (particularly whitebark pine seeds and cut-throat trout) have declined and may continue to decline in the future. This may, in time, reduce the long-term capacity of the area to support grizzly bears. However, to date, grizzly bears have been able to adjust their diet and continue to reproduce successfully, producing offspring that can survive to adulthood and reproduce in turn.

Habitat and range expansion

As of 2019, grizzly bears had expanded their area of occupancy to include almost all of the suitable habitats within the boundaries of the DMA. As of 2015, about 27% of the total area Occupied was beyond the DMA boundary. By definition, we know less about the abundance of bears beyond the area where monitoring of females with cubs occurs, but it is likely that

density is lower than closer to the more strictly protected core area (at least in part due to lower survival resulting from greater proclivity to conflict with humans), and that the gender balance disproportionately favors males. Within the area designated by the USFWS as the RZ, human access, availability of attractants, and other industrial or commercial activities that tend to displace bears are limited to the point where they are unlikely to cause negative population-level effects. Human access and incompatible activities are less strictly controlled beyond the RZ and ultimately will limit grizzly bear density but—we believe—will not preclude occupancy that is sufficient to provide a population buffer, as well as connectivity to other grizzly bear populations.

Mortalities

In the Yellowstone area, the vast majority of deaths among grizzly bears over age 1 have been caused, directly or indirectly, by humans, more than half by agency staff following human-bear conflicts.

FWP's view is that human-caused grizzly bear deaths are an unfortunate but inevitable result of an expanding bear population that is increasingly closer to agriculture, livestock, residences, and suburban areas. Only the most sparsely populated portions of North America have enough space between humans and bears to keep conflicts to a minimum. Thus, even the relatively large, secure areas of the U.S. Northern Rockies are too small to fully immunize grizzly bears against the risks associated with human populations.

This does not, however, mean that these secure areas are too small to provide the cores needed for grizzly bear populations to slowly increase, and thus to add dispersers to connectivity areas that eventually allow for an interconnected metapopulation. From the perspective of population dynamics, the question is not how grizzly bears die, but rather how long they live before dying. To date, mortality rates have not been so high as to produce a long-term population reduction or to deter continued geographic expansion. Still, each human conflict-related grizzly bear death is unfortunate and FWP, along with other government agencies and non-governmental organizations (NGOs), have made and will keep making strong efforts to prevent, reduce, and mitigate human–bear conflicts. These efforts are the most effective way to reduce human-caused bear mortalities.

Genetics, isolation, connectivity

Grizzly bears living in the Yellowstone area have been isolated from other grizzly bear populations for over 100 years, raising concerns over the genetic effects of small population size. No immigrants into the Yellowstone area population have been documented and both heterozygosity and allelic diversity are among the lowest of North American grizzly bear populations for which data are available. However, these two metrics of genetic diversity declined only very slowly, if at all, from 1985 to 2010. Based on direct estimates from genetic data, the rate of inbreeding has been very low since 1985, and no physiological, behavioral, or demographic effects associated with, or indicative of, inbreeding have been detected. Importantly, compared to estimates from 1910–1960, estimates from 1985–2007 indicate that effective population size (the summary metric best suited to consider genetic effects) has continued to increase, and is well above the level where the short-term effects of reduced genetic diversity would be expected. Currently, all indications are that Yellowstone grizzly bears are genetically well adapted to their existing environment and facing no immediate threat related to population genetics.

However, from a genetic perspective, the Yellowstone population is sufficiently small that isolation from other populations poses risks for long-term viability exceeding 100 years. Although no genetic issues currently limit the ability of

grizzly bears in Yellowstone to survive and reproduce normally, their ability to respond evolutionarily to unknown future challenges, including environmental ones, may be limited by low allelic diversity combined with isolation. Thus, introduction of genetic material from other grizzly bears is ultimately required to reduce long-term risks associated with the loss of allelic diversity in the Yellowstone grizzly bear population.

Best estimates are that this long-term genetic risk can be ameliorated by the effective migration into Yellowstone of as few as 1–2 animals per generation (with a generation considered to be about 10–15 years) if continued indefinitely into the future. Thus, genetic connectivity is required over the long-term, but such connectivity can be thought of as a slow and continuous trickle of bears rather than a sudden and dramatic increase of gene flow.

Recent geographic expansions of Yellowstone-area grizzly bears in a northwesterly direction and of NCDE-area grizzly bears in a southeasterly direction, have increased the probability of natural genetic connectivity in the future. A major impediment to achieving connectivity is the rapidly increasing human development associated with Interstate Highway 90 and with other major transportation arteries (see the beginning of Part III, on the geographic setting of the thirty focus counties in Western Montana). Thus, increasing the ability of humans and bears to safely share the Montana landscape is the great challenge that FWP intends to meet.

Northern Continental Divide area

Abundance and trend

Using mark-recapture analyses—with marks being DNA recovered from hair—Kendall et al. (2009) estimated the 2004 population of grizzly bears within their 33,480 km^2 survey area as 765 (95% CI = 715–831). Mace et al. (2012) used vital rates (e.g., birth, death, and migration rates) from bears monitored during 2004–2009 to estimate λ, the annual rate of growth, as approximately 3% per year (1.031; 95% CI = 0.928–1.102). Projecting this rate of growth to the estimated abundance in 2004, they estimated population size (including some areas adjacent to the NCDE area) at greater than 1,000 in 2009. Costello et al. (2016) used similar methods in updating the rate of growth during the 2004–2014 period. Depending on how the analysis handled independent females whose fates were undetermined, λ was estimated as 1.020 or 1.027 (with a mean of 1.023). Stochastic simulations yielded a similar mean, with 95% confidence limits of 1.015–1.029. These analyses suggested a 2014 population size of 960 bears (95% CI = 946–1,089). Independently, and using mark-recapture and DNA approaches similar to those of Kendall et al. (2009) but in a spatially-explicit framework, Kendall et al. (2019) estimated λ during 2004–2012 within their 33,300 km^2 study area as 1.043 (95% 1.017–1.069), although it was slightly higher for females than for males. In 2018, a predicted population projection, assuming 2004-2014 vital rates within the DMA, estimated that the population would increase from 1,068 bears in 2019 to 1,163 bears in 2023. Subsequently, 6-year estimates of independent female survival within the DMA were calculated each year during 2019–2021. Survival rates ranged from 0.93 to 0.95 with a mean of 0.94. Given that survival of independent females are the most important driver of population trend, these rates provide supportive evidence for the continued projected population growth. The NCDE population has expanded beyond the DMA, especially since the mid-2010s. Although the most recent model projection utilized DMA-specific vital rates to estimate growth, the model did not yet include inputs to exclude individuals that permanently dispersed outside of the DMA. Therefore, the resulting population estimates were likely more relevant to the total number of bears within the NCDE area, rather than the population within the DMA. Additionally, if vital rates are generally lower outside of the more protected DMA, as expected, these estimates may be biased high.

Habitat and range expansion

Using methods similar to those developed by Bjornlie et al. (2014a), Occupied range in the NCDE area increased from 1994 to 2018, when it was estimated to be over 60,000 km^2. The percentage of this Occupied area beyond the DMA boundary increased from about 15% in 2004 to over 35% in 2018. Most of this spatial expansion occurred in an easterly direction and a substantial portion also occurred along the eastern frontier of the NCDE population's core. Although grizzly bears far east of the mountains in agricultural areas can avoid conflicts with humans by restricting their movements to riparian areas, they are likely to conflict with human use beyond those linear areas, either by foraging on growing or spilled grain or by seeking shelterbelts or shady areas for daybeds (Skuban et al. 2018) which are typically situated near houses and other structures used by people. By 2018, more of the NCDE population's Occupied range was on private land than was on public land.

Genetics, isolation, connectivity

Unlike in the Yellowstone, Cabinet-Yaak, and Bitterroot areas, we have very little short- or long-term concern about the genetic health of the Northern Continental Divide area bear population, not only because the metrics of genetic diversity provide no reason for concern but also because this population is connected to, and fortified by, Canadian populations to the north. Expected heterozygosity among selected genetic microsatellites in NCDE bears (Kendall et al. 2009, Mikle et al. 2016) was above the mean expected for that latitude (Proctor et al. 2012: 16) and was similar to that observed in large, connected populations in northern British Columbia. Kendall et al. (2009: 10), in noting genetic discontinuities among sections of the NCDE population, pointed out that these differences were similar to those observed between NCDE bears and those in the Prophet population of northern British Columbia, some 1,150 km distant. With population growth and expansion, genetic diversity within the NCDE has increased (Mikle et al. 2016).

Proctor et al. (2012: 25) considered NCDE grizzly bears north of US Highway 2 to be within the same genetic grouping as those in Alberta and British Columbia south of Canada Highway 3—which Proctor and Morehouse (2021) estimated as numbering approximately 210 bears. Although it would be naïve to view grizzly bear populations on the Canadian side of the border (or those north of Highway 3) as a reliably unending and problem-free connection all the way to the Yukon, there does appear to be sufficient connectivity to provide for occasional genetic exchange. On the British Columbia side, density of grizzly bears in the upper Flathead drainage (studied for over 40 years) has varied, largely in response to huckleberry abundance (McLellan 2015); yet it was among the highest recorded among southern interior grizzly bear densities during the late 1990s, and even at its lowest ebb it was comparable to densities estimated in the NCDE area. In the Castle Bear Management Area (between Alberta's southern border and Canada Highway 3), which faces issues similar to those on Montana's East Front, density was estimated as approximately 20 bears per km^2 in the "core" conservation area and 17 per km^2 in the adjacent Support Zone (Morehouse and Boyce 2016c), similar to recent estimates in the NDE area, and was probably growing slowly.

Although Proctor et al. (2012) showed that Canadian Highway 3 reduced demographic connectivity among bears on either side of it, their Fig. 9c also showed considerable genetic overlap among genetic signatures of bears north and south of the highway (with most such overlap produced by male migration, but some caused by relocation of conflict bears north across Highway 3). Efforts are currently underway to reduce the limitations placed on grizzly bear movement by Highway 3 (Proctor and Morehouse 2021). In turn, these southern Canadian populations, while affected by highways and development that constrict connectivity and facing conservation challenges of their own, are not entirely isolated genetically from populations further north.

Cabinet-Yaak area

Abundance and trend

The population of grizzly bears in the CY area, although slowly increasing and fully capable of persistence, remains small. As of the end of 2021, approximately 60–65 grizzly bears were estimated to inhabit the CY area (including 4 translocated as part of the augmentation program), with slightly more than half of these in the Yaak portion of the area. Fourteen of the 22 bear management units within the USFWS recovery area were occupied by females with young for at least one year during 2016–21 (10 in 2021). The population was estimated to have grown at a rate of approximately 1.9% annually between 2012 and 2021, albeit with considerable uncertainty (Kasworm et al. 2022). While reproductive rates have been comparable to other grizzly bear populations in Montana and elsewhere in the Rocky Mountains, adult female survival rates have only risen to a level supporting population growth in the years since 2007.

Beginning in 1990, concerns about low population size led to a program called "augmentation"—meaning the augmenting of a bear population by adding a new bear from outside it. Under this program, grizzly bears occasionally were moved from other areas into the Cabinet portion of the CY area. From 1990 to 1994, the USFWS augmented the CY area with an initial 4 bears (3 of which remained for over 1 year) from British Columbia and from 2005 to 2019—after FWP began cooperating with USFWS on this program in 2005—another 18 (10 females, 8 males) from the Flathead River drainage. Of these 22 total bears, 16 stayed at least 1 year, while 5 (3 females, 2 males) are known to have produced offspring in the area and 7 are known to have died. The 3 females have produced at least 15 cubs, who in turn are responsible for at least 23 2nd–generation offspring. The augmentation program is considered to have saved the Cabinet segment of the CY population from extirpation (Kasworm et. al 2022).

Genetics, isolation, connectivity

Concerns about genetic diversity for grizzly bears inhabiting the Cabinet-Yaak area differ qualitatively from those for Yellowstone grizzly bears. Grizzly bears in the CY are known to be susceptible to deleterious effects of inbreeding because i) the population size is small, and ii) most animals are descended from only a few males. Thus, the short-term effects associated with having an Ne of under 50 are relevant for this population. CY bears have similar population genetics as those in the NCDE because of historic connectivity, as well as the recent augmentation of NCDE bears to the Cabinet Mountains. Thus, if the risk of inbreeding can be overcome, there is, unlike in Yellowstone, no particular concern for loss of alleles, putting the CYE population at risk of inability to respond adaptively to future environmental stresses.

In recent years, some male—and fewer female—grizzly bears from British Columbia population units called Yahk, South Purcell, and South Selkirk, as well as from the U.S. Selkirk and NCDE areas, have been documented as immigrating naturally into the CYE (Proctor 2018, Proctor and Morehouse 2021). Relatively little gene flow into the CYE area has been documented (and, as of this writing, none from the NCDE or Selkirk areas). Four bears are known to have immigrated from the Purcell Mountains into the Yaak portion of the CYE, producing 14 offspring (Kasworm et al. 2022). Although contiguous with the Yaak portion of the CY area on the U.S. side, the Yahk grizzly bear population unit in British Columbia is small (estimated in 2005 to be about 20 bears, with a density of approximately 6.5 bears per 1,000 km^2), and little movement of

females has occurred between it and the adjacent South Purcell unit north of Highway 3 (Proctor and Morehouse 2021). Efforts to increase the permeability of Highway 3 to grizzly bears (particularly females) could bolster the conservation prospects of the Yahk area (and, in time, the Yaak and potentially the Cabinet sections of the CYE area), because the Purcell area is less affected by constraints to connectivity with larger populations to the north than is the Yahk area (Proctor and Morehouse 2021). However, home ranges that overlap different recovery areas (Cabinet-Yaak, Selkirk) and adjacent Canada (Purcell) have been documented, and the "estimated occupied range of grizzly bears" is uninterrupted between NCDE, Cabinet-Yaak, Selkirk, and adjacent Canada.

Bitterroot area

Due largely to its many miles of remote and protected habitat, the Bitterroot area (primarily in Idaho, but also extending east to the foothills of the Bitterroot Mountains in Montana) has long been identified as a priority area for grizzly bear recovery (Mattson and Merrill 2002, Roy et al., 2001, USFWS 2000). Merrill et al. (1999) identified the Idaho portion of the Bitterroot area as potentially suitable for grizzly bears. Extrapolating from Resource Selection Function models developed in Yellowstone and the Swan Mountain Range, Boyce and Waller (2003) projected that the Bitterroot Recovery Zone could potentially support over 300 grizzly bears. Using a more general predictive model, Mowat et al. (2013) predicted that the Bitterroot Recovery Zone could support over 400. Boyce et al. (2002) used theory and estimates of the potential population size in the Bitterroot to bolster the case that even a small population in the greater Bitterroot area would substantially buffer grizzly bears against complete extirpation in the U.S. Rocky Mountains, assuming low levels of dispersal among the NCDE, Cabinet-Yaak, and Bitterroot populations.

As of autumn 2022, there is not a population of grizzly bears in the Bitterroot system. However, individual animals have been documented within, or very close to, the Bitterroot system, including from the Cabinet-Yaak, NCDE, and Selkirk Ecosystem (Missoulian 2019, USFWS 2019, Kasworm et al. 2020, Nadeau 2020). Thus far, apparently these animals have left the area in one of three ways: they have naturally returned to their place of origin; they have been moved by management agencies; or they have been killed by humans. For example, a bear originally captured near Whitefish and placed in the Cabinet-Yaak area moved back and forth across Interstate 90 in two successive years, spending a few months during summer 2019 in the Bitterroot mountain range, before ultimately losing its tracking collar in the Whitefish range. Recent verified observations continue to suggest that a few individuals are present between occupied areas and the Bitterroot area each year. Evidence from GPS collars and genetic parentage of outlier bears suggests that male bears traveled distances greater than those required to move among grizzly bear core areas (Costello and Roberts 2022). However, in order for grizzly bear recovery to occur in the Bitterroot area, additional demographic connectivity from other populations, particularly for female bears who are unlikely to travel as widely as males, will be required.

The USFWS has embarked on a new EIS to address grizzly bears in the Bitterroot. Assessments conducted by Idaho Department of Fish and Game suggest low productivity and quality for potential grizzly bear habitat in the Lolo-Selway and Salmon River Regions (pers. comm.).

Additional background on issues and alternatives

Numerical objectives

FWP has developed numerical objectives, often specific to regions or hunting districts, for some species (e.g., elk) but not for others (e.g., mountain lions, mountain goats). Indices of grizzly bear abundance in the GYE and NCDE have been developed by the USFWS as part of assessing progress toward recovery and these form part of FWP's planning efforts. At recovered levels, the number of grizzly bears in Montana would be sufficient to assure long-term persistence, assuming continued habitat security and continued work to minimize human–bear conflicts. However, independent of requirements under the ESA and commitments to the two Conservation Strategies and understanding that some Montanans believe there are too many grizzly bears in the state and others believe there are too few, FWP views the grizzly bear as a species for which detailed numerical objectives would not be useful.

Distributional objectives and population connectivity

As mentioned elsewhere, Montana FWP is a signatory to the two completed Conservation Strategies and is a member of the IGBC subcommittees for Montana's four Ecosystems (GYE, NCDE, SCE, BE). As such, Montana FWP has committed to do its part to achieve and sustain recovered grizzly bear populations in the 4 RZs. (FWP takes the position that grizzly bears in and around the GYE and NCDE areas have reached federal recovery goals).

However, a fundamental tenet of responsible wildlife management is to avoid managing for isolated populations that number as few as Montana grizzly bear populations currently do (and would into the foreseeable future). Thus, even if federal delisting rules were to eschew such considerations, FWP recognizes the value of providing functional connectivity between population cores. Connectivity in this sense should not be interpreted as requiring one seamless group of animals stretched across the various population cores; instead, occasional migrants among the cores will suffice and these can be provided by a long-term average density of bears that is lower than the density in the population cores. In grizzly bears, demographic connectivity may be achieved through the residency of females and males in the areas between sub-populations because female bears typically disperse shorter distances than males. Demographic connectivity can often be achieved by moving females. By default, demographic connectivity also achieves genetic connectivity (Costello 2020). Modeled pathways that harbor connectivity are primarily associated with mountainous areas and secondarily associated with rivers and streams in open valleys (Figures 17 and 18; Sells et al. 2023).

Figure 17. Prediction of female grizzly bear connectivity pathways in western Montana, summarized from 5 sets of directed (randomized shortest path) movement simulations using start and end nodes associated with routes of NCDE-CYE, NCDE-BE, NCDE-GYE, CYE-BE, and GYE-BE (Fig. 1). Class 1 = lowest relative predicted use, whereas class 10 = highest relative predicted use. Simulations were based on 46 individual iSSFs for NCDE females (Sells et al. 2023).

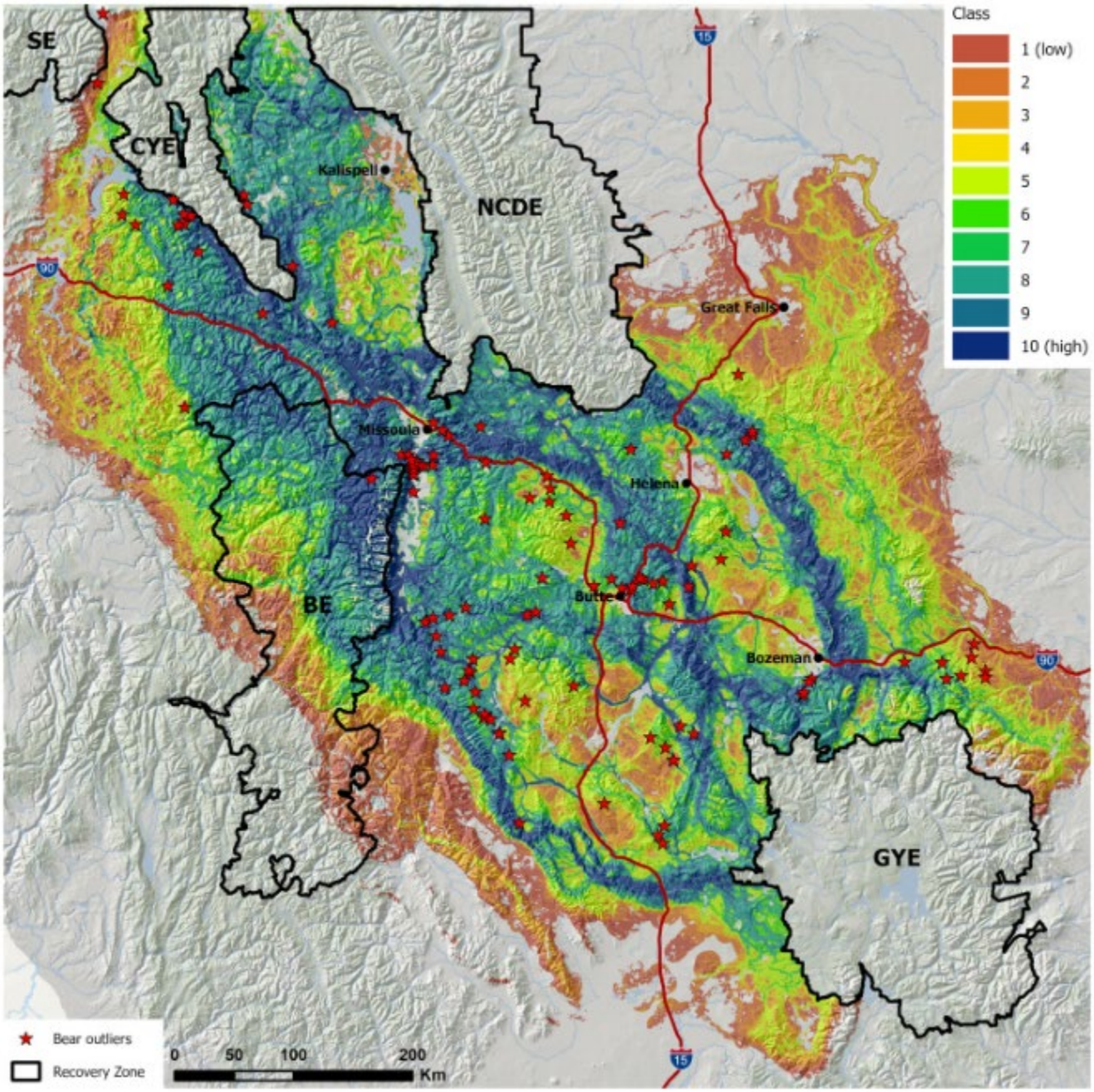
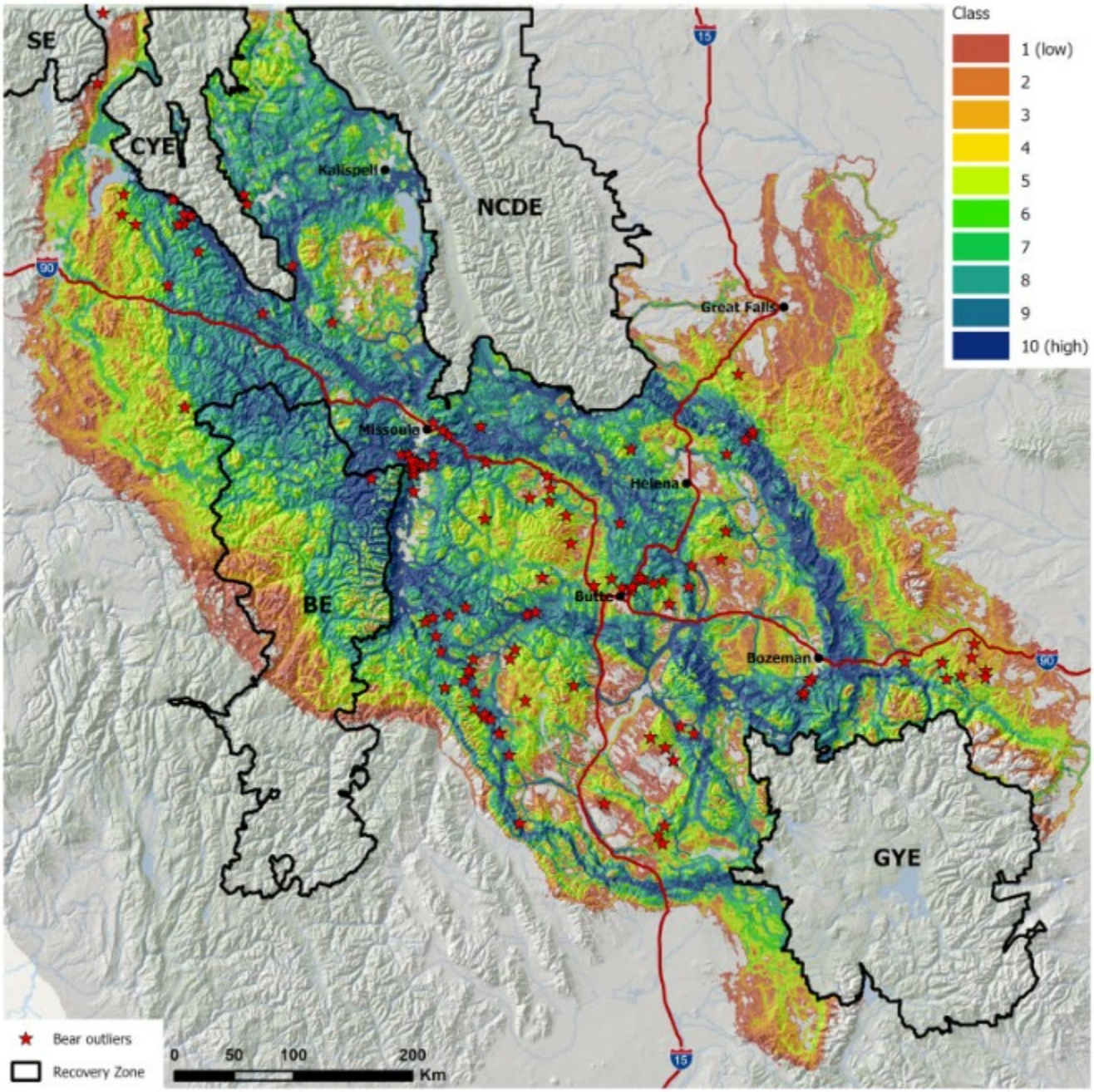


Figure 18. Prediction of male grizzly bear connectivity pathways in western Montana, summarized from 5 sets of directed (randomized shortest path) movement simulations using start and end nodes associated with routes of NCDE-CYE, NCDE-BE, NCDE-GYE, CYE-BE, and GYE-BE (Fig. 1). Class 1 = lowest relative predicted use, whereas class 10 = highest relative predicted use. Simulations were based on 19 individual iSSFs for NCDE males (Sells et al. 2023).



FWP recognizes that lands on which this connectivity would occur are not managed with grizzly bears as a recognized priority; public lands are more heavily roaded and used than are areas identified as "secure" by inter-agency plans,

and human–bear conflicts on private lands must be avoided. FWP favors working with partners to gradually increase the capacity for coexistence (recognizing that this will require efforts from people and entail some suffering for bears), and remains optimistic that, long-term, the level of coexistence will provide for the needed connectivity. However, if connectivity cannot be achieved in this way, artificial connectivity (occasionally moving bears among cores) can be used to achieve the goal of increased genetic diversity.

Considering that the landscapes between secure areas are more heavily populated, developed, and traveled than are the cores that have supplied the engines of grizzly bear recovery, and that deaths of grizzly bears older than cubs are overwhelmingly caused by people, a reasonable question is whether this vision can work biologically. We can expect that, even with effective conflict prevention and public education about coexistence, grizzly bears will encounter a higher risk of dying (directly or indirectly) due to interactions with people, particularly in the areas between cores that are not subject to restrictions on human use (other than restrictions designed to reduce attractants). Will this higher mortality doom the efforts to allow for long-term connectivity? Or alternatively, is there a feasible future that acknowledges the inevitably higher risks for animals that are between core areas, while still providing the desired connectivity between those cores?

Population biologists use the term "source-sink dynamics" to describe populations overlaying some habitats that create conditions in which reproduction exceeds mortality and other habitats in which mortality exceeds reproduction (Pulliam 1988). A number of studies linking grizzly bear population dynamics to habitat conditions (particularly those highly influenced by human activity) have shown or postulated the existence of such source-sink dynamics (e.g., Schwartz et al. 2006d, 2012; Ciarniello et al. 2007). Although the presence of habitats in which additions fail to balance subtractions raises legitimate concerns about overall sustainability, readers should keep in mind that the source-sink concept was developed to explore conditions under which populations could persist in their presence. It would be erroneous, if understandable, to equate a population "sink" with an unstopped "drain" through which all the animals disappeared. Whether a population can persist in the presence of "sinks" depends on the strength and proximity of sources, the "depth" of the sinks, the proportions of the population using sources and sinks, and the details of movements and dispersal of individuals among them.

A related concept, sometimes conflated with source-sink dynamics, is that of an "ecological trap" (also termed an "attractive sink"). In this concept, habitats exist that not only provide insufficient safety or resources for animals' recruitment to balance mortality but are also attractive to those animals (Battin 2004). That is, the evolutionarily developed cues that animals use to tell them where they'll do well are no longer a good match for the existing conditions in these habitats; animals are "lured" in (perhaps from better habitats), as it were, despite these habitats not actually providing for their life requisites. For grizzly bears, human attractants in populated areas have the potential to create such ecological traps, at least at the local level. (For North American grizzly bear populations, see Northrup et al. 2012 and Lamb et al. 2017; for European contexts, see Steyaert et al. 2016, Penteriani et al. 2018.)

The distinction between the two concepts (source-sink vs. ecological trap) is important: grizzly bears in the U.S. Rocky Mountains can plausibly persist within a source-sink system but would likely be on a downhill trajectory if too many of the sinks became ecological traps. The primary way to prevent this would be to reduce or secure attractants to grizzly bears that are likely to ultimately result in their deaths. In contrast, the presence of a population sink doesn't necessarily doom the overall population as long as the population trajectory within it isn't too strongly negative, and the sink is close enough to sources that are, in turn, strong enough to maintain occupancy. That is, a patch of land may be a "sink" but may also, at the

same time, serve to provide or enhance connectivity. Currently, FWP is not aware of ecological traps that are attracting grizzly bears from core habitats in recovery areas in a way that would pose a threat to population viability or other status.

An empirically based model of grizzly bear persistence in Western Montana

The most applicable examination of how source-sink dynamics appear to be operating for grizzly bears in Western Montana is that of Lamb et al. (2020). These authors used a large data set of grizzly bear studies in British Columbia (with almost 2,700 individual bears followed, either genetically or through telemetry, in 41 different studies) to understand how survival and reproduction varied by the magnitude of human influence on each individual landscape. In addition to finding (as other studies have) that grizzly bears tend to become more nocturnal when in closer proximity to humans and their infrastructure, Lamb et al. (2020) found that a freely available database called the "Human Influence Index" was a good predictor for the rate at which grizzly bears would die. This resource allowed them to develop a map that predicted the growth or decline of a given grizzly bear population in any given part of British Columbia. Lamb et al. (2020) summarized their findings as "a striking paradox of coexistence: The mobility of [grizzly] bears averts extirpation through demographic rescue, yet these same animals face considerable risk once they arrive near people…connectivity to wilderness is a critical mechanism of coexistence…bear density in human dominated landscapes often remains an order-of-magnitude lower than in wilderness areas…and would rapidly be extirpated without continual immigration… [and without] social tolerance for [grizzly bears], and creative solutions for coexistence." Note: "Wilderness" as used above is a general term referencing areas of minimal human influence, not necessarily equated with federally-designated wilderness under the U.S. Wilderness Act of 1964.

In the figures, we applied the model developed by Lamb et al. (2020) to Montana west of the Continental Divide (see Sidebar 8. for methods). These maps can be interpreted as providing insight into two important questions: i) If the "seed" of a population of grizzly bears has been initiated outside of a Recovery Zone, then according to the Lamb model, what would be that population's expected trajectory (λ)? and ii) If the expected trajectory is negative, how far away is that population from a putative source that could supply immigrants?

We caution readers against focusing on the exact λ values; those values are derived from studies in British Columbia, and thus may be higher or lower than values observed in Montana. Instead, readers should focus on the fact that the relative differences in growth rates most likely reflect what we can expect, given current levels of human influence. It would be incorrect to interpret the λ in a given area as indicating the rate at which the grizzly bear population is changing now (the map includes areas with no extant grizzly bear population). The λ values are conditional; they illuminate the underlying long-term trend we would expect to see, should there be enough animals to constitute a population considered capable of having a trend. Similarly, areas other than those shaded in dark blue should not be considered as areas where grizzly bears cannot possibly be found at any time, but instead as areas where persistence requires immigration. (Of course, FWP cannot directly increase immigration—but it can take steps to facilitate coexistence, increasing the probability that immigrants will survive.) Finally, we caution that these maps do not predict where grizzly bears will find connectivity, but instead depict the likely source-sink dynamics underlying, and informing, the management approaches available to FWP. The maps can help FWP prioritize conflict reduction resources by suggesting: i) where survival rates are consistent with sustainability; ii) where the mortality of bears must be reduced if connectivity is a goal; and iii) where it makes little sense to prioritize connectivity (because human influence is already so high as to make connectivity infeasible).

FWP interprets these maps as providing optimism that, assuming the continuation of conflict prevention and response programs and the continuation of approximately current levels of human infrastructure, grizzly bear connectivity (at least west of the Continental Divide) can gradually be accomplished—even in the presence of human–bear conflicts, and some resultant deaths of bears.

Sidebar 8. Development and interpretation of figures 19 and 20.

Development

To develop Figures 19 and 20, FWP downloaded from https://doi.org/10.7927/H4BP00QC the raster format GIS Human Influence Index (HII) and, with one exception (explained below) applied from Lamb et al. (2020a) the summary relationships between HII and asymptotic population growth (λ) that ignore minor differences in grizzly bear reproduction associated with vegetative productivity. (In the Lamb models, this vegetative productivity was indexed by the Normalized Difference Vegetation Index, abbreviated as NDVI, which accounted for a small proportion of variance.)

In consultation with Dr. Lamb, we began by comparing Montana's grizzly bear habitats that lie west of the Continental Divide (which are characterized by human-dominated valleys with roads, homesites, small communities, and small-scale agriculture) to those that lie east of the Divide (which are characterized by livestock-dominated areas) and decided to focus on the former, which are more similar than the latter with the British Columbia study areas that informed Lamb's model.

The HII values in turn reflect human population density, infrastructure, and access, and vary from 0 (no human impact) to 64; in the areas of study, generally the HII values were below 40. HII does not model grizzly bear mortality directly, but the model does account for the relationship between HII and mortality.

We altered the mapping protocol used by Lamb et al. (2020) in one respect: Rather than apply the predicted λ at the smallest possible (i.e., 1 km^2 pixel) scale, we used a moving-window protocol to assign to each pixel the λ resulting from the mean HII at the scale of the average home range, reasoning that these were more meaningful spatial scales on which to envision population growth rates. (Note: As shown respectively in Figures 19 and 20, the mean home range for a female is 358 km^2, and for a male is 1,364 km^2.

We lack an analogous model to illustrate how, and indeed whether, such source-sink dynamics might play out on Montana lands east of the principal mountain chains, where human attractants and ultimate causes of grizzly bear mortality differ somewhat from those further west.

Interpretation

Potential grizzly bear population growth rates, as estimated by applying the Lamb et al. (2020) model to western Montana at the scale of mean female (Figure 19) and male (Figure 20) home range sizes, suggest that some areas (shown in dark blue on both maps) would be capable of sustaining grizzly bears, once colonized, even without additional immigrants. However, other areas (shown in other colors) would likely act as sinks where population persistence would require continuing immigration from source populations such as the NCDE and CYE. White isopleths indicate distances from the presumed source.

Figure 19. Estimated potential population growth rate at the spatial scale of the mean female home range size (358 km²), as extrapolated from the Lamb et al. (2020) model.

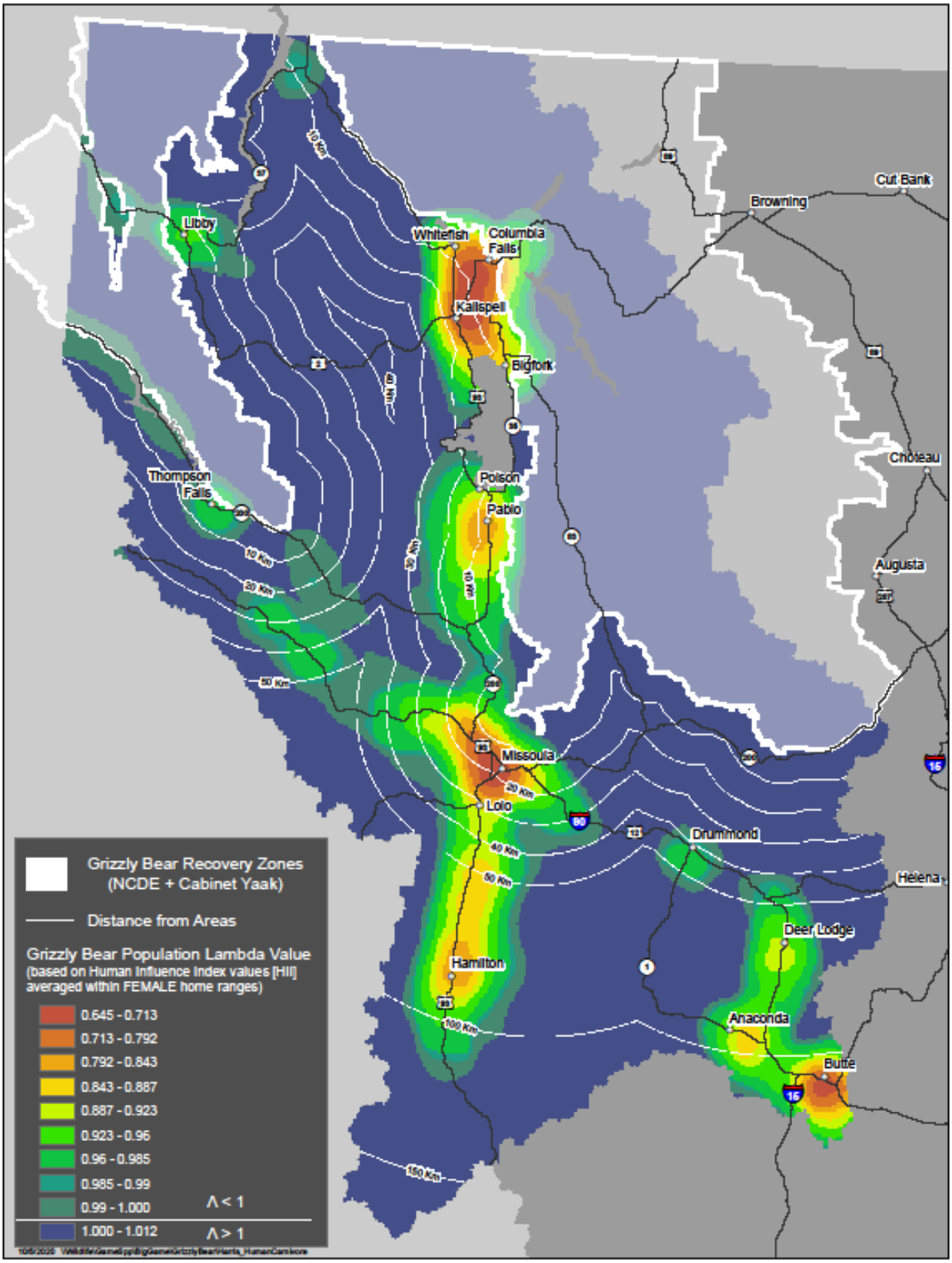
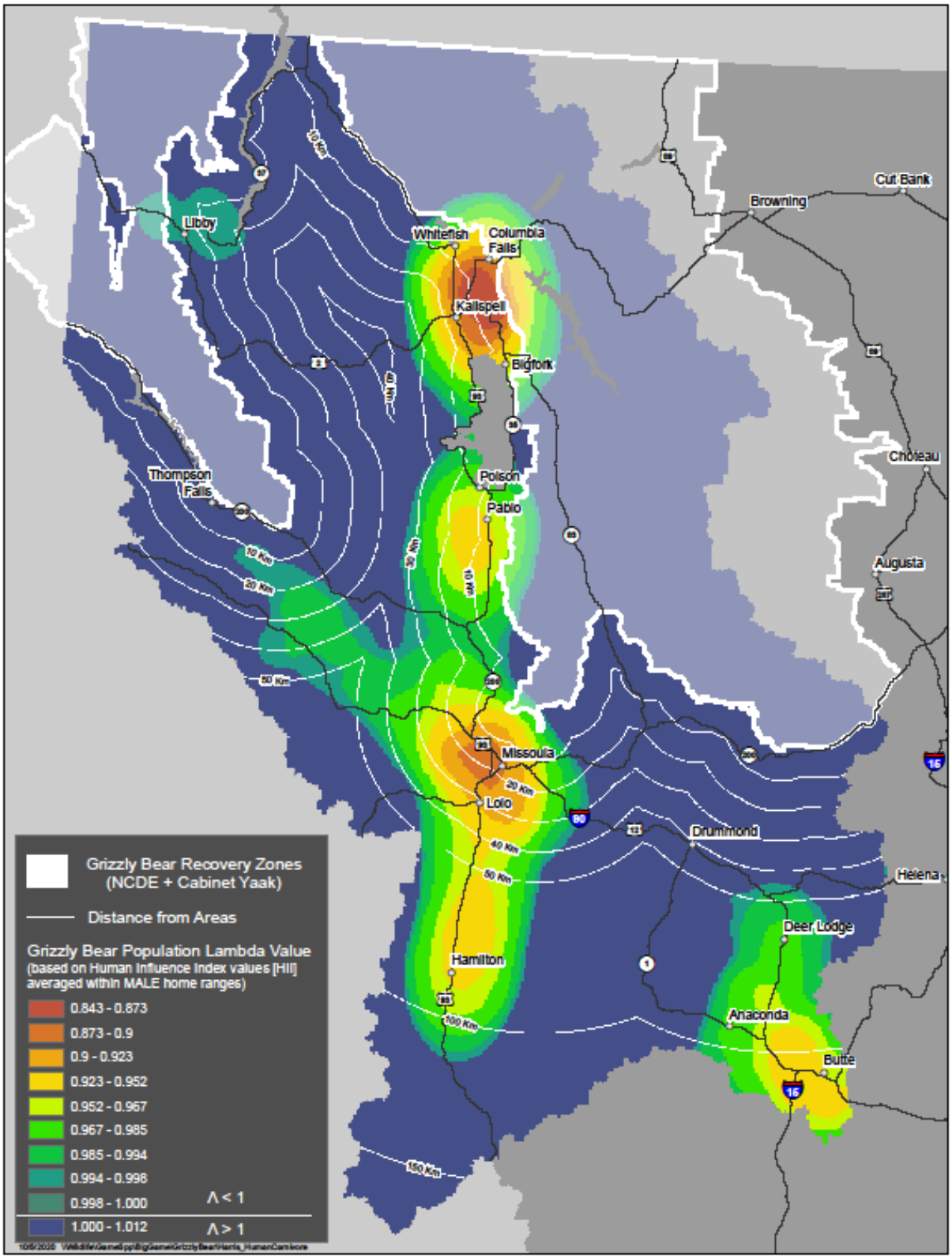


Figure 20. Estimated potential population growth rate at the spatial scale of the mean male home range size (1,364 km²), as extrapolated from the Lamb et al. (2020) model.



Human safety

It hardly requires restating that grizzly bears are potentially dangerous animals. According to draft and incomplete statistics compiled by the USFWS for the decade 2011–2020, there were 32 incidents in Montana that were categorized as "attacks." The locations of these incidents were as follows: 17 were in the GYE; 13 were in the NCDE (of which 4 were within Glacier National Park); and 2 were in the CYE. The severity of human injury from these incidents was as follows: in 15, severity was minor (i.e., less than 24 hours in hospital); in 12, severity was major (i.e., more than 24 hours in hospital); in 1, severity was fatal; and in 4, severity of injury was not recorded. The human activities just before these incidents were as follows: In 17 (53%), hunting (or related activities); in 10, hiking; in 2, bicycling; and in other cases, gathering, working, or involved in unknown activities. Bear spray was carried, either by the victim or by someone in the victim's party, in 12 of the incidents and was used in 8. In 2021 there were 15 incidents and 1 human fatality in the Montana portion of the GYE; and 18 incidents and 1 human fatality in the NCDE.

Bear spray, which has an active ingredient of some form of capsaicin pepper, is generally considered highly effective in deterring a grizzly bear attack (Herrero and Higgins 1998, Smith et al. 2008). Although not difficult to use, some people do not understand that it is a deterrent rather than a repellent or that it is only useful within a short range (typically 10–12 m). Most practitioners recommend practicing using bear spray (particularly becoming adept at removing the safety device), keeping it from extreme temperatures, and acquiring fresh bear spray after about four years of storage. Although windy or extremely cold conditions can compromise the effectiveness of bear spray, Smith et al. (2021) concluded that it would still have utility under most adverse conditions.

Conflict prevention

Regarding conflicts with grizzly bears (and sometimes with black bears or mountain lions as well), FWP has been a leader in both prevention and response efforts. The term "human–bear conflict" (or "conflict" for short) is rarely defined rigorously, if at all, when invoked in everyday speech or even in reports and technical papers. This plan provides a definition (see Definitions) but acknowledges that the word is often used generally, without rigorous definition, in common parlance. Thus, readers should keep in mind the looser, less precise usage often adopted.

As of summer 2023, FWP supported a total of 10 bear managers in or near Anaconda, Bozeman, Chouteau, Conrad, Hamilton, Kalispell (2), Libby, Missoula, and Red Lodge. Despite uncertain funding, FWP has also supported assistants (some only seasonally) for many of those locations. Bear specialists are constantly innovating to add and evaluate new tools for prevention. This includes development of outreach activities and educational materials. They also conduct research on bear behavior around attractants to gain a better understanding of how to prevent conflict. Resources and needs for these efforts depends on and vary in scope and scale. In Region 2, FWP also provided in-kind support and close technical assistance through a bear management specialist and range-rider employed by the landowner-led Blackfoot Challenge group. Thus, during the non-denning season, a team of 14 staff have actively worked with landowners to address conflict issues and to respond to individual grizzly bears involved in conflicts.

These FWP staff, in turn, coordinated closely with similarly trained and tasked staff on the Flathead and Blackfeet Reservations (both of which employ fully trained, full-time bear managers), and at Glacier and Yellowstone National Parks.

They also coordinated closely with a statewide conflict prevention specialist employed by USDA-Wildlife Services (based in Missoula). Where large livestock were involved in potential or actual conflicts with grizzly bears, they also coordinated closely with USDA-Wildlife Service conflict response staff.

The contributions of non-governmental organizations (NGOs) in helping to minimize human–bear conflicts cannot be overstated: FWP staff routinely coordinates with many NGOs who conduct their own activities to educate and support landowners, recreationists, and citizens to prevent conflicts. In addition to the internationally recognized work of the Blackfoot Challenge (noted just above), indispensable contributors in their various regions have included (in alphabetical order):

- Big Hole Watershed Committee, which employs a range rider and operates a livestock carcass collection program;
- Bitterroot Bear Aware Collaborative, which helps subsidize bear-resistant sanitation receptacles for communities and provides education about bears;
- Blackfeet Nation Stock Growers Association, which has provided education about electric fencing and ranching near grizzly bears generally along the East Front;
- Clearwater Resource Council, which works in the Seeley Lake area to install electric fencing and bear-resistant sanitation tools, thus helping to prevent future food rewards and habituation there;
- Conservation Science Collaborative, which helped to facilitate a range rider and information about livestock guard dogs on the East Front;
- Defenders of Wildlife, which helps provide electric fencing by cost-sharing and by assisting in installation;
- Great Bear Foundation, which has organized volunteer-drive fruit pickups, to discourage bears from congregating around feral apples and other fruit trees;
- Greater Yellowstone Coalition, which has helped fund a range rider in the Gravelly Mountains and also helped to facilitate bear-resistant sanitation receptacles on public lands;
- Madison Valley Ranchlands Group, which supports construction of a livestock composting facility in Madison Valley;
- Missoula Bear Smart Working Group, which has written a Missoula Bear Hazard Assessment and a Human-Bear Conflict Management Plan for the city and surrounding areas. The conflict plan was unanimously adopted by Missoula County Commissioners and the Missoula City Council.
- People and Carnivores, which provides education, works with selected landowners to implement conflict prevention, and has pioneered new approaches to secure attractants from grizzly bears;
- Swan Valley Bear Resources, which helps landowners to prevent conflicts by providing fruit gleaning, bear-resistant sanitation receptacles, electric fencing, education, and more;
- Tom Miner Basin Association, which works to secure attractants in the area northeast of Yellowstone National Park;
- Watershed Restoration Coalition, which supports construction of a livestock composting facility near Deer Lodge;
- Western Landowners Alliance, which has provided support programs to help ranchers living with difficult predators.

Many of these organizations have received financial support from the Vital Ground Foundation or the Montana Outdoor Legacy Foundation. The latter is also a major funder and supporter of FWP's own conflict prevention work, which continues to incorporate new technologies and new lessons learned from experience. Although there is statewide consistency in the overarching goal (conflict-free coexistence of people and bears) and in many of its supporting strategies, the focus and activities toward that end are somewhat variable among FWP regions and individual bear managers, largely due to different sources of human–bear conflicts.

FWP bear managers' conflict objectives and recent related activities are summarized below.

The below objectives have been articulated:

- work with landowners to identify and secure attractants;
- work with government agencies to promote food storage on public lands;
- work with city, county, state, and federal governments to minimize conflicts;
- provide information and outreach about conflict prevention to the media;
- educate the public about how to live and recreate safely in grizzly bear country;
- respond to conflicts on private and public land; and
- build relationships of trust with and among landowners, NGOs, agency staff, and the public.

The below activities have been pursued as well by bear managers, who have worked with landowners to erect over 400 temporary or permanent electric fences to separate bears from potential attractants. In 2020 alone, managers responsible for the northwest section of the NCDE (and surrounding lands) performed the following activities:

- worked with waste management staff from the counties of Flathead, Lake, Lincoln, and Missoula, as well as from the municipality of Whitefish, to improve resistance to bears in various waste transfer stations;
- installed permanent electric fencing to protect small livestock for 10 landowners;
- loaned temporary electric fencing to 8 additional landowners;
- worked on developing electric screens and mats, to fortify electric fences and to prevent access to grain bins;
- loaned motion-activated noise makers ("Critter Gitters") to landowners on 24 occasions;
- loaned 10 bear-resistant sanitation containers;
- continued to lead and facilitate a locally based group to pick excess fruit (which otherwise would attract bears),
- helped lead public "bear fairs" in 4 small communities and made presentations at twelve public meetings.

In 2019, FWP bear managers responsible for the CYE provided education or training in minimizing conflicts at 32 events or meetings.

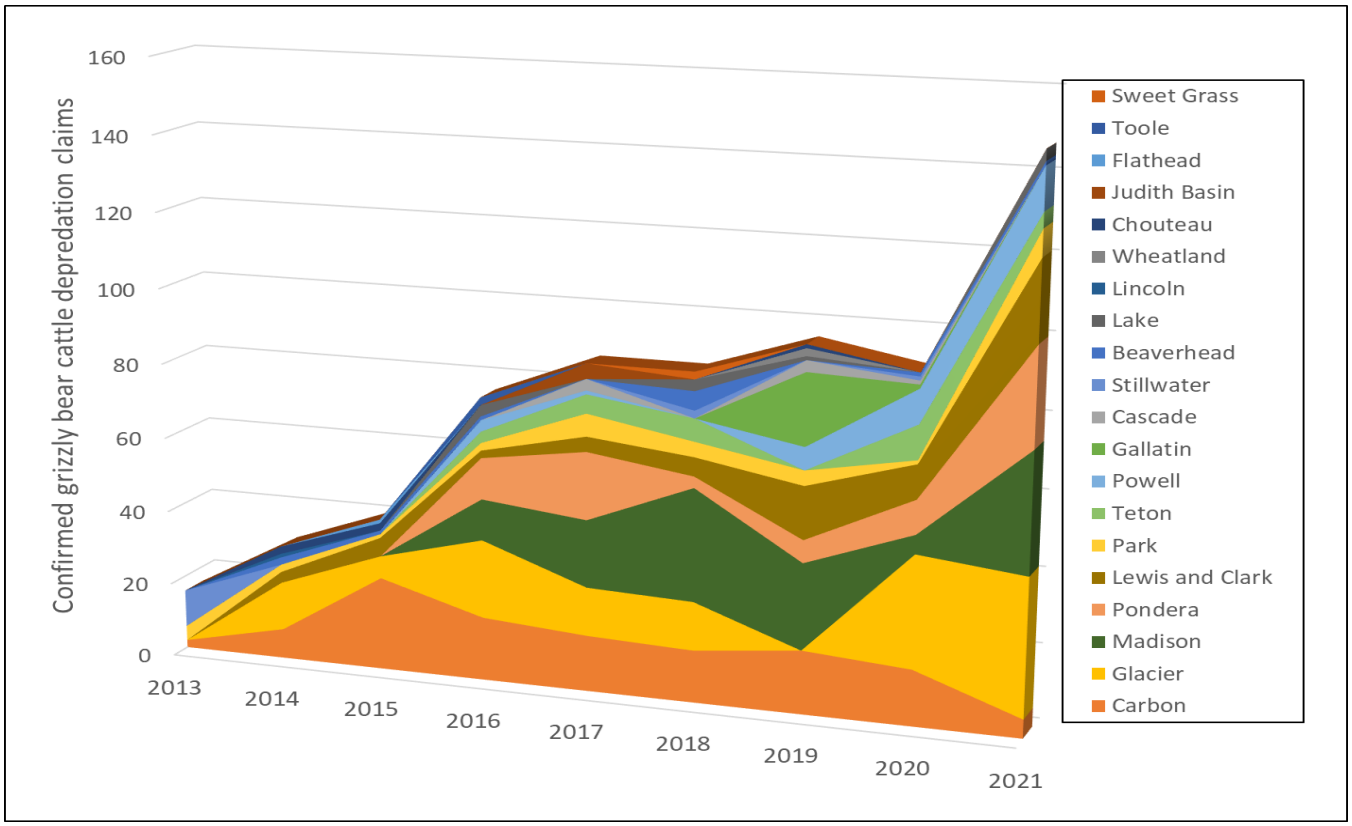
Because not all depredation by grizzly bears on livestock is discovered, reported, or confirmed, we lack a complete census of livestock lost (Harris 2020). The most rigorously vetted data set is that compiled by the Livestock Loss Board (LLB, Montana Department of Agriculture, https://liv.mt.gov/Attached-Agency-Boards/Livestock-Loss-Board. Since 2013, LLB has reported claims of livestock losses to wolves, grizzly bears, and mountain lions. To determine eligibility for compensation, each claim must be verified by USDA-WS.

From 2013 to 2021, LLB statistics show 676 claims of individual cattle (mostly calves, although these are not distinguished in the data set) killed by grizzly bears. During this period, the number of individual cattle losses claimed by county were: Glacier, 133; Madison, 119; Carbon, 118; Pondera, 73; Lewis and Clark, 63; and the rest scattered throughout

the remainder of the 30 counties. Claims by county varied annually, probably reflecting the idiosyncratic nature of human–bear conflict generally, but clearly increased almost linearly during the nine-year period (increasing, on average, by about 14 cattle claims annually—see Figure 21). Harris (2020) reviewed the literature on predator-induced losses of livestock, concluding that verified losses almost certainly understated true losses.

Figure 21. Confirmed Montana cattle (including calves) lost to grizzly bears

From 2013–2021—verified by USDA-US. Montana Livestock Loss Board, https://liv.mt.gov/Attached-Agency-Boards/Livestock-Loss-Board/Livestock-Loss-Statistics-2022.



Also during 2013–2021, a total of 250 sheep were verified and claimed as lost to grizzly bears—mostly from the counties of Pondera (66), Teton (54), and Toole (53). Temporal and spatial patterns of depredation are more variable for sheep than for cattle, likely due to wide variations in the number of animals involved: most sheep depredations involved fewer than six animals, but some involved dozens.

Livestock carcasses

Especially in early spring, when bear hibernation ends and livestock are most likely to die, grizzly bears will feed on available livestock carcasses—bringing the bears closer to livestock and humans (Newsome et al. 2015) and increasing the likelihood of conflicts. Bear managers have used one of three responses: i) move the carcasses to remote locations, thus diverting bears from coming near people; ii) by remove carcasses and deposit them in secured locations where bears cannot gain access; or iii) electric fencing for private boneyards to prevent bear access and aggregation.

There is little doubt that it is undesirable to leave such attractants as livestock carcasses and boneyards near human infrastructure (Wilson et al. 2005, 2006). Some ranchers have, either on their own initiative or as a result of agency

recommendation, moved carcasses from lands they control to areas that are somewhat more remote. FWP and NGO programmatic approaches have included either preventing bears from accessing these resources entirely (either by moving them to protected dumps or compost piles) or redistributing them to remote areas where it is expected they serve to detain bears from moving closer to people while also providing a supplemental source of food (Madel 1996). Electric fencing of private boneyards has also been effective at reducing bear use of ranches (Wilson et al. 2005). Livestock carcass removal programs have been initiated by the Blackfoot Challenge (with indirect support from FWP) in the Blackfoot River drainage (Wilson et al. 2014, 2017), on the Rocky Mountain Front by FWP, and in the Big Hole areas (by the Big Hole Watershed Committee).

The only organized program of livestock carcass redistribution known to us is that begun by FWP Region 4 in 1987 and continuing through at least 2017 (Madel 2017). Aune and Kasworm (1989:262) suggested such a program could serve to detain grizzly bears in the East Front foothills during spring, thus reducing bears' use of private lands further east. They envisioned this program as a transition step toward altogether removing livestock carcasses as a source of bear food, adding that the program should not be a general "feeding program" and should not redistribute more than 10–20 carcasses per year.

Madel (1991, 1996) considered that livestock carcass redistribution reduced conflict compared with private boneyards near residences (although evidence of success was anecdotal) and that it also functioned as a substitute protein source for grizzly bears who historically would have had greater access to spring carcasses from ungulates (bison and elk). The livestock redistribution program implemented by FWP along the East Front of the Rockies gradually has been reduced in recent years. The number of carcasses involved per year was 222 in 1989–1990, 139 in 1991–1994, and only 22 in 2017 (Madel 1991, 1996, 2017), as privately-operated boneyards providing carcasses for redistribution were phased out. It is unknown, however, to what extent private boneyards have been replaced by smaller-scale, privately-operated analogues of FWP's carcass redistribution program.

There are no reports of rigorous, controlled studies comparing the effects on human–bear conflict of diversionary use of carcasses versus carcass removal (Garshelis et al. 2017). Feeding of bears is a common practice in Europe (typically using both maize and livestock carrion), often conducted in association with hunting but also with the objective of diverting bears from settled areas and reducing depredation on sheep. After the European Union banned the use of carrion in feeding stations in 2004, Kavčič et al. (2013) found that bears in Slovenia continued to use feeding sites (now supplied only with maize) at similar rates as before the ban, and that depredation rates on sheep did not change. Kavčič et al. (2015) used this finding—along with concerns that supplemental feeding could increase reproductive rates and thus could indirectly increase bear-human conflicts—to urge caution when considering continued supplemental feeding in the European context. Jerina et al. (2015, cited in Garshelis et al. 2017) found an inverse correlation between time Slovenian bears spent near feeding sites and time spent near settlements during autumn, although not at other times of year. See also Robbins et al. 2004:168.

In spring 1998, the provincial government of Alberta began moving road-killed ungulate carcasses to remote sites (1,430–2,013 lbs., or 650–915 kg, per site per year) in a quest to reduce springtime livestock depredation. After this program ended in 2014, Morehouse and Boyce (2017b) examined its effectiveness. During the program's last two years of operation, they found that 12 monitored sites were used by 22 uniquely DNA-identified grizzly bears (roughly one-quarter of resident grizzly bears and about 13% of all detected grizzly bears). During the first year after the program's end in 2014, none of those 22 bears was identified from available hair samples obtained opportunistically at spring conflict sites, suggesting that there

was no immediate rush by the bears to replace the suddenly unavailable carcasses with living livestock at the conflict sites.

Throughout the study period, livestock depredations had been increasing in areas further east from the mountains in Alberta (as in Montana), but this trend did not change with cessation of the carcass intercept program (Morehouse and Boyce 2017a). Spring livestock depredation incidents were fewer in the 2 years post-program than in the program's final year, although more than in other years of the program's existence. Assessing the possible effects of the program on conflict incidence, always a difficult proposition, was further complicated in this case by the increasing effectiveness of community-based conflict prevention efforts (Morehouse et al. 2020).

Conflict response

Many calls received by FWP bear managers do not require a conflict response. These calls may involve requests for information, observations of a bear that the reporting party does not consider threatening, or other issues that can be handled by telephone. Among incidents that are appropriately considered conflicts, most are addressed with site visits and efforts (such as securing attractants) to prevent bears from returning. If the bear in question is still nearby during the site visit, sometimes an attempt is made to use hazing (informal aversive conditioning) to discourage it from returning. However, in many cases these measures alone do not resolve the issue, and the possibility of capturing the bear is considered.

At this point, FWP staff members generally begin communication with the USFWS grizzly bear recovery coordinator to discuss options. If there is a failure of conflict resolution efforts that do not involve handling bears, then it often occurs that the joint decision is made to set traps and attempt to secure physical control of the bear(s) in question. When depredation upon livestock is suspected, USDA-WS is involved in the investigation and makes the determination as to whether depredation by grizzly bears is confirmed. If a bear is successfully captured, further discussions ensue regarding which of four dispositions of the bear is most appropriate.

Release onsite

In this option the bear is released back to the original site, typically with a radio collar to facilitate tracking. This option may be appropriate for several reasons: i) sometimes the captured bear was not the one understood to be involved in the conflict; ii) sometimes the mere act of capture and release will deter the bear from further conflict behavior; iii) sometimes only some members of a bear's family group were captured.

Short-distance relocation

In this option the bear is relocated to a new site that is far enough away from the original site to eliminate (at least temporarily) the conflict potential, but not so far away that the bear is unlikely to know how to procure resources and avoid aggressive conspecifics. The relocation sites are selected—based on safety, accessibility, and capacity to absorb additional bears—from a list of sites previously approved by the land manager. Even if the bear returns to the conflict site, this option may buy time for FWP staff to work with people on such steps as removing or securing attractants.

Long-distance relocation

In this option the bear is relocated to a more distant site, where it is less likely to return to the conflict site (Milligan et al. 2018). Sometimes these relocated bears settle into their new home; other times they wander widely, eventually

establishing new home ranges or settling in areas that cannot be predicted in advance. Other times they eventually return to the previous home range. As with short-distance relocation sites, the relocation site is selected—based on safety, accessibility, and capacity to absorb additional bears—from a list of sites previously approved by the land manager.

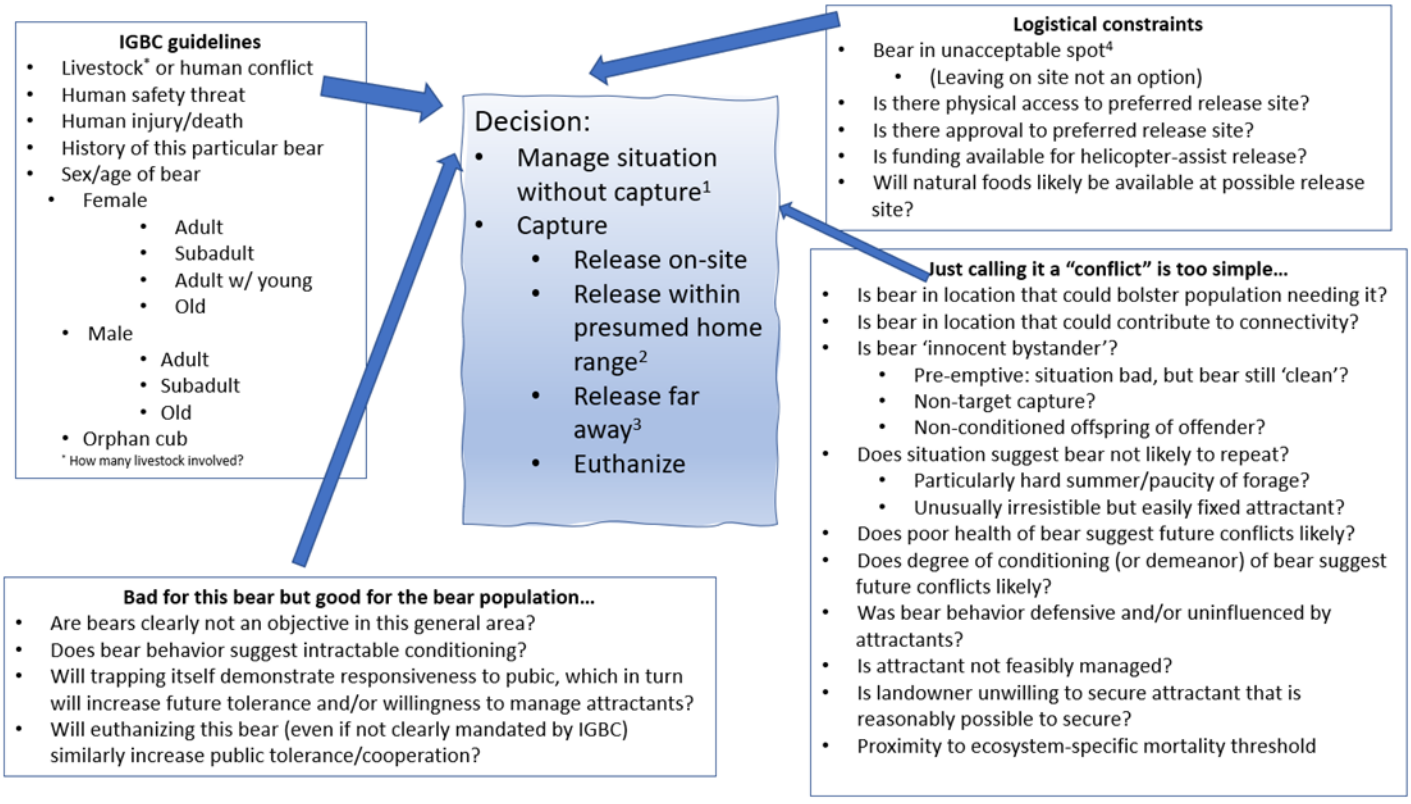
Euthanization

In this option the bear is euthanized. Typically, hides, skulls, or other parts are retained by the agency and donated for educational purposes.

Figure 22 shows the factors considered once a decision has been reached that a bear requires hands-on attention.

Figure 22. When human–bear conflict is verified: Flow of considerations and responses

1 includes attractant management and, often, also hazing or aversive conditioning.
2 is short-distance relocation—releasing the bear a short distance away and encouraging it to return to natural foods in the area.
3 is long-distance relocation—releasing the bear farther away, allowing time to manage attractants and otherwise reduce conflict potential even if the bear returns later; alternatively, some bears will settle in the relocation area.
4 is when a bear cannot be released on site due to attractants that cannot be removed, human presence, or some other situation making it an unacceptable spot for a grizzly bear at the time.
Note: Relocation could be unsafe for people (if near human infrastructure like a golf course) or bears (if near a hazard like a cliff).



Sometimes traps are set before a conflict is documented, in situations where a decision is made that a bear is in a risky place (even if it never causes damage). These are typically termed "preemptive captures." At other times, a bear other than the targeted one is captured. On rare occasions, orphaned cubs are captured and transferred to a temporary holding facility, and a permanent facility is found for them.

During the four non-denning seasons from 2017 to 2020, FWP staff led or were heavily involved with 176 "management" or conflict captures. Of these, 145 (82%) were inside of, or closest to, the NCDE recovery zone (and of these, 84 (58%) were in the northwest (FWP Region 1), 12 (8%) in the southwest (FWP Region 2), and 49 (34%) east of the mountains (FWP Region 4). Twenty-seven captures (15%) were within or associated with the GYE, and only 4 (2%) were within or associated with the CYE. These 176 capture events resulted in bears being transferred to captivity on two occasions (1%), released onsite on 11 occasions (6%), relocated on 104 occasions (59%), and euthanized on 59 occasions (34%).

Because the reasons for initiating a capture were varied and often complex, quantification of those reasons is imprecise and sometimes unclear. Of the documented primary reasons for deciding to capture and handle the bear, the most common were: depredation on livestock (42); killing of poultry, usually chickens (21); exhibiting bold or extremely habituated behavior or being near residence (20); damaging property (15); accessing garbage (12); and accessing fruit or fruit trees (8). There were also 14 cases of preemptive capture—i.e., the bear was considered to be in a situation that risked a future conflict, although no conflict had yet occurred. Additionally, there were 37 cases of incidental capture—e.g., the bear captured was one not implicated in the conflict, in some cases a juvenile.

During this period from 2017 to 2020, for the 173 incidents in which a primary reason for capture was clearly documented, in 42 incidents (24%) the primary reason was depredation of large livestock (cattle or sheep). Of those 42 incidents, in 33 (79%) the offending bear was euthanized when captured. Two additional bears involved in livestock depredations were euthanized after one attempt at relocation.

In early 2021, the 67th session of the Montana legislature passed Senate Bill 337, which amended 87-5-301, MCA, in two ways that affect the relocation options available to FWP bear managers for federally listed grizzly bears. Newly enacted subsection (3)(a) limits FWP bear managers to moving a grizzly bear only to sites previously approved by the Commission. Newly enacted subsection (3)(b) prohibits FWP bear managers from relocating a grizzly bear involved in conflict outside of a Recovery Zone. The legislation does not preclude USFWS, or other entities permitted by USFWS, from relocating or translocating bears (see Appendix C). The new legislation does not speak to restrictions on relocating grizzly bears that are not under ESA protection.

During the 4 non-denning seasons 2017-2020, 129 of the 173 captures for which specific geographic locations were available (75%) that FWP personnel led or were heavily involved with occurred outside of recovery zones. These 129 capture events resulted in bears being released onsite on 5 occasions (4%), relocated on 84 occasions (65%), and euthanized on 40 occasions (31%).

Among the most common documented primary reasons for deciding to capture and handle bears outside of recovery zones were livestock depredation (29), killing poultry (most often chickens, (20)), exhibiting bold or extremely habituated behavior or near residence (14), property damage (9), accessing garbage (8), and accessing fruit or fruit trees (8). In 11 instances, bears were captured preemptively—i.e., they were considered to be in a situation that risked a future conflict, although no conflict had yet occurred. Additionally, in 26 captures the bear captured was categorized as incidental—e.g., a bear other than the captured one had been the capture target or the captured bear was a juvenile that was not implicated in the conflict.

Among the 29 captures in which depredation of large livestock (cattle or sheep) was cited as a primary reason for capture outside of a recovery zones, the bear was euthanized in 21 (73%) cases.

Moving non-conflict grizzly bears (captured outside RZs) whose origin is uncertain

FWP's Preferred Alternative would allow managers to relocate such bears to release sites considered to provide the best chance for the bear to avoid future conflict, even if that site were not within the animal's presumed or known population core of origin, as long as the site had previously been approved by the Commission and was included within the "estimated occupied range of grizzly bears." Thus, the Preferred Alternative envisions increased application of the "estimated occupied range of grizzly bears" boundaries to management decisions. Whereas estimated occupied range maps are now analyzed primarily to document changes in occupied range over time, the resulting maps would also be used to determine whether or not specific release sites could be used in situations such as envisioned here.

It is thus appropriate to clarify how the "estimated occupied range of grizzly bears" maps are (and would continue to be) produced. Following Bjornlie et al (2014a:183), Costello et al. (2023), Dellinger et al. (2023), and Kasworm et al. (2023), the "estimated occupied range of grizzly bears" maps are produced by applying zonal analysis and ordinary kriging to 3 km2 cells with verified grizzly bear locations documented during a 15-year window (20-years for CYE) up to the current year. Verified locations used to determine occupancy of cells are collected from GPS transmitters; VHF telemetry flights; capture and mortality locations; human-grizzly bear conflict sites; verified observations (sightings or tracks) or remote camera photos confirmed by agency personnel; and opportunistic samples of grizzly bear hair, blood, scat, or tissue confirmed by DNA analysis. GPS data are screened to exclude all but one randomly selected location per bear per day. This ensures that GPS data are not overrepresented in the data set and are appropriately scaled to the daily activity radius used to determine grid cell size. Data involving unusual single-track temporary excursions, made by relocated or other collared bears, may also be screened if they unduly distort the extent of occupied range. The method is unaffected by the intensity of location points within cells but is influenced instead by the number of neighboring cells with locations points.

The algorithm developed by Bjornlie et al. (2014a) was designed to provide the "most parsimonious balance of inclusion and exclusion of low-density peripheral locations …. [while allowing]…for annual updates of grizzly bear distribution…." FWP finds it a good choice when the objective is to identify a boundary that distinguishes where grizzly bears have established residency, as opposed to areas where bears have made occasional forays or areas with low-density peripheral locations. Note that the "estimated occupied range of grizzly bears" map is deliberately not as inclusive as USFWS's "may be present" concept (Figure 4), which is an estimate of the larger area over which grizzly bears have been observed to occur. In the CYE, verified observations (i.e., those ranked 4 or 5 by Kasworm et al. 2020) within a 16-year moving window are used to populate Hydrologic Unit Codes (HUCs) at the 6th order watershed scale (Allen 2011). The outer-most boundary of HUCs with verified observations are then merged with the CYE Recovery Zone to create the Occupied range. As the case with the GYE and NCDE maps, the CYE's Occupied range map is updated biennially. This process develops a map at finer scale than that of Bjornlie et al. (2014a), but shares with it the characteristics of being objective, repeatable, and updateable.

Protocols for moving grizzly bears when needed

As a listed species, decisions about capturing and moving grizzly bears are ultimately made by the USFWS. In practice, this occurs following a consultative meeting (typically by telephone) involving FWP staff and USFWS staff (as well as staff from USDA-WS and tribal biologists, if relevant). Release locations are typically on public lands to sites previously approved by land management agencies (typically in multi-year agreements). Before a relocation or translocation occurs, land managers are consulted and bears are moved only to selected sites that are deemed appropriate by the land management officials at that time.

The Commission has authorized, for use by FWP staff, a suite of potential release sites in Montana (Appendix G). The occasional translocation of individual non-conflict grizzly bears from the NCDE to the GYE for purposes of genetic augmentation is included in the currently operative Tri-State Agreement (between Montana, Idaho, and Wyoming, see Appendix H). Guidance provided by an inter-agency team of biologists and managers regarding the best candidate bears, opportune timing, and most appropriate release settings has been documented in a briefing paper (see Appendix I). The recovery permit to translocate grizzly bears from the NCDE to areas within the GYE for the purposes of genetic augmentation to address future threats associated with isolation of the GYE grizzly bear population was approved by the USFWS in June, 2024 (see Appendix J). Translocation for connectivity purposes is not a standalone strategy as the conservation of habitat and the prevention of conflicts in between recovery zones are necessary components to ensure long-term connectivity. Measures described in the 2016 GYE Conservation Strategy are and will continue to be used to promote genetic connectivity through natural movements. These measures include habitat protections, population standards, mortality control, outreach efforts, and adaptive management.

Destinations of bears captured in conflict settings

Each FWP region works with their federal and state land management partners to maintain a list of suitable release sites for grizzly bears needing to relocated. FWP bear managers always obtain specific permission from these partners prior to releasing animals. FWP Region 1 operates under a relocation plan jointly developed with the Flathead, Kootenai, and Lolo National Forests. FWP Region 2 operates under a “Relocation protocol and interim decision-making process for grizzly bear occurrences in outlying area,” jointly developed with USFWS, BLM, DNRC, CSKT, Blackfoot Challenge, and the Lolo, Helena-Lewis and Clark, Bitterroot, and Beaverhead-Deerlodge National Forests. FWP Regions 3 and 5 operate under a relocation plan developed jointly with the Custer Gallatin and Beaverhead Deerlodge National Forests. FWP Region 4 operates under a relocation plan developed jointly with the Lewis and Clark National Forest.

As required by legislation signed into law in 2021, the Commission approved a list of sites to which grizzly bears may be released. Maps of these sites are included as Appendix G. Ideal sites would meet the following criteria; 1) site is not a designated trailhead, 2) site is not a designated or known dispersed camping site, 3) site is not immediately adjacent to private land, unless that private landowner has given explicit permission, 4) site is not an active grazing allotment with livestock present, 5), site is not currently occupied by humans conducting work such as timber harvest nor is the site serving as a human encampment for such activities, 6) site is far enough from capture site as to make it less likely for the bear to return to the conflict site. Ideally, release sites are some distance behind locked gates and remote enough to prevent recurring conflict.

Some designated release sites may never be used or used very infrequently. As of March 2022, FWP can only translocate federally listed conflict bears if captured within federally identified recovery zones.

Moving bears to initiate new or support existing populations

FWP has not moved any grizzly bears with the intent of starting a new population. Beginning in 2005, FWP, in close coordination with USFWS, has taken the lead in capturing and moving occasional bears from NCDE to CYE (see above section, Current status of grizzly bear populations in Montana, CYE subsection).

FWP has not, as of this writing, moved any grizzly bears into the GYE from other populations. However, the Commission approved, in concept, moving a few grizzly bears from the NCDE to GYE populations at their meeting on December 14, 2021. A more detailed protocol document articulating the purpose and need for the augmentation program as well as providing guidance to field staff regarding the type of bear, circumstances around its capture, time of year, and likely release areas, has been drafted and approved by both the GYE and NCDE subcommittees of the Inter-agency Grizzly Bear Committee (IGBC). The protocol calls for:

- Translocating 'non-conflict' bears from other populations in Montana to pre-selected and pre-approved areas within the Greater Yellowstone Ecosystem. Areas chosen for release would be those judged most likely to allow the individual to meet its biological needs without conflicts with humans, and also most likely to breed.
- Trapping would be conducted to capture and move bears as resources allow. "Conflict" bears would encompass not merely bears known to have history of conflict, but also non-target animals captured at or near the site of a conflict. Thus, animals available for this program (i.e., "non-conflict") bears would be those captured in remote settings, typically resulting from specific efforts to identify appropriate candidates for the genetic augmentation program.
- The frequency with which such animals would become available would vary annually, and not be predictable. The expectation is that approximately 2 to 4 candidate bears would become available and be moved every 10 years. There would be no additional expectations or requirements for the timing beyond that. For example, if opportunities arose, more than 1 bear might be moved in any given year; conversely, a few years might pass with no good opportunities.
- This magnitude of capturing and moving bears would result in approximately 3 to 6 bears being moved to the Yellowstone area per grizzly bear generation. If one-half of the bears moved stayed in the Yellowstone, survived long enough to reproduce, and produced (or sired) a cub that survived to adulthood, approximately 1.5-3 effective migrants per generation would gradually be added to the Yellowstone population.
- Translocated individuals would be considered experimental[6] animals, and either moved or euthanized should they cause conflicts with humans [similar to how any other grizzly bear will be managed].
- For any translocated individuals that survive and remain in the Yellowstone area at least 1 year, the allowable mortality limit for that gender for the GYE (per the Conservation Strategy) would be increased by one (to account for the unanticipated addition of that individual, reinforcing that the augmentation is for genetic, not demographic purposes).

[6] Not to be confused with the legal definition of an "experimental population" in ESA 10(j).

The 2023 legislature identified additional staff capacity for bear captures and translocations for genetic exchange.

Orphaned cubs

FWP policy on orphaned grizzly bear cubs is provided in Appendix F, which is a part of the larger policy on accepting wildlife for rehabilitation at the MWRC. Although MWRC has accepted orphaned grizzly bear cubs in the past and may do so in future, placing these animals in appropriate captive facilities is difficult and time-consuming. The policy appended here clarifies field protocols as well as the rare circumstances that FWP anticipates accepting orphaned grizzly bear cubs to its captive facility under either Alternative.

Conflict management operational structure

FWP would continue supporting bear managers in or near Anaconda, Bozeman, Chouteau, Conrad, Hamilton, Kalispell, Libby, Missoula, and Red Lodge. Building on current structure, FWP would prioritize bear manager FTE where expanding population presents the need for conflict management and also opportunities for connectivity while maintaining efforts in the three Occupied cores. FWP's bear technician position and associated operations in Libby is funded by the Hecla Mining Company.

Prioritizing information, outreach, and communication

It seems clear that rural residents, recreationists, ranchers, farmers, and all others with the potential to interact with grizzly bears would benefit from more knowledge about bears and how to minimize adverse interactions with them. Thus, educational efforts will be an important component of FWP efforts moving forward. That said, it would be risky to assume that education is invariably successful in changing behaviors that lead to human–bear conflicts (Gore et al. 2008, Baruch-Mordo et al. 2011, Dietsch et al. 2017). Without well designed research to monitor actions (rather than merely attitudes) of the intended education recipients, we should not assume that education by itself will yield the desired results (Gore et al. 2006, Baruch-Mordo et al. 2009). Work with reducing black bear-human conflict has shown, however, that educational programs can augment the effectiveness of proactive enforcement (Baruch-Mordo et al. 2011) or direct provision of bear-proofing materials (Johnson et al. 2018).

Resources required

See an explanation of this issue in Part II, under the No Action Alternative under the same title name.

Hunting of grizzly bears: Values and beliefs

FWP acknowledges that, to some Montana citizens (as well as to many outside the state), any hunting of grizzly bears is offensive to their deeply held values. While rarely articulated clearly, FWP understands at least some of these values to hold that the grizzly bear is different from other species of wildlife in Montana (and different even from the closely related black bear) and should not be considered a game species (which are legally protected but subject to recreational hunting when specifically authorized by the Commission). For people holding these sets of values, details regarding the type of hunt considered, the number of animals killed, potential negative or positive effects on conservation prospects of grizzly bears, on the safety of people, and on security from property damage are unlikely to be important influences on their views toward future

FWP recommendations. These values are legitimate, need to be taken seriously, and will be part of any consideration of possible hunting in the future.

Sidebar 9. Would a grizzly bear hunt be a "trophy" hunt?

Montana statutes and rules do not define "trophy" hunting. Similarly, this document does not use the term. Section 87-2-701, MCA, however states that grizzly bear hunters must purchase a "trophy" license to possess and transport a harvested animal. The harvest is cited as an undefined trophy in the law, ostensibly to deter poaching and establish accurate harvest data. Because the grizzly bear is classified as a game animal, any hunter who harvests a grizzly bear would be prohibited from wasting edible meat.

For other Montana citizens (and others outside the state), a more nuanced description of various alternative ways hunting might take place and how FWP would view hunting if it occurred could inform their support or opposition. Still others support hunting grizzly bears unreservedly, such that a nuanced description of how it might take place would not be important. Some of these people would feel disenfranchised by a FWP that did not take advantage of a future legal structure that allowed for hunting, considering it to have become an agency they no longer recognize or feel speaks to them.

Results from a 2020 survey of Montanans regarding the topic of grizzly bear management in Montana (Nebitt et al. 2020) found a sizable majority of Montanans supported some form of potential grizzly bear hunting: 49 percent supported enough hunting to manage grizzly bear population size; 30 percent supported a very limited season that does not affect their population size; and, four percent supported as much grizzly bear hunting as possible. Seventeen percent responded that grizzly bears should never be hunted in Montana. A majority (61 percent) agreed or strongly agreed that people should have the opportunity to hunt grizzly bears as long as populations can withstand the pressure, whereas 24 percent disagreed or strongly disagreed with this notion. Views were more mixed for other questions related to hunting grizzly bears. When asked if hunting should be used as a tool to reduce conflict, 46 percent agreed or strongly agreed, and 36 percent disagreed or strongly disagreed. When asked if hunting would make grizzly bears more wary of humans, 39 percent agreed or strongly agreed, while 32 percent disagreed or strongly disagreed.

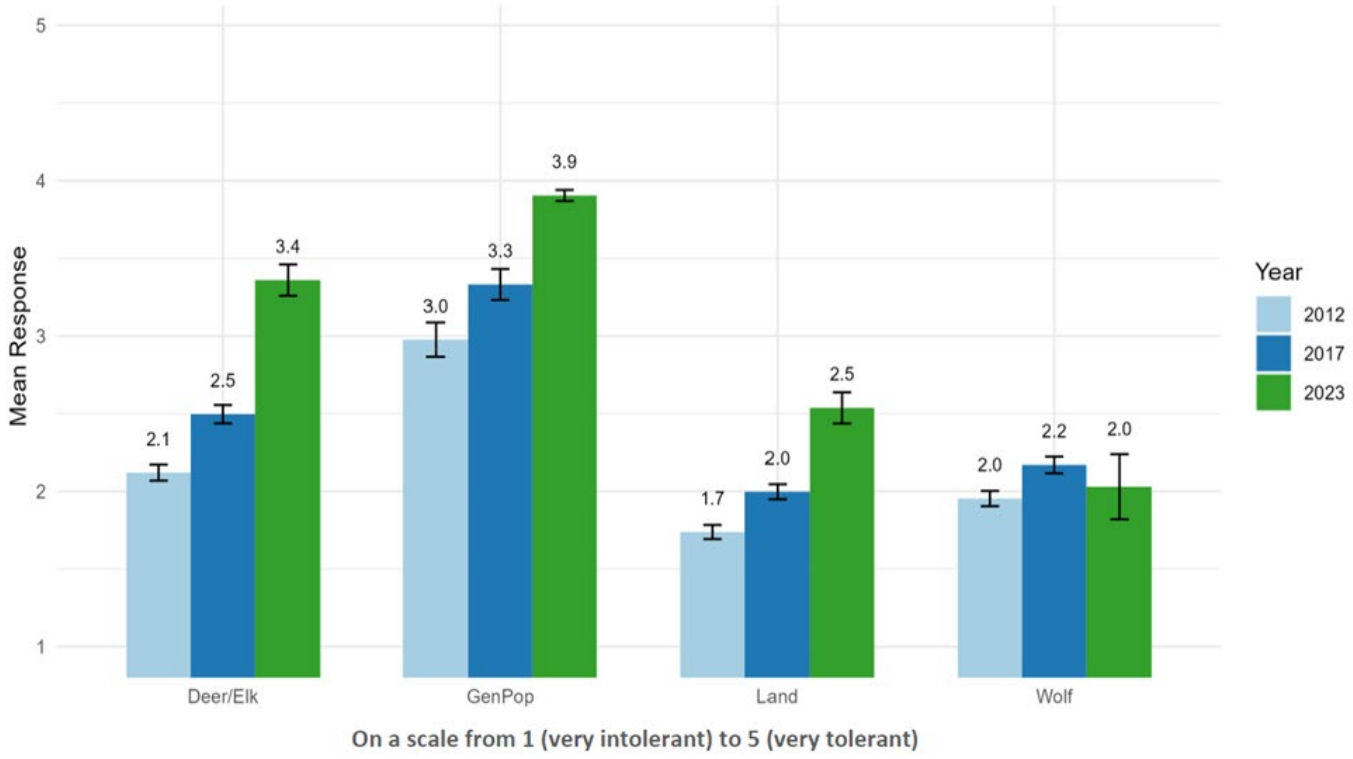
Previous FWP plans have indicated that grizzly bear hunting may promote acceptance and tolerance. This may still be true, but FWP has no expectation that enhanced acceptance or tolerance would occur among all segments of Montana's citizenry. Acceptance and tolerance are embedded in attitudes, and attitudes in turn are embedded in fundamental values and cultural identities. These change slowly, and typically not as a result of a single management decision or activity.

However, FWP does find evidence that providing a place for hunting within the overall management and conservation scheme may, for those whom hunting forms an important part of their identity, foster a sense that the agency is empathetic with those values (Manfredo et al. 2017). FWP believes this sense of inclusion, particularly among rural landowners who would be asked by Montanans generally to allow grizzly bears to travel through, and sometimes live on their lands, can serve to improve their cooperation with programs to reduce conflicts even if their attitudes toward grizzly bears have not changed. Reducing conflicts, in turn, benefits all Montanans for whom managing for an interconnected grizzly bear population is a value.

Some indirect evidence for this comes from Lewis et al (2012) in regards to wolves. They reported that tolerance for having wolves on Montana's landscape remained low as of 2012. Among a cross-section of Montana residents, 37% reported being "very intolerant" whereas 23% reported being "very tolerant". Percentages reporting being "very intolerant" increased to

45% among deer/elk license holder, 48% to wolf license holders, and 63% to rural landowners (defined as owning at least 160 acres). Notably however, Lewis et al. (2012) reported increased satisfaction (and decreased dis-satisfaction) among all 4 groups following the 2011 wolf hunt (although it is possible that these attitudes may have changed for other reasons). Dissatisfaction among Montanans generally decreased from 39% to 22%; among deer/elk license holder from 51% to 21%; among wolf license holders from 67% to 25%, and tellingly, among rural landowners from 64% to 34%. In addition to the wolf survey data from 2012, data from Metcalf et al. (2024) showed that intolerance with wolves being on the Montana landscape has decreased over time (Figure 23). These findings cannot tie hunting and trapping directly to increased tolerance but the activities are likely an important factor. A more recent perspective supporting the potential for harvests supporting tolerance for a species was provided by Richardson (2023). A variety of actions and activities may result in increased support depending on individual perceptions.

Figure 23. Wolf tolerance in Montana



Admittedly, the tolerance of wolves does not directly translate to the tolerance of grizzly bears under a hunting scenario. However, from the 2020 Survey of Montanans regarding the topic of grizzly bear management in Montana, we find generally positive attitudes towards grizzly bears (Costello et. al., 2020). That said, a sizable majority of Montanans support some form of potential grizzly bear hunting: 49 percent support enough hunting to manage grizzly bear population size; 30 percent support a very limited season that does not affect their population size; and, four percent support as much grizzly bear hunting as possible (Costello, 2020). Only seventeen percent responded that grizzly bears should never be hunted in Montana (Costello et. al., 2020). Residents who believed hunting should be used to manage conflict, were themselves hunters, had vicarious wildlife experience with property damage, believed grizzly populations were expanding, were older, or were more likely to believe populations were too high (Nesbitt et. al., 2023).

Thus, there is an argument to be made that a feeling of inclusion, control, engagement, and agency – which hunting may engender even if the vast majority of landowners never draw a permit or if hunting never occurs on or near their land -- is particularly important for landowners because they have outsized influence to affect grizzly bear conservation. Their cooperation in grizzly bear conflict prevention is critical. Grizzly bears obtaining human rewards on their land are much more likely to continue that behavior elsewhere, and repeat offenders almost always die years before they otherwise would. Thus, increasing the level of trust between landowners and an agency or organization working toward grizzly bear conservation carries much greater conservation impact than would a similarly scaled increase in trust between a randomly selected citizen and the same agency or organization.

Considering the values of those who prize hunting, and/or of rural landowners whose cooperation in reducing human–bear conflict is key to success (but impossible to mandate) does not mean that those values are the only ones considered by FWP. FWP expects that various aspects of its ultimate strategy will be supported more by some members of the public than others and has no illusions that any plan will unify the attitudes and values of all Montanans. The fundamental goals of the plan must be broadly acceptable to most Montanans, but it is unlikely every aspect will find favor among all Montana's citizens.

A potential grizzly bear hunt: functions, expectations, and regulations

Under any realistic scenario including a future hunting season, the following general principles would apply to FWP and any citizens affected by hunting: (i) The hunting program would be small in scope; (ii) The general approach of FWP toward grizzly bears would remain very similar to its current approach to the species. Grizzly bear hunting would be added to the scope of what FWP considers and does but would not dominate that scope. FWP anticipates that, as now, the overwhelming majority of attention and resources would be spent on conflict reduction and, under the Preferred Alternative, in furtherance the objectives of interconnected populations that are consistent with prioritizing human safety and minimizing disruptions to Montana citizens' ways of life and livelihood; (iii) If hunting occurred, it would be embedded within and consistent with FWP's overarching goal of maintaining thriving grizzly bear populations within their core areas, under the Preferred Alternative in encouraging connectivity among those areas where doing so is most likely to result in biological benefit and where bear-human conflicts can mostly likely be kept to manageable levels, and maintaining public support for both of those goals. Specific details to any hunting season will need approval by the Commission following required public process. As part of the season-setting process, FWP routinely conducts public scoping to gain insight into the public's concerns about any Montana hunting and trapping season. FWP uses these scoping comments, other communications, and survey and harvest data to craft proposals for season recommendations. Once proposals are presented to the Commission, the Commission may reject, modify, or approve the recommendations. Once approved, the final proposal becomes regulation.

History of grizzly bear hunting in Montana

Montana recognized grizzly bears as a game animal in 1923, initiating the regulation of harvest by requiring a hunting license to harvest a bear and by designating hunting seasons and units. Additional regulations were enacted over time (Table 7). Wildlife managers began estimating the total annual kill of grizzly bears (including hunting) in 1947. Assuming hunting

accounted for 60% of annual kill, the approximate numbers of bears harvested statewide by hunters during 1947 and 1966 ranged from to 6 to 36 and averaged 22 (Greer 1972). Until 1967, a general big game license allowed a hunter to harvest either a black bear or a grizzly bear.

In 1967, when grizzly bears were recognized under the Endangered Species Preservation Act, Montana introduced a special grizzly bear hunting license. A mandatory check was also established to monitor annual harvest more closely. During the years 1967–1974, hunters' annual harvest in the GYE was 0–9 bears with an average of 3, and in the NCDE was 9–28 bears with an average of 19 (Figures 24 and 25.

In 1975, when grizzly bears were listed as threatened under the Endangered Species Act (ESA), hunting seasons were closed outside of the NCDE. The NCDE hunt was permitted to continue as long as human-caused mortalities from all causes, including hunting, did not exceed a quota, which was set at 25 at that time.

In 1983, a subquota of 9 human-caused mortalities was established for females. In 1986, this subquota was reduced to 6 and the overall quota of human-caused mortalities was reduced to 21. Concurrently, costs of grizzly bear hunting licenses were increased, and more restrictions on the date of license purchase were enacted.

During the years 1975–1990, the number of grizzly bear licenses sold, and the number of grizzly bears harvested, gradually decreased (Figures 24 and 25), and 60% of bears harvested were males. Hunters' success rates (i.e., bears harvested per license issued) showed a range of 0–3.4%, and an average of 1.6%.

In 1991, a limited-entry spring grizzly bear hunt was implemented on the Rocky Mountain Front, designed to target conflict bears. This special hunt resulted in the harvest of 3 males with a hunter success rate of 5.9%. Responding to a lawsuit, a court injunction closed the fall hunting season in 1991. Subsequently, authority for Montana to establish a grizzly bear hunting season in the NCDE was removed by USFWS in a federal rule.

Table 7. Timeline of changes to grizzly bear hunting in Montana

- Items in regular type represent changes enacted by Montana law or by Commission regulation or rule.
- Items in bold type represent changes enacted by federal law or rule.

Year	Management event or regulation change
1923	Bears (grizzly and black) are declared game animals. Anyone with a general big game license may harvest one grizzly or black bear within defined seasons and areas. Spring grizzly bear hunting season is closed statewide.
1942	Grizzly bear hunting season is modified to coincide with fall big game hunting season.
1947	Harvest of cubs or females with cubs is prohibited. Managers begin estimating annual harvest number.
1948	Baiting of bears is prohibited.
1967	**Grizzly bear is listed as endangered under Endangered Species Preservation Act of 1967.** Managers begin maintaining grizzly bear mortality records in one central location. A requirement is established for a special grizzly bear hunting license, obtainable before or during the season; license fee is set at $1 for residents and $25 for non-residents. A requirement is established for hunters to purchase a $25 trophy license within 10 days of harvesting a grizzly bear. A harvest limit is established of 1 grizzly bear per license, per person, per year.
1969	Mandatory reporting of grizzly bear kills, with presentation of hide and head, is implemented.
1970	Last date of license purchase is set at September 15 (one day before first general big game hunting season).
1971	Grizzly bear license fee is raised to $5 for residents and $35 for non-residents; the $25 trophy license remains. Waiting period of 7 years established for next purchase of a grizzly bear license by successful grizzly bear hunters.
1972	Last date for grizzly bear license purchase is set at July 1. Baiting with livestock, using trapping devices, and pursuing with dogs are prohibited in the harvest of grizzly bears.

1975 **Grizzly bears are listed as threatened in the lower 48 states under Endangered Species Act (ESA).**
Grizzly bear hunting is closed in all areas except NCDE; in NCDE, 10 hunting districts and an annual quota of 25 human-caused grizzly bear deaths, including from hunting, are established.

1976 Grizzly bear hunting license fee is raised to $25 for residents and $125 for non-residents.
Regulation is enacted: hunting season closes within 48 hours of notice after the number of human-killed bears reaches 25.

1978 Last date of license purchase is set at June 15.

1980 Grizzly bear hunting license fee is raised to $150 for non-residents.

1982 Grizzly bear hunting license fee is raised to $175 for non-residents.
Last date of grizzly bear license purchase is set at August 31.

1983 Annual subquota is set at 9 human-caused deaths (including by hunting) of female grizzly bears in NCDE.

1984 Grizzly bear hunting license fee is raised to $50 for residents and $300 for non-residents.

1986 **USFWS special rule adjusts annual quotas related to grizzly bear hunting along Rocky Mountain Front. Quota for all human-caused grizzly bear deaths is adjusted to 21; subquota for NCDE females is adjusted to 6.**
Three bear management units are established in the NCDE, each with an additional female subquota.

1987 State law is passed, limiting harvest to one grizzly bear per person per lifetime.

1991 Limited-entry, spring (April 1– May 4) grizzly bear hunting season is implemented on the Rocky Mountain Front; the harvest limit is 3 grizzly bears total, after which the season closes. Fifty permits are issued (46 used by hunters) with approximately two-thirds of hunting effort occurring on private lands. Harvested are 3 males, aged 4, 5, and 21; the older two previously had been captured and marked, and had a history of human–bear conflicts. A few days before being harvested, the 21-year-old is believed to have depredated calves nearby.
Fall hunting season for grizzlies is canceled, due to federal court preliminary injunction on hunting them.

1992 Commission omits grizzly bear hunting season from biennial regulations for 1992–1993.
State's authority to establish grizzly bear hunting season in NCDE is removed by USFWS in federal rule.

Figure 24. Grizzly bears harvested in Montana.

Numbers are estimated for 1947–1966,and observed for 1967–1991.

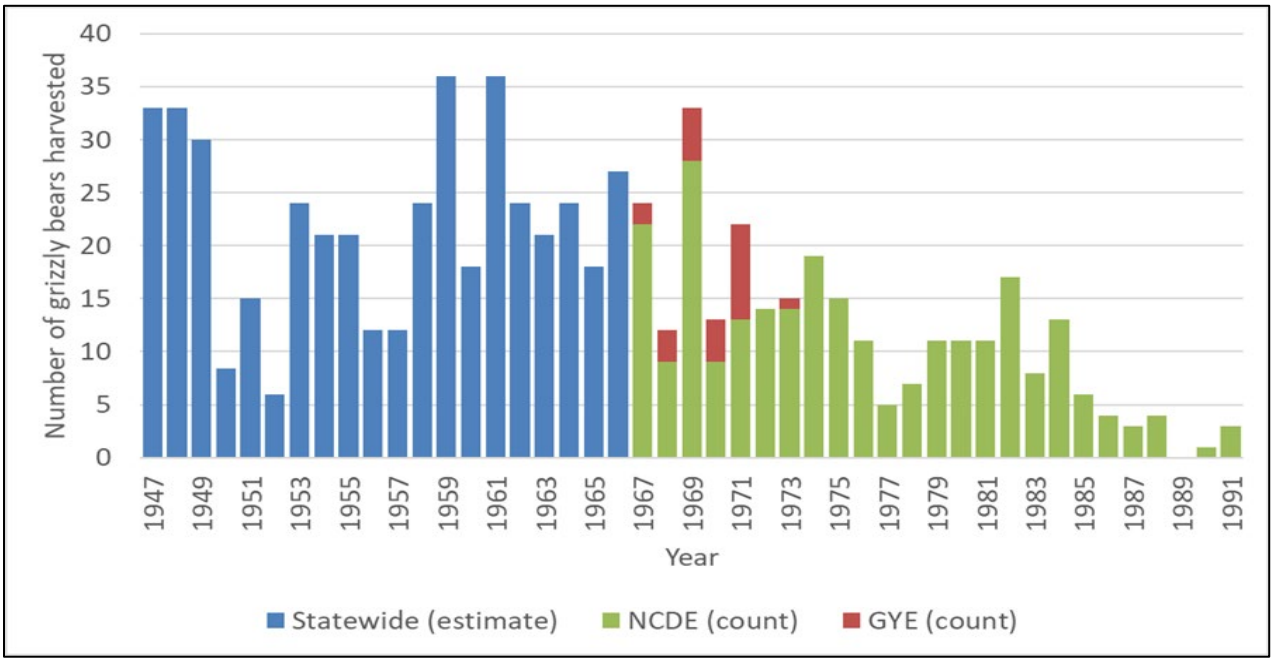
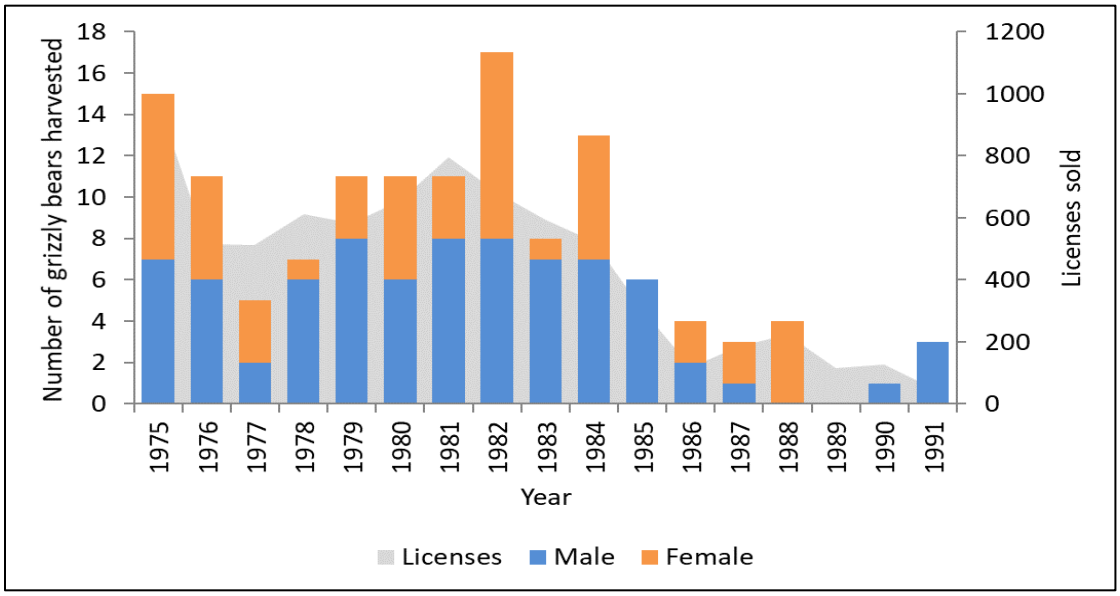


Figure 25. Observed numbers of grizzly bears harvested and licenses sold in Montana.

From 1975–1991.



The 2017 draft proposed hunting season

Any hunting of grizzly bears in Montana would occur under regulations adopted by the Commission through a public process. In 2017, as a requirement of delisting the GYE DPS, the USFWS required Montana, Wyoming, and Idaho to propose hunting regulations they could point to as adequate regulatory mechanisms to ensure that hunting would not jeopardize a (future) delisted population. Montana adopted regulations that provided a structure for a future hunting season and were viewed both by FWP and the Commission as conservative. Montana, Wyoming, and Idaho entered into an MOA (since updated, see Appendix H) whereby the three states agreed to annual maximum mortality limits applies within the GYE DMA based on the estimated population size and sex/age structure. These mortality limits would include all sources of mortality (including estimated unreported mortality) and would be applied separately to females and males that are independent of their mothers (i.e., over 2 years old). If, after all other sources of mortality were accounted for, there were bears that could be killed without exceeding these limits, they could be allocated among the states and available for hunting. This system would ensure that no one state could cause the mortality limit overall to be exceeded. In Montana, hunts could occur inside or outside of the DMA, but the applicable mortality limits were those within the DMA (that is, even hunts outside the DMA were subject to the mortality limits applying in the DMA, there were no permits allocated specifically for bears outside the DMA). The guiding principles of Montana's hunting season structure that was adopted by the Commission in May 2017 included:

- Maintain a viable grizzly bear population in the Montana portion of the GYE under state management;
- Increase broad public acceptance of sustainable harvest and hunter opportunity as an effective part of successful, long-term grizzly bear conservation; and
- Maintain positive and effective working relationships with stakeholders.

Upon FWP's recommendation, the Commission ultimately decided to delay the adoption of the proposed hunt, a decision that was rendered moot by litigation that suspended the USFWS delisting rule. See Sidebar 10 for FWP's 2017 hypothetical hunting structure for GYE, should delisting occur.

Sidebar 10. Hypothetical GYE hunting structure (FWP, 2017) in case of delisting. Note: This is the structure designed in 2017. It does not reflect improvements in population estimation techniques since that time.

Seasons and overall structure

- Spring (Mar. 15 – Apr. 20) and fall (Nov. 10 – Dec. 15), designed to limit exposure of female grizzly bears to hunting
- Mandatory hunter reporting within 12 hours of harvest
- Quotas by hunting district, with district to close upon 24-hour notice when quota reached
- When female quota is reached, all hunting districts close (regardless of whether the male subquota had been reached)
- Maximum harvest equal to the number of permits (i.e., hunter success assumed to be 100%)
- Mandatory orientation for all permit holders; taking a bear in a den prohibited
- Taking of females with young prohibited, as would be use of dogs, baits, or scents

Geographic limitations

- Seven possible hunting districts in the GYE, with two (the western-most and eastern-most) closed to harvest to minimize probability of removing a genetic migrant and facilitate genetic exchange between the NCDE and GYE.

Estimation of number of permits

1. Use estimate of population size for year t (using the revised methodology)
2. Calculate total sex-specific mortality limits (from GYE CS table) for population size in year t
3. Calculate "discretionary" mortality allowable in year (t+1) by subtracting the total estimated actual sex-specific mortality in year t (which includes an estimate of unknown deaths) from sex-specific mortality limits
4. Allocate 34% of resultant discretionary mortality to Montana (proportion of GYE DMA)
5. For example, in 2017, Chao2 estimated population size was 718. Montana would have proposed offering 6 permits, with subquotas of 5 males and 1 female (i.e., hunt would have closed within 24 hours of a female being harvested). The Chao2 method was revised since this process was developed in 2017, therefore, in the future, the population size for year t will be derived from the revised Chao2 estimate (less biased) and observed vital rates within an Integrated Population Model.

Would hunting grizzly bears reduce human–bear conflict?

The GBAC stated that while hunting can be a useful tool in managing grizzly bear populations, it will not replace the need for conflict prevention. As reflected in ARM 12.9.1401 from 1977, a reasonable thought is that hunting of grizzly bears could be useful in reducing bear-human conflicts, and that hunting could modify the behavior of bears so as to reduce their danger to humans. FWP is not aware of definitive research that could support or refute either assumption for grizzly bears in Montana. Hunting is not likely to be an effective tool for conflict prevention or reduction. Human-bear conflict was not correlated with prior harvest, providing no evidence that larger harvests reduced subsequent human-bear conflicts. Given that variation in natural foods, harvest is unlikely to prevent elevated levels of human-bear conflicts in years of food shortage unless it maintains bears at low densities – an objective that might conflict with maintaining viable populations and providing opportunities for sport harvest (Obbard et al. 2014). However, work on black bears in a number of North American jurisdictions can be instructive for considering the possible effects on conflict complaints generally. The below quote on the topic comes from a committee of the International Association for Bear Research and Management (IBA), in their March 2017 position paper entitled "Hunting as a tool in management of American black bear populations" (IBA 2017):

> The efficacy of hunting as a means of reducing nuisance complaints is subject to considerable scientific debate and is situation-dependent. Some studies have linked hunting and trapping to reduced human–wildlife conflict, suggesting that they reduce populations from biological carrying capacity, remove some problem individuals from the population before they would ordinarily die, and alter the behavior of wildlife (Conover 2001). In New Jersey, the occurrence of a hunting season was linked to decreases in human–bear conflicts the following year (Raithel et al. 2016), and in one Ontario study area, nuisance complaints

> increased substantially during the 5 years following the closure of a spring hunting season (Hamr et al. 2015), though neither study considered the likely confounding effects of local food conditions on complaint numbers. Conversely, studies in Wisconsin and across Ontario as a whole found no evidence that increasing harvest reduced subsequent human–bear conflict; instead, conflict levels were tied to underlying population growth in Wisconsin (Treves et al. 2010), and in Ontario, to annual variation in natural foods, with complaints increasing in years of poor food supply (Obbard et al. 2014).

The position paper concludes that "[w]here the primary management objective is to slow population growth or limit population size or distribution, then increasing human-caused mortality is the only option. A regulated and monitored hunt can do this effectively…Conversely, if the primary management goal is to reduce human–bear conflict, the crucial and, arguably, only efficient and long-term way to do so is through education, outreach, and implementation of practices and regulatory policies that remove bear attractants…."

The papers cited by IBA (2017) provide reason to doubt that hunting per se would reduce conflicts generally. Hunting itself is very unlikely to solve all bear/human conflicts and thus reduce the need for our active bear conflict reduction program. However, there are four aspects of the situation in Montana deserving consideration for the possibility that they could plausibly provide some reduction in bear/human conflicts. We note here that only the fourth of these has been supported by empirical data, so urge that these be viewed as hypotheses, to be examined later if hunting were to occur:

1) It is true that a dead bear cannot behave in any way once killed and that — not being herd animals — animals other than the one removed cannot "learn" from the death of the hunted animal. However, it is not necessarily the case that every instance of hunting results in the death of the targeted bear. Hunting may, in some cases, serve a similar function as does purposeful hazing, if the animal is pursued by humans but not killed and if the animal senses that it is being harassed. This would seem particularly true if shots are fired close enough to provide negative stimulus, but the animal not hit.

2) Although it is probably true that "conflict" animals per se would rarely if ever be specifically and deliberately targeted by hunters, it is nonetheless possible that subtle behavioral attributes with a genetic component may make some animals more vulnerable to hunters than others. We routinely accept this concept when hunting other animals (e.g., mule deer more vulnerable on a per capita basis to an "either deer species" hunt than white-tailed deer, due in part to their less wary nature). If some bears are genetically wired to be less wary than others – or have been taught by their mothers that the reward of being near people outweighs the risks – they may indeed be more vulnerable to hunting. Thus, it is conceivable that hunting bears that are exposed to human attractants could disproportionately remove some of those most apt to respond to those attractants.

3) If hunting removes primarily dominant males (as a guided hunt might do), this could reduce the imperative felt by females with cubs to get out of their way. If, as has been shown with some data in Scandinavia, males appropriate the most secure and best food patches, relegating females with cubs to refuges near people where adult males are less willing to venture, a reduction of dominant males could allow some of these females with cubs to spend longer in these secure areas.

4) Some hypothetical hunts could have the effect of reducing population density at a local geographic scale. Garshelis et al. (2020) have shown that among Minnesota black bears (often hunted over bait), population size – largely dictated by hunting pressure - added to the effects of annual variation in food abundance and efforts to secure attractants in explaining variation in conflict reports. Reductions in population size caused by hunting reduced conflicts; thus, on a local scale, it is plausible that this could occur with grizzly bears as well – although Garshelis et al. (2020) caution that this could be

difficult if attractants remain unsecured. These authors concluded that "A recommendation stemming from experiences in Minnesota is to mitigate local conflicts through targeted measures aimed at changing human behavior, reducing availability of attractants, and increasing tolerance of people, while at the same time managing and monitoring the population on a larger scale at a socially-acceptable level." (Garshelis et al. 2020: 16). Thus, although hunting itself would be unlikely to be sufficient to reduce conflicts to tolerable levels, it could be of minor assistance in that cause.

Hypothetical hunting structures approaches and their rationales

- **Issues and attributes common to all.**
  - Any such hunts would be structured so as to bias off-take in favor of males.
  - Under delisted status, any grizzly bear hunt would only be authorized by the Commission after thorough public process.
  - FWP does not envision offering hunts within the planning horizon in hunting units in, or near, the Cabinet-Yaak or Bitterroot grizzly bear areas.
  - FWP envisions recommending little or no hunting in connectivity areas if bear presence is unknown, density is believed to be very low, and evidence of desired connectivity is lacking.
  - FWP envisions that hunting may be used as a tool to limit grizzly bear population density in areas where potential for connectivity is low and potential for human-grizzly bear conflict is high.
  - Under the Preferred Alternative, hunts would be sustainable (i.e., not intended to reduce population abundance) where providing for connectivity between the current NCDE, GYE, CYE and/or BE populations is a high priority.
  - Grizzly bear hunts would be once-in-a-lifetime opportunities for successful applicants (87-2-702, MCA).
  - As with all hunts of animals classified as a game animal, no edible portion of the carcass could be left in the field or wasted (87-6-205(4), MCA).
  - Sale or purchase of the head, hide, or mounts of a grizzly bear legally taken by a hunter would be prohibited (87-6-206, MCA).
  - Any successful applicant for a grizzly bear hunting license would pay the applicable license fee; in addition, any successful hunter over 12-years of age would be required to purchase a trophy license within 10 days after the date of kill (87-2-701, MCA).
  - A mandatory orientation session would be required of all hunters licensed to kill grizzly bears.
- **Approach 1: No hunting.**

  Description:
  - No recreational hunting. Bears that die from the deliberate activities of humans would be those that required removed when conflicts could not be resolved by non-lethal means.

  Characteristics:
  - Although allowable by statute and regulation, no hunting season would be proposed by FWP or approved by the Commission.

Projected benefits:

- No additional mortality to any grizzly bear population over and above natural mortality, and mortality made necessary by management actions.

Projected challenges:

- Defending the lack of hunting to Legislators, Commission members, and/or members of the public who would expect it if delisted, given existing policies.

Projected downsides:

- Loss of opportunity to provide additional source of funding for bear management and conservation.
- Loss of a sense of involvement and engagement among landowners living near the bears subject to this kind of hunt. FWP anticipates that a sense of disengagement among landowners affected by grizzly bear presence ultimately makes communication and cooperation with FWP bear managers and NGO staff working to minimize human/bear conflicts more difficult and may make grizzly bear conservation more difficult in general.

- **Approach 2: Limited draw, sustainable off-take hunt.**

Description:

- A limited number of tags would be available via random lottery for licenses to take a single grizzly bear during short spring- and fall-seasons in specified areas where populations from the Greater Yellowstone cornerstone and/or the Northern Divide cornerstone (depending on listing status) have shown evidence of density-dependence. (This would be very similar to the (never-implemented) model used in 2017 for the GYE at the request of USFWS).

Characteristics:

- The number of permits would be limited to the maximum discretionary mortality allowable under a multi-agency conservation strategy.
- The maximum discretionary mortality under multi-agency conservation strategies would be determined after accounting for all known and estimated mortality from other sources and based on a population estimate considered to be conservative. Thus, best available models project that this hunt would not reduce the underlying growth rate of the population affected.
- For any hunt in or near the GYE, the number of permits would be limited by the 3-state MOA allocating discretionary mortality among Wyoming, Idaho, and Montana.
- Hunting units would not be geographically confined to a DMA, but any animals take would count against the maximum prescribed within that DMA.
- Hunts would end within any given hunt unit when the limit for females harvested in that unit is reached. For hunts involving multiple hunting units, the entire hunt (i.e., among all hunt units) would end when the limit for females harvested is reached in any hunt unit. Hunters would be required to report harvest within 12-hours and closures would occur upon 24-hour notice when a limit is reached.
- Season dates would be designed to limit female mortality by targeting periods when most females are denning and primarily males are out of dens.
- Taking of any bear in a group would be prohibited.

- Taking of a bear in a den would be prohibited.

Projected benefits:

- The primary anticipated benefit would be an enhanced sense of involvement and engagement among landowners living near the bears subject to this kind of hunt. FWP anticipates that an enhanced sense of landowner engagement that would accompany this type of hunting would help foster communication and cooperation with FWP bear managers and NGO staff working to minimize human/bear conflicts.
- A secondary anticipated benefit would be the generation of revenue from the sale of a limited number of licenses and potentially from non-refundable application fees; these revenues would be ear-marked for supporting regionally placed grizzly bear managers.
- A tertiary anticipated benefit would be providing a modest amount of hunting opportunity for those interested in legally taking a grizzly bear.

Projected challenges:

- Complex rule-structure.
- The need to adjust allowable mortality and, in the case of the GYE, coordinate with 2 other states annually.
- Workload involved with FWP staff checking harvested bears, and publicizing hunting season closures (if needed) rapidly.

Projected downsides:

- Frustration and disagreement from those opposed to such a hunt.
- The potential that a harvested animal might have been one that would have contributed to connectivity later had it lived longer. (FWP believes this probability is small because of the geographic restrictions in this type of hunt, as well as the limited number of animals hunted).
- The potential that the social benefits anticipated above (i.e., fostering a sense of engagement and cooperation among landowners and others who feel burdened by co-existing with grizzly bears) would not be realized, in part because of the modest number of bears removed.

- **Approach 3: Auction hunt.**

Description:

- Either in conjunction with hunts described above or as a stand-alone program, a single statewide permit would be offered at auction (as authorized under 87-2-814, MCA), with the highest bidder obtaining authorization to take a single grizzly bear from within a number of potential locations. It is likely, albeit not mandated, that the permittee would prioritize taking a large male bear and would hire an outfitter/guide to assist. The auction could either be conducted directly by FWP or outsourced to a qualified organization which would be allowed to retain up to 10% for administrative costs.

Characteristics:

- One grizzly bear, statewide, annually.
- Hunting units would not be geographically confined to a DMA, but any animals taken would count against the maximum prescribed within that DMA. Hunters would be required to report harvest within twelve hours. If

occurring in conjunction with a hunt under Approach 2 (as described above), the limit in would be reduced by 1 to account for this mortality.

- Subject to the geographic constraints above, hunting units available to the permittee would allow for considerable choice (but not include areas within, or near, the CYE or BE).
- Season dates would be designed to limit female mortality by targeting periods when most females are denning and primarily males are out of dens.
- Taking of any bear in a group would be prohibited.
- Taking of a bear in a den would be prohibited.

Projected benefits:

- The primary anticipated benefit would be the generation of revenue from the sale of a single, high-priced permit; these revenues would be ear-marked for supporting regionally placed grizzly bear managers.
- A secondary anticipated benefit would be providing a very small amount of hunting opportunity for those interested in legally taking a grizzly bear and willing to spend a great deal of money for this rare opportunity.

Projected challenges:

- FWP workload associated with administering the auction (or managing the contract of an outside organization if outsourced).
- FWP workload associated with staff checking harvested bears, and publicizing hunting season closures (if needed) rapidly.

Projected downsides:

- Many people object to a hunt that is available only to the highest bidder, a person typically with financial means to bid well above what most can afford. This type of hunt is likely to be considered by most of the public as a "trophy hunt," which are held in lower regard by many members of the public than hunts available to those of lesser financial means.

- **Approach 4: Population growth reduction hunt.**

Description:

- Either in conjunction with hunts described above or as a stand-alone program, a limited number of tags would be available via random lottery for licenses to take a single grizzly bear during short spring- and fall-seasons in specified areas where the geographic distribution of bears has expanded into areas that are outside of DMAs, and that provide no connectivity with other population cores. Permits would be limited numerically to produce, at maximum, a slow and modest reduction in the underlying rate of growth but would be constrained by the maximum allowable mortality limits codified in any multi-agency conservation plans.

Characteristics:

- These hunts would occur where reducing the number of bears, short-term, and the growth-rate longer-term of the bear population, are considered social benefits.
- Hunt permits would be valid only on private land and require advance permission of the landowner.
- Hunting would not occur where connectivity between population cores can occur.
- Taking of any bear in a group would be prohibited.

- Taking of a bear in a den would be prohibited.

Projected benefits:

- The primary anticipated benefit would be an enhanced sense of involvement and engagement among landowners living near the bears subject to this kind of hunt. FWP anticipates that an enhanced sense of landowner engagement that would accompany this type of hunting would help foster communication and cooperation with FWP bear managers and NGO staff working to minimize human/bear conflicts. FWP anticipates that increased communication and cooperation, in turn, would benefit grizzly bear conservation in areas where connectivity and population growth is an articulated objective.
- A secondary anticipated benefit would be enhanced acceptance among local residents of remaining bears because of the removal of some bears from these landscapes (i.e., areas where bears are not expected to contribute measurably to connectivity or to establish new populations). Bear-human conflicts would be anticipated to decline slightly simply from fewer bears being on the landscape.
- A tertiary anticipated benefit would be providing a modest amount of hunting opportunity for those interested in legally taking a grizzly bear.
- An additional anticipated benefit would be the generation of revenue from the sale of a limited number of licenses and potentially from non-refundable application fees; these revenues would be ear-marked for supporting regionally placed grizzly bear managers.
- Finally, while not identified as an objective, it is possible that because of the geographic restrictions of this hunt, animals harvested would be those likely to become involved in conflict situations, thus further reducing bear-human conflict.

Projected challenges:

- Delineation of hunting areas that meet the criteria.

Projected downsides:

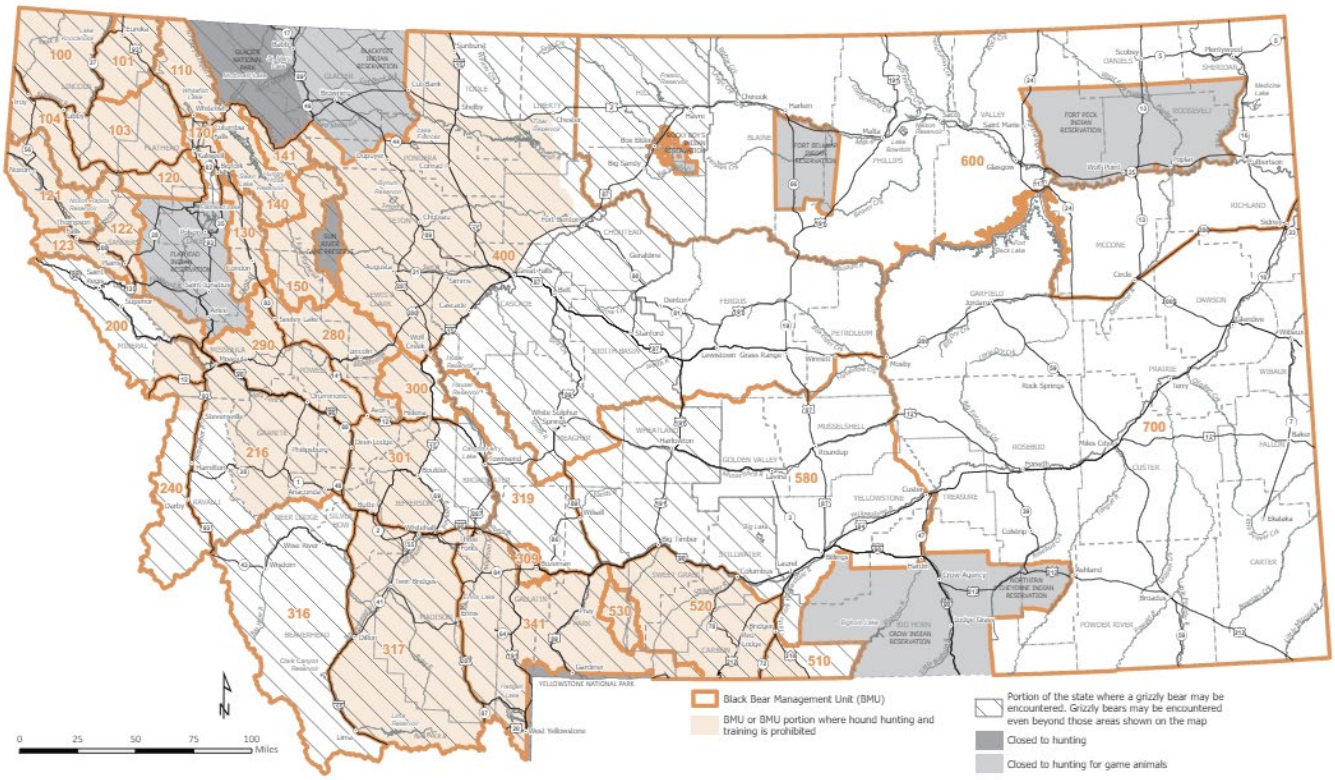
- The potential that the social benefits anticipated above (i.e., fostering a sense of involvement and cooperation among local residents who feel burdened by co-existing with grizzly bears) would not be realized, in part because of the modest number of bears removed (i.e., bears would remain on the landscape, and bear-human conflicts would likely continue, albeit perhaps both at lower levels than were this type of hunt not implemented).

Recreational activities in potentially occupied grizzly bear habitat

Black bear hunting with hounds

The 2021 Montana legislature passed a law allowing licensed hunters to chase black bears with hounds during the spring hound season in any valid hunting district or management unit during the period that unit is open to hound hunting or chasing. Hound hunting and training is prohibited in occupied grizzly bear habitat in the areas shown in Figure 26. The Commission has the authority to close areas to avoid conflicts between hunters and grizzly bears.

Figure 26. FWP Bear Management Units.



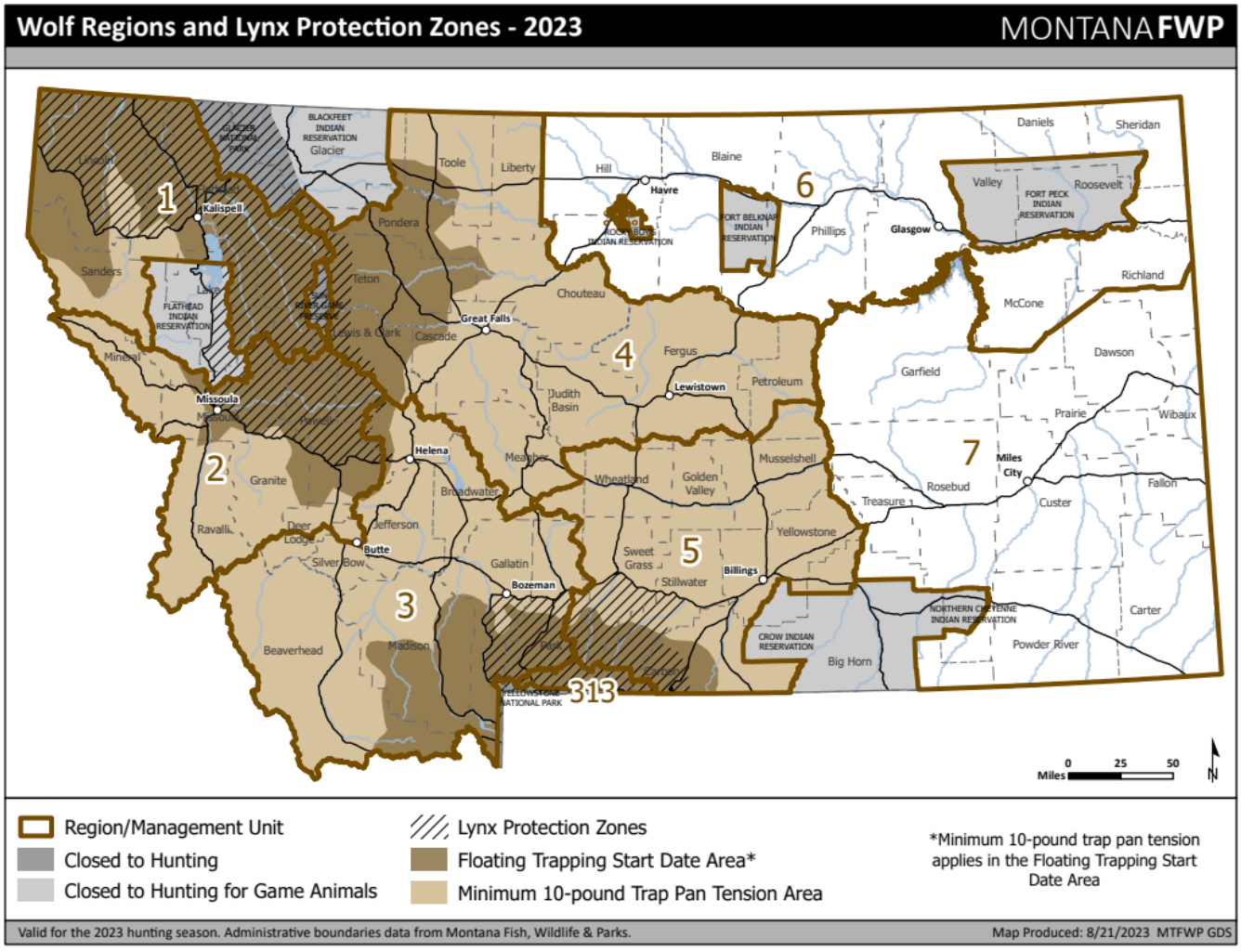
Wolf trapping

Wolf trapping with footholds became legal again in Montana in 2012. For many years, trapping was limited to footholds but in 2021 the Commission approved the use of snares in addition to footholds. Trapping regulations include a floating start date for wolf trapping in occupied grizzly bear habitat. The intent of the floating start date is to avoid conflict with grizzly bears that have yet to den for the winter. FWP makes a decision opening trapping in occupied bear habitat each Monday in December with input from field staff on bear activity. The Commission can adjust seasons annually, regionally, and on short notice to address harvest rate and population trajectory or concerns to species like lynx or grizzly bears. As a result, wolf regulations should not impact other federally listed species or the ability to delist or keep delisted those species.

Trappers are urged to exercise caution when out in the field throughout the trapping season as bears can be active at any time to include grizzly bears that leave dens at some point during winter. Trappers are encouraged to avoid trapping in areas where grizzly sign is detected.

It is in the best interest of the department and within statutory direction to protect and conserve species to limit human-grizzly bear conflicts and incidental take resultant from activities such as black bear hunting with dogs and wolf trapping.

Figure 27. FWP Wolf Regions.



Part IV: Supplementary Information

Summary of science used in this document

This section covers references on science used by FWP to develop this document, organized by relevant topic with brief notes about the main takeaway.

Grizzly bear biology

FWP generally has depended on the following sources for basic biological information on grizzly bear biology in North America: Pasitschniak-Arts (1993), Schwartz et al. (2003) and Garshelis (2009). With specific reference to denning, FWP has consulted Haroldson et al. (2002), Graham and Stenhouse (2014), Krofel et al. (2016), Pigeon et al. (2016b), and Johnson et al. (2017).

Augmentation

Servheen et al. (1987) provided an early discussion paper of how augmentation into the Cabinet-Yaak area might occur. Maguire and Servheen (1992) discussed the decision analysis used to decide on the age/sex class of bears to use in the pilot augmentation project and estimated the probabilities that augmented bears would remain in the target area, as well as that they would be involved in subsequent human–bear conflicts. Servheen et al. (1995) reported on early efforts to augment four bears into the CYE during 1990-92. They used the word "transplant," but we prefer "augmentation." Kasworm et al. (1998) updated this report. Proctor et al. (2004) used simulations to show that augmenting the CYE population was more effective than other alternatives in reducing extinction probability in the short-term. Kasworm et al. (2007) used genetic evidence to show that three of the four grizzly bears augmented in the early 1990s had remained resident for at least a year and that at least one had successfully reproduced. Kendall et al. (2015) concluded, based on a large-scale mark-recapture experiment depending on genetic signatures for the marks, that augmentation had succeeded in preventing the CYE population from becoming functionally extirpated.

Density dependence

Our general understanding of population regulation in grizzly bears was informed by Brockman et al. (2020), Keay et al. (2018), McLellan (1994, 2015), Miller et al. (2003), and Schwartz et al. (2006a) (Gardner et al, 2014).

Genetics, minimum population size, conservation biology

For background on conservation genetics as it relates to grizzly bear conservation and management generally, FWP has referred to Wright (1931), Franklin (1980), Frankham et al. (2013), Jameison and Allendorf (2012, 2013), Mills and Allendorf (1996), and Wang (2004). On the genetics effects of small and isolated populations for grizzly bears specifically in the Northern Rockies, FWP has referred to Harris and Allendorf (1989), Miller and Waits (2003), Haroldson et al. (2010), Kamath et al. (2015), Kendall et al. (2009), Kasworm et al., 2007, Laikre et al. (1996), Kendall et al. (2015), Proctor et al. (2004), and Proctor et al. (2012).

Infanticide

It has long been known that grizzly bears sometimes kill each other, and that cubs are the most frequent victims of such intraspecific killing (Craighead et al. 1976, Mattson et al. 1992, Olson 1993, Mörner et al. 2005). Adult males are the most frequent perpetrators, but other sex/age classes of bears, including adult females, are known to occasionally kill cubs (Hessing and Aumiller 1994, McLellan 1994.)

Based on observations of spatial distributions of females and males in two disparate study areas, Wielgus and Bunnell (1994) suggested that adult females avoided adult males (in one but not the other study area) in order to reduce the probability that their cubs would be subjected to intraspecific predation. Because grizzly bear females are induced ovulators, Wielgus and Bunnell (1995) suggested that sexually selected infanticide (SSI)—in which a male enhances his reproductive success by killing cubs and mating with the mother who shortly after comes into estrus—might operate in bears and that the avoidance documented was a counterstrategy by females.

Swenson et al. (1997b) found evidence consistent with the hypothesis that hunting had affected the social structure of bears in Sweden in a way that exacerbated SSI and lowered the population's rate of increase from what it would have been without infanticide. Following on this, Wielgus and Bunnell (2000) added this element to their earlier interpretation of their data. A number of subsequent studies from Europe supported some, albeit not all, of the original implications of Swenson et al.'s (1997b) work (Swenson et al. 2001a,b Dahle and Swenson 2003; Bellemain et al. 2006a,b; Zedrosser et al. 2009; Steyaert et al. 2013; Gosselin et al. 2015).

FWP finds the most well researched, thorough, and geographically applicable reviews of SSI to be that of Miller et al. (2003) and McLellan (2005). In a review of four cub survival and litter size data Alaskan populations, Miller et al. (2003) found no evidence consistent with the expectations had SSI been common. Instead, he found that litter sizes and cub survival were lower in national parks, where densities were probably close to carrying capacity, than in nearby, similar hunted areas where densities had been lowered by hunting. In his study area, where one might expect to find the kind of hunting-related effects of SSI postulated by Wielgus and Bunnell (1995) and Swenson et al (1997b), McClellan (2005) found no evidence consistent with expectations of the hypothesis. Additional data and analyses in the same study area later led to a similar conclusion (McLellan 2015).

McLellan (2005) also provided a useful simulation model that further explored expectations under explicitly articulated versions of the SSI hypothesis for bears, finding that it should typically be rare, and when present, the most likely perpetrators would be older rather than younger males. Finally, McLellan (2005) pointed out some particularities of the study area in which Wielgus and Bunnell (1995) claimed to have found their counterstrategy, but also pointed out some design and analysis flaws from their study that left it open to alternative explanations.

Grizzly bears and people

In addition to the sources cited elsewhere, FWP has referenced the following:

- For grizzly-bear livestock conflicts, Anderson et al. 2002.
- For details on compensation programs (particularly for lost livestock), Morehouse et al. 2018, Harris 2020.
- For conflicts in domestic settings (and reasons grizzly bears might be attracted to such settings), Elfström et al. 2013, 2014a,b; Fernández-Gill et al. 2016; Gunther et al. 2004, Howe et al. 2010, and Morehouse 2016a,b.

Relocation

Brannon (1987) provided an early report on success of relocations of GYE grizzly bears involved in conflict (the author used the term translocation, but we replace it with relocation for consistency). He found that between 1968 and 1984, 57% of individual moved were not later involved in human–bear conflicts and that 41% did not return to their capture site (77% of those moved more than 75 km). Riley et al. (1994) defined success of relocations of Northwestern Montana bears slightly differently: no resumption of conflict activities within 2 years, and mortality only from legal hunting or natural causes. Under this definition, success rate for bears over 1.5 years old was 44% for 1st-time relocations and 15% for bears moved more than once. Females were twice as likely than males to be successfully relocated, although no statistical difference between sexes was observed for animals originating east of the mountains where livestock depredation predominated as the conflict cause. Campbell (1999) reported that 6 of 13 grizzly bears relocated from the Cooper River Delta in Alaska whose movements could be adequately monitored returned to their original home range compared with 3 that did not.

Linnell et al. (1997) reviewed relocations of large carnivores worldwide, concluding that relocated animals typically roam widely after release and are prone to the same types of conflict that justified the initial capture and relocation. Finally, Milligan et al. (2018) evaluated 110 relocations of grizzly bears in Alberta, characterizing 33 of these as "successes" (defined as the bear surviving at least one year with no evidence of homing and not requiring additional management action). Increasing success in relocation was associated with implementation earlier during the non-denning season than later, and the release location having a low mortality risk (fewer roads, more water bodies). Bears released further from their release site were less likely to exhibit homing behavior than those released closer, but also had home ranges over three times as large for the first year following release.

Population status and potential for each population core

Bitterroot area

For insight into the potential for the Bitterroot area to support grizzly bears long-term, FWP used Boyce and Waller (2003) as well as the more general assessment of Mowat et al. (2013). For additional insight into attitudes toward grizzly bears and their possible recovery in the Bitterroot area, we referenced the qualitative study conducted by Velado (2005). Boyce et al. (2002) modeled metapopulation dynamics with and without the addition of a population in the Bitterroots. For more recent status of grizzly bears in the Bitterroot area, we used USFWS (2020).

That the BE retains appropriate habitat for grizzly bears is supported by the work of Merrill et al. (1999); Boyce and Waller (2003) used habitat and population size information from earlier studies of grizzly bears in the Swan Mountains and Yellowstone to estimate that the BE might ultimately support approximately 321 grizzly bears.

Cabinet-Yaak area

For context and background on grizzly bear conservation efforts in the Cabinet-Yaak area, we used Kasworm et al. (1998). For more recent information on status, trends, and prospects, we relied on Kasworm et al. (2019, 2020), Kendall et al. 2015), Proctor et al. (2018), and USFWS (2020). On augmenting bears to the area's population, we used Maguire and

Servheen (1992), Servheen et al. (1987, 1995), and Kasworm et al. (2007). For recent management efforts, we used Annis (2017, 2018), Annis and Trimbo (2019).

Northern Continental Divide area

Principle references informing FWP's understanding of the status of grizzly bears in the Northern Continental Divide area comes from Kendall et al. (2009, 2019), Mace et al. (2012), Costello et al. (2016), Mikle et al. (2016), Costello and Roberts (2019, 2020), and USFWS (2020). We referenced Teisberg et al. (in review) for information on body condition of grizzly bears in this area.

Greater Yellowstone area

FWP has generally depended on annual reports produced by the IGBST for its understanding of the status and trend of grizzly bears in the Greater Yellowstone area. Other important sources on which we base our understanding of the status of grizzly bears in the Greater Yellowstone area include Miller and Waits (2003), Schwartz et al. (2006a), Harris et al. (2007), Cherry et al. (2007), Schwartz et al. (2006a,b, 2008, 2010, 2012), Haroldson et al. (2010), Fortin et al. (2013), Van Manen et al. (2014, 2016, 2020, 2021), Costello et al. (2014), Bjornlie et al. (2014a,b), Kamath et al. (2015), Wells et al. (2019), and IGBST (2006, 2012, 2013, 2021). The USFWS species status review (USFWS 2020) provides a useful summary.

Critiques of science used

FWP is aware of, and has thoroughly considered, critiques of science produced by the IGBST that have been published online or in various non–peer-reviewed venues. Here, we briefly explain our rationale for accepting the quantitative analyses conducted by IGBST and thus IGBST's interpretations.

- **Overview: Areas of concurrence and differences of interpretation re: Yellowstone grizzly bears.**

Issue 1. Critics and IGBST agree that from the 1980s until about 2001, grizzly bear abundance in the Yellowstone area increased at a modest pace and more slowly since then. They disagree about the magnitude of the increase.

Issue 2. Critics and IGBST disagree about how many bears most likely have been present in the past decade or so.

Issue 3. IGBST has concluded that mortalities of grizzly bears (including all documented and estimates mortalities never detected) have remained at levels consistent with a stable population; critics have claimed that mortalities have increased, possibly to the point of causing a population decline.

Issue 4. Critics and IGBST concur that all available approaches to estimating abundance and trend of grizzly bears are imperfect. They disagree regarding the most likely consequences of these imperfections.

Issue 5. Critics and IGBST concur that grizzly bear spatial distribution has increased considerably and has continued to do so at least through 2018. They disagree about the causes and implications of the increase.

Issue 6. Critics and IGBST concur that important dietary items for grizzly bears (notably whitebark pine and cut-throat trout) have declined in abundance, as well as that these declines have made life more challenging for grizzly bears. They disagree about evidence for population level consequences of these declines.

Issue 7. Critics and IGBST concur that increasing human population and development poses challenges for continued grizzly bear conservation, and that reducing human–bear conflicts as much as possible is the highest priority.

- **Detailed explanations.**

Issue 1: Trend.

The IGBST has used data from four independent sources to estimate the trend of GYE grizzly bears since 1983 (IGBST 2006, 2012, 2021): 1) asymptotic growth rates (i.e., λ), estimated from multi-year estimates of survival and fecundity rates (Harris et al. 2006, Harris 2007), 2) tallies of unique females with cubs observed within the GYE, filtered to reduce to inconsequential the probability of incorrectly considering as separate animals multiple observations of the same one (Knight et al. 1995) and expanded to estimate the number of undetected females with cubs (via Chao et al., IGBST 2021), 3) mark-resight estimates using data from fixed-wing aerial surveys of marked and unmarked females with cubs (starting in 1998), and 4) a partial reconstruction minimum number of bears known alive at various years in the past (which is unavoidably characterized by a long time-lag as many animals are only enumerated and added to estimates of presence in years past when they die and their carcasses become available for inspection).

FWP is aware of only a single criticism of the first method. Doak and Cutler (2014) argued that Harris et al. (2007) over-estimated asymptotic population trajectories by ignoring reproductive senescence among older-aged females. However, Harris et al. (2006) had earlier showed that incorporating reproductive senescence as estimated by Schwartz et al. (2003) had negligible influence on estimated trends using this approach.

More common have been criticisms that numbers of unique females with cubs generated by the Knight et al. rule set are sensitive to the observer effort and because observer effort has generally increased through time, that apparent increases are spurious. However, while it's true that very low levels of effort would return a lower number of females-with-cubs than were actually present, it is not necessarily the case that observation effort past a certain level would continue to return even more females-with-cubs, both because the Knight et al. rule precludes increases without limit, and because the Chao estimator explicitly handles the condition under which all animals are observed multiple times. Figure 4 in Van Manen et al. (2014) shows that grizzly bear seen/hour during flights went up and hours flown actually declined somewhat from 1997 to 2012 – so at best, the relationship between effort and total number of sightings is complex, not necessarily (certainly not entirely) controlled by effort. Van Manen et al. (2014) also presented evidence that although the number of bears captured increased during 1998-2012, the proportion representing bears previously captured did not change during the same period, a pattern consistent with an increasing population during this time period. More recently, improvements to the original Knight et al. (1995) ruleset have resulted in estimates of population trend largely similar to those in use in recent years (IGBST 2021).

The refined Chao2 (IGBST 2021) is a component of the integrated population model (IPM) and is the best available science for estimating the GYE population. An IPM mathematically integrates annual count data with a traditional population projection model that estimates the change in population size from one year to the next using sex- and age-specific survival and reproductive rates. With adoption of the IPM, the IGBST has recalibrated prior year population estimates so they are comparable over time, and vital rates and demographics for the GYE population may now be reviewed annually so that managers are able to make appropriate adjustments to mortality rates. The newly adopted IPM will better estimate trends in the foreseeable future.

Issue 2: Abundance.

Acknowledging that even the best conceivable approach to estimating the abundance of grizzly bears in the GYE would be subject to some uncertainty, we find the estimates produced by IGBST (2021) to be well grounded in empirical data

and reasonable models, thoroughly considered and vetted, and in any case, the best available. IGBST (2021) estimated that in 2019, total abundance within the DMA was over 1,000 bears. Using the improved approach outlined in IGBST (2021), the study team reported an abundance estimate in 2022 of 965 bears (95% confidence interval 819 – 1,121). With the adoption of the IPM, abundance estimates will be more precisely and accurately estimated in the foreseeable future.

Issue 3: Trends in mortalities.

IGBST has reported that documented and estimated mortalities (including, but not limited to, radio-marked bears) has been lower than estimated 'limits' for all years since monitoring began. Critics contend that mortalities have increased markedly in recent years and infer that the population could be in decline as a result. FWP is unable to confirm some of the numbers used in reports that take issue with the IGBST results. FWP's analysis shows that the number of "TRU" (total reported and unreported, i.e., an estimate of mortalities taking into account those never documented) deaths of male grizzly bears during the 19-year period 2002-2020 increased (at a rate of approximately 1.13 male bears/year, $z = 5.18$, $P < 0.01$), as did the number of mortalities as a proportion of estimates of adult male abundance (at a rate of approximately 0.004 mortality rate/year; $z = 3.76$, $P < 0.01$). However, FWP's analysis shows that the number of "TRU" mortalities of females has shown no significant change during the 2002-2020 period ($z = 0.77$, $P = 0.44$). Thus, it is not logically inconsistent for mortalities aggregated among both genders to have increased, while density of females has either not changed or increased. It is also consistent with IGBST's conclusion that male bears have increasingly occupied areas with greater risk while population trajectory (controlled by the female segment of the population) has increased slowly or remained approximately stable. Critics claim the number of mortalities have increased, possibly to the point of population decline. The IGBST does not dispute that the number of mortalities has increased over time but attribute it to increasing population size. Their vital rate monitoring has shown that survival rates of independent bears have remained stable over time.

Issue 4: Uncertainty in trends and abundance estimates.

FWP understands, as IGBST has acknowledged, that the Knight-Chao estimator is imperfect. In particular, because of the limitations of the original Knight et al. (1995) rule set to differentiate individual females (Schwartz et al. 2008), it becomes increasingly conservative as the number of true females increases. Past some density of females, this index would be expected to remain flat even if true density continued to increase. However, most of these issues were recently resolved by IGBST (2021). Likewise, the IGBST has provided additional analyses leading to its conclusion that the preponderance of evidence supports the conclusion that Yellowstone area bears increased relatively rapidly during 1983-2002, more slowly during 2002-2014 and very slowly if at all since 2014. There is no evidence of a population decline since 1983. With the adoption of the IPM, uncertainty in trends and abundance estimates will be better accounted for.

Issue 5: Increase in minimum area occupied.

There appears to be consensus among IGBST and some critics that the minimum area of grizzly bear occupancy in the GYE area has increased considerably since 1980. The method IGBST has used to quantify this was reported by Bjornlie et al. (2014a) and interprets this expansion as resulting from bears being near, or at carrying capacity within the inner portion of the area of occupancy (not necessarily in all portions of it), noting that males are disproportionately represented among the pioneering bears. Critics make two points about this to counter this assessment: a) the rate of occupancy expansion has exceeded estimates that IGBST has made of the rate of increase in abundance, and b) that density overall must have

declined, not increased, because relatively constant trend indices over the period of geographic expansion suggests the same number of bears occupied an increasing area.

a) Implicit in the first theme of criticism is that the rates of increase in abundance and occupied area should bear an approximately 1:1 relationship to one another. FWP knows of no accepted biological theory dictating that rates of increase in abundance and areal extent of a free-ranging wildlife population must be similar. That said, if one had to choose a simple mathematical expectation for the relationship of abundance (λ) to expansion (A), it would more likely be $A = \lambda 2$ than to be $A = \lambda$. This is because if appropriate habitat surrounds the core of an expanding population, animal home ranges would gradually build on each other in two dimensions (longitude and latitude) rather than the single dimension available to an increase in numbers. FWP would not contend that a simplistic quadratic relationship between abundance and area is necessarily correct or empirically supported for GYE grizzly bears but offers it as context within which to interpret the discrepancy in the two rates of increase.

Additionally, there are biological reasons to expect grizzly bears of both sexes to begin exploring new habitats (and, by such exploration, increase estimates of the area occupied by grizzly bears), particularly when situated at the frontier of the existing geographic distribution (e.g., Swenson et al. 1997a, Kojola and Laitala (2000), Jerina and Adamiĉ (2008). Animals who can find good habitat not already occupied by conspecifics can enjoy a fitness advantage (i.e., better survival and reproduction) over those who stay put.

b) Van Manen et al. (2016) considered the grizzly bear density had approached or reached its capacity within the central portions of the study area (with its outer-most boundary approximated by the DMA) but did not necessarily imply that density was similarly high along the expanding front of grizzly bear distribution.

Issue 6: Food declines vs. density.

FWP is unaware of disagreement in the scientific literature that important dietary items for grizzly bears (notably whitebark pine and cut-throat trout) have declined in abundance. A reasonable hypothesis to examine (and one that some critics have favored) is that these declines have contributed to the reduction in reproductive rate and juvenile survival that resulted in reduction of population growth from the roughly 4–7% estimated during 1983–2001 (Harris et al. 2006, Harris 2007), to the roughly 0–2% estimated during 2002–2012 (Van Manen et al. 2016). Another reasonable hypothesis is that these declines in reproductive rates and juvenile survival resulted from increased resource competition (and consequences thereof) that in turn was associated with higher grizzly bear density. These two plausible events (reduced food availability vs. more bears competing for those foods) occurred at about the same time, and both would be expected to reduce or halt population growth. How do we know which one was more important?

In situations such as this, it is generally seen as weak science to simply document a correlation between one plausible explanation and the observed consequences and, from this, conclude causation. Instead, scientists attempt to elucidate specific responses that would logically flow from one, but not the other plausible cause. Then, quantitative empirical data is gathered and used to examine which of the two hypotheses is most consistent with the empirical evidence. This is the approach taken by IGBST:

a) Bjornlie et al. (2014b) wondered if trends in home range sizes of males and female grizzly bears in the Yellowstone area could provide some insight into the relative roles played by the whitebark pine (WBP) decline and the increase in grizzly bear density. They found that female home ranges were smaller during 2007-2012 than during 1989-1999,

whereas those of males did not change significantly between the two time periods. They hypothesized, based on previous published research on bears, that home range size of female bears would increase if declines in WPB required bears to search further for foraging, but would decrease if intra-specific competition resulted from increased density. To test the competing hypotheses, Bjornlie et al. (2014b) developed indices of grizzly bear density in the Yellowstone area from a long history of marked animals and also used fine-scaled maps of WBP to quantify the proportion of grizzly bear home ranges affected by its decline. They then used model selection procedures to assess the strength of the evidence for the two competing hypotheses. Bjornlie et al. (2014b) found that data supported an association between density and female home range size (smaller home ranges associated with higher density) but did not support an association with availability of WBP. Signals were slightly more nuanced for male home range sizes: the associations with both WBP and density were similar when home ranges were quantified using one method; associations were somewhat stronger with density than WBP when home ranges were quantified using an alternative method. However, only the density relationship using the alternative home range metric was significant. These analyses provided justification for Bjornlie et al. (2014b) to conclude that the smaller home range sizes of females seen during the latter period were more likely a result of high density than reductions of WBP.

b) Van Manen et al. (2016) used a similar competing-hypotheses design to examine influences directly on the vital rates that drive population growth (survival and cub production), with particular focus on the time period 2001-2011 when WBP mortality increased markedly. They used the same index to grizzly bear density developed by Bjornlie et al. (2014b) and developed a spatially- and temporally explicit index of WBP mortality using remote-sensing databases. These spatial covariates were applied to each individual grizzly bear sampled. Van Manen et al. (2016) found no evidence that independent (i.e., no longer under mothers' care) female survival had changed during 2002-2011 compared with 1983-2001, and modest evidence that independent male survival had increased. However, there was no evidence that either independent female or male survival was associated with either density or WBP. In contrast, Van Manen et al. (2016) found support for models that included density as associated with both cub and yearling survival, but not for models that included WBP. Similarly, cub production (quantified by the transition rate from not having cubs in one year to having a litter the next year) was found to be associated with density but not WBP mortality.

Those two studies provided empirical evidence to support the relative importance of grizzly bear density (as opposed to declining WBP) in explaining differences observed since the earlier study period. FWP is unaware of any similarly rigorous analyses, published or unpublished, that would question or refute either of those studies.

Issue 7: Increasing human population and development.

In recent decades, although still sparsely populated by national standards, Montana has seen great increases in its human population and, in turn, of areas where humans live, work, and play. The results for grizzly bears include more fragmented habitat, more exposure to humans, and more potential for conflict. Additionally, recreationists have largely unhindered access to millions of acres of undeveloped land which, based on documentation of current and expected trends, either is or will be occupied by grizzly bears. As bear numbers and distribution increase and the number of outdoor enthusiasts grow, contact and interaction with people engaged in outdoor activities is likely to increase.

Biological effects of hunting

FWP is aware of, and has thoroughly considered, written critiques suggesting that hunting grizzly bears in Montana would almost certainly result in more strongly negative biological consequences than indicated in this document's section on hunting (e.g., Gosselin et al. 2015, Bischof et al. 2018, Mattson 2020). Below is a brief review of those writings.

1) Mattson (2020) uses an overly simplistic dichotomy of whether hunting mortality would be compensatory or additive. It ignores the literature showing density-dependent responses, not in adult survival where theory and empirical evidence in most large-mammal studies suggests it should not occur, but in juvenile survival and recruitment where one would expect to find it. See the section on density dependence. Mattson (2020) ignores the data on grizzly bears in Alaska (Miller et al. 2003, Keay et al. 2018, Brockman et al. 2020,) and misinterprets McLellan (2005).

2) Critics contend that sexually selected infanticide (SSI) would occur in Montana bear populations subject to a recreational hunt, reducing cub and possibly yearling) survival (or litter sizes prior to mortality, if females increase counterstrategies to avoid infanticide and in so doing sacrifice foraging opportunities at the expense of their own reproductive output). A number of studies are cited, primarily from European bear populations, supporting these arguments.

FWP does not dispute or take issue with the potential for infanticide or SSI among bears in Montana, nor with research showing the importance of SSI in many populations of bears in Europe. However, as articulated earlier in the section on infanticide in bears, FWP finds the most cogent, well researched, and applicable works relating to SSI among North American bears to be those of Miller et al. (2003) and McLellan (2005) and is unaware of newer or more applicable research that would cast doubt on the value of those studies.

Conclusions from both Miller et al. (2003) and McLellan (2005) are persuasive that litter size and juvenile survival among bear population subjected to low offtake via recreational hunts would increase if hunting reduced density of populations near carrying capacity and would be unchanged if hunting had no effect on—or reduced density of—a population below carrying capacity. Neither study supported the hypothesis that hunting (and particularly, reducing the abundance of adult males) would reduce litter size or juvenile survival.

Also relevant is Swenson (2003), which states that the presence of SSI among Scandinavian bear populations "does not mean that SSI is important in every population… North American and Scandinavian brown bears have very different histories. Humans tried to exterminate bears in Scandinavia with all available technology for hundreds of years and almost succeeded.... This long history of persecution may have been an important selective force in shaping life history strategies…lowered aggressiveness and increased productivity… may make European brown bear females less able than North American females to defend their cubs from infanticidal males.... In contrast to Europe, brown bears in North America were exterminated rapidly after European immigrants arrived; they survived only in inaccessible areas."

3) A number of publications have implicated hunting as having deleterious effects on grizzly bear social dynamics, foraging tactics, life-history strategies, or other biological attributes (Zedrosser et al. 2013; Frank et al. 2017, 2018, 2021; Bischof et al. 2018), and thus that biological effects of hunting would extend beyond the loss of hunting individuals. These studies have focused on the hunting population of brown bears in Sweden, where harvest rates have been high, regulations are lax, and most hunting occurs with the help of dogs. Such research is helpful for context, but FWP's view is that extrapolating effects to such a different system would not constitute good science.

4) FWP's understanding of the likely effects of hunting on human–bear conflicts is summarized in the above section on hunting.

Human dimensions

For attitudes and concerns regarding the presence, management, and conservation of grizzly bears, FWP relied on Frost (1985), Velado (2005), Sage (2019, 2022), and Nesbitt et al. (2020, 2023). A study not addressed in this plan is Canepa et al. (2008).

Relationship of this plan to federal laws and regulations

U.S. Endangered Species Act

As of this writing, all grizzly bears in the lower 48 states are classified by the U.S. Fish and Wildlife Service (USFWS) as threatened under the Endangered Species Act. All actions FWP takes must be consistent with protocols and procedures outlined by the USFWS under the ESA and its implementing regulations. As a threatened species, ultimate management authority is with the USFWS. That said, day-to-day management occurs in a cooperative setting, whereby land management agencies act according to plans that have been developed in consultation with and approved by the USFWS, and in which states and tribes conduct conflict prevention and response activities (in conjunction with USDA WS when livestock depredation in involved). The USFWS must approve of actions that affect individual grizzly bears, i.e., relocation, translocation, euthanasia. The USFWS does not typically require notification or involvement with day-to-day- conflict prevention, conflict response (except when capture of individual grizzly bears is contemplated), education and information efforts on the part of states and tribes.

USFWS "4d" rule

Under the protection of the ESA, "taking" of grizzly bears is prohibited. To "take" is defined by the ESA as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." However, Section (4)(d) of the ESA "Protective Regulations" provides the authority for the Secretary of the Interior to issue regulations for a threatened species that modify the strict interpretation of "take" for states that have entered into a cooperative agreement with the USFWS. Montana has entered into such an agreement. Federal Regulation 50 CFR 17.40(b) lays out four exceptions to strict federal prohibition on "take" that are applicable to grizzly bears in Montana (see Appendix A for the full text of 50 CFR 17.40(b)). These have become known colloquially as the "4d rule."

First, the rule allows grizzly bears to be taken "in self-defense or in defense of others," subject to the requirement that the individual taking the bear must report the event to the USFWS within five days and cannot transport, sell, or retain any parts of a grizzly bear killed in such a situation. Second, it allows authorized federal, state, or tribal authorities to remove (i.e., euthanize) a grizzly bear "constituting a demonstrable but non immediate threat to human safety or committing significant depredations to lawfully present livestock, crops, or beehives" if such taking is done humanely and in accordance with inter-agency guidelines (for more on the Inter-agency Guidelines, see below) and only when "it has not been reasonably possible to eliminate such threat or depredation by live-capturing and releasing unharmed in a remote area the grizzly bear involved." Third, federal, state, and tribal authorities may engage in taking other than killing or permanently injuring a grizzly bear (e.g., harassing, trapping) for scientific or research purposes, again with the requirement of appropriate reporting to the USFWS.

Relationship of this plan to state laws, regulations, and resolutions

MEPA, Montana Code Annotated (MCA), and Administrative Rules of Montana (ARM)

This plan is written to be consistent and in compliance with the:

- Montana Environmental Policy Act (MCA , Title 75), following guidelines produced by Stockwell (2013).
- Elements of the Montana Code that refer to big game, predators, and grizzly bears specifically (Section1-1-508, MCA; Sections 87-1-201; 87-1-217; 87-1-304; 87-2-101; 87-2-701; 87-2-702; 87-3-131; 87-5-103; 87-5-301; 87-5-302; 87-5-725; 87-6-106; 87-6-202; 87-6-205; 87-6-206; 87-6-907; 87-7-413, MCA).
- Elements of the Administrative Rules of Montana (ARM) with relevance to grizzly bears, specifically ARM 12.3.514; 12.8.806; 12.9.1401; 12.9.1403; 36.11.403; 36.11.421; 36.11.432.

Legislative resolutions

In 2021, the 67th Montana legislature passed Senate Joint Resolution 18. The full text appears below.

A JOINT RESOLUTION OF THE SENATE AND THE HOUSE OF REPRESENTATIVES OF THE STATE OF MONTANA REQUESTING THAT MONTANA'S CONGRESSIONAL DELEGATION WORK TO RETURN MANAGEMENT OF MONTANA'S RECOVERED GRIZZLY BEAR POPULATIONS TO THE STATE OF MONTANA AND INITIATE FURTHER REVIEW OF MONTANA'S GRIZZLY BEAR POPULATIONS.

WHEREAS, the United States Congress authorized the Endangered Species Act of 1973; and

WHEREAS, the Endangered Species Act defined "endangered species" to mean "any species which is in danger of extinction throughout all or a significant portion of its range"; and

WHEREAS, the Endangered Species Act defined "threatened species" to mean "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range"; and

WHEREAS, the grizzly bear was designated as a "threatened species" in the conterminous United States under the Endangered Species Act on July 28, 1975; and

WHEREAS, the Endangered Species Act was amended by the United States Congress in 1978 so that the new definition of "species" included a "distinct population segment" that interbreeds; and

WHEREAS, in Senate Report 151 of the 96th United States Congress, the Congress instructed that the authority to designate distinct population segments be exercised "sparingly and only when the biological evidence indicates that such action is warranted"; and

WHEREAS, in 1993, the United States Fish and Wildlife Service revised the Grizzly Bear Recovery Plan, establishing six grizzly bear recovery zones, including the Greater Yellowstone Grizzly Bear Recovery Zone, the Northern Continental Divide Grizzly Bear Recovery Zone, the Cabinet-Yaak Grizzly Bear Recovery Zone, the Selkirk Grizzly Bear Recovery Zone, the Bitterroot (Mountains of Idaho and Montana) Recovery Zone, and the North Cascades (Mountains of Washington) Recovery Zone; and 67th Legislature SJ 18

WHEREAS, in 1996, the United States Fish and Wildlife Service and the National Marine Fisheries Service developed a policy to clarify the meaning of "distinct population segment," and the clarification required a distinct population segment to exhibit "discreteness" relative to the remainder of the species and "significance" to the species to which it belongs; and

WHEREAS, for the purpose of the discrete population segment policy, the United States Fish and Wildlife Service and the National Marine Fisheries Service define "discreteness" as being separated from other populations of the same species by physical, physiological, ecological, or behavioral factors, or as being delimited by international governmental boundaries with significant differences in habitat management, conservation regulations, exploitation control, or regulatory mechanisms; and

WHEREAS, because of the genetic interchange between the Northern Continental Divide, Cabinet-Yaak, and Selkirk grizzly bear recovery zones, and because of the genetic interchange that occurs between

grizzly bears crossing the border between the United States and Canada, these three recovery zones should be considered one large interbreeding distinct population segment; and

WHEREAS, delisting efforts for the Greater Yellowstone Grizzly Bear Recovery Zone have been ongoing for 13 years, and the grizzly bear population in the Northern Continental Divide Grizzly Bear Recovery Zone has reached recovery goals and should also be in an ongoing delisting process; and

WHEREAS, delays in the United States Fish and Wildlife Service delisting process create a significant loss of social tolerance among Montanans who are adversely impacted by the continued expansion of grizzly bears.

NOW, THEREFORE, BE IT RESOLVED BY THE SENATE AND THE HOUSE OF REPRESENTATIVES OF THE STATE OF MONTANA:

That the Legislature supports the delisting of Montana's grizzly bear populations from the Endangered Species Act and the return of Montana grizzly bears to state management.

BE IT FURTHER RESOLVED, that the Legislature call on the United States Fish and Wildlife Service to revise the 1993 Grizzly Bear Recovery Plan and reevaluate the Grizzly Bear Recovery Zone efficacy across all ranges.

BE IT FURTHER RESOLVED, that the Legislature requests that the United States Fish and Wildlife Service create a statewide distinct population segment that includes all of Montana's grizzly bear recovery zones for the purpose of delisting the bear and returning its management to state control.

BE IT FURTHER RESOLVED, that the United States Fish and Wildlife Service develop a new management plan pursuant to section 4(d) of the Endangered Species Act that would aim to resolve conflicts between bears and humans within the Northern Continental Divide Grizzly Bear Recovery Zone and other grizzly bear recovery zones.

BE IT FURTHER RESOLVED, that the Legislature call on Montana's Congressional Delegation, as part of its efforts to return management of Montana's grizzly bears to the state, to exempt the delisting of grizzly bear populations from judicial review.

BE IT FURTHER RESOLVED, that the Secretary of State send a copy of this resolution to the Secretary of the United States Department of the Interior, the Governor of the State of Montana, the Department of Fish, Wildlife, and Parks, the Secretaries of State for the States of Washington, Wyoming, and Idaho, and to each member of the Montana Congressional Delegation.

Relationship of this plan to inter-agency cooperative plans

Below is a summary of other inter-agency cooperative plans in relationship to this current plan.

1993 Recovery Plan

Grizzly bear populations listed under the ESA are broadly managed under the auspices of the Grizzly Bear Recovery Plan, initially published on January 29, 1982, and revised and approved by the USFWS on September 10, 1993. The 1993 Recovery Plan identified “Ecosystems” in which grizzly bears were present but in need or recovery. Recovery zones were specifically established in the Recovery Plan for the Yellowstone Ecosystem (termed the YGBE in the 1993 Recovery Plan, but subsequently referred to at the Greater Yellowstone Ecosystem, GYE); the Northern Continental Divide Ecosystem (NCDE), the Cabinet-Yaak Ecosystem (CYE), and the Selkirk Ecosystem (SE). Additionally, the 1993 Recovery Plan identified two “evaluation areas” for which further planning would be conducted. These were the Bitterroot Ecosystem (BE), and the North Cascades Ecosystem (NCE). In March 2000, the USFWS published a final EIS detailing its plan to recovery grizzly bears in the Bitterroot Ecosystem, at which point, the BE “evaluation area” became recognized as a 6th recovery zone. The SE and NCE are located entirely outside of Montana, and thus enter consideration in this plan only tangentially. The other 4 “Ecosystems” are located entirely (in the case of the NCDE), primarily (CYE), or partly (GYE, BE) within Montana.

The 1993 Recovery Plan outlines general approaches the USFWS identified as fulfilling the ESA's requirement that delisting only occur once the conditions that necessitated listing were resolved. However, detailed strategies and tactics for each Ecosystem have evolved over time, and been superseded by various subsequent documents and agreements that have updated our understanding of the species' status, monitoring protocols, and specific actions needed to achieve recovery. Thus, while the 1993 Recovery Plan remains the foundational document from which most others flow, its importance for day-to-day management has receded as newer, more relevant documents have been produced by federal, state, and tribal authorities.

Inter-agency Grizzly Bear Committee (IGBC)

In 1983 the Secretaries of the Interior and Agriculture and the Governors of Idaho, Montana, Wyoming, and Washington signed a Memorandum of Agreement to establish the Inter-agency Grizzly Bear Committee (IGBC). Their purpose for creating the IGBC was to "coordinate [federal and state] management and research actions to the greatest extent possible to insure the best utilization of available resources and prevent duplication of effort." The mission of the IGBC is "…to achieve recovery and delisting, and to support ongoing conservation of grizzly bear populations and their habitats after delisting in areas of the western United States through inter-agency coordination of policy, planning, management, research and communication: (IGBC 2019). Sub-committees for each of the six identified grizzly bear Ecosystems were subsequently created. The IGBC consists of "…representatives from the U.S. Forest Service, the National Park Service, the U.S. Fish and Wildlife Service, the Bureau of Land Management, the U.S. Geological Survey and representatives of the state wildlife agencies of Idaho, Montana, Washington and Wyoming. In the interest of international coordination and cooperation, the Canadian Wildlife Service is also represented. At the Ecosystem level, Native American tribes possessing grizzly habitat within the recovery areas have also been involved" (http://igbconline.org/story-of-the-igbc/). FWP has been a full member of both the IGBC Executive Committee and of the GYE, NCDE, CYE, and BE sub-committees from the outset.

The IGBC is not a governing body or legal entity (IGBC member agencies retain their individual authority and autonomy); rather it exists to provide and coordinate policy-level oversight and direction among its various members. Various documents produced or sanctioned by the IGBC have relevance to this plan and are referenced as appropriate. The intention is that the plan be fully consistent with, and build upon, documents produced by the IGBC.

IGBC Guidelines

An early, important, and still-used document is called the Inter-agency Grizzly Bear Guidelines (1986). In its Section III, this document put forth general goals of NPS and USFS lands.

GYE Conservation Strategy (CS)

FWP is a signatory to the inter-agency Memorandum of Understanding (MOU) regarding the GYE CS (GYE Subcommittee 2016), which serves as an inter-agency management plan for the GYE and surrounding lands. The GYE CS is not a regulatory document, but rather a summary of commitments and regulatory mechanisms made by each government entity. The GYE CS would formally take effect upon delisting of bears within the proposed GYE DPS. If delisting occurs, the ESA requires the USFWS, in cooperation with the state of Montana, to monitor the species for at least five years afterwards to assure that recovery is sustainable). The CS, however, is not considered to be time-limited, but rather to be in effect indefinitely and (although reviewed by participants at 5-year intervals). The GYE CS is pending revision to incorporate the

revised Tri-state MOA, the use of the IPM as the population estimator, and other related population, habitat, and management information.

The GYE CS summarizes strategies and actions that federal, state, and tribal authorities have pledged to undertake within the Demographic Monitoring Areas (DMA) that includes and surrounds the GYE Recovery Zone (which would be renamed the Primary Conservation Area after delisting). The CS categorizes these commitments as Demographic Monitoring and Management (i.e., population management), Habitat Management and Monitoring, and Conflict Prevention and Response. FWP is primarily involved with the first and third of these, and tangentially involved with the second.

NCDE Conservation Strategy (CS)

FWP is a signatory to the inter-agency MOU implanting the NCDE CS (NCDE Subcommittee 2019), which serves as an inter-agency management plan for the NCDE and surrounding lands. The NCDE CS (NCDE Subcommittee 2019) is not a regulatory or statutory document, but rather a summary of commitments and regulatory mechanisms made by each government entity. The NCDE CS is currently being reviewed and updated, and would take formal effect upon delisting of bears within the proposed NCDE DPS. If delisting occurs, the ESA requires the USFWS, in cooperation with the state of Montana, to monitor the species for at least five years afterwards to assure that recovery is sustainable (a separate monitoring strategy would be developed by the USFWS). The CS, however, is not considered to be time-limited, but rather to in effect indefinitely and (although reviewed by participants at 5-year intervals).

The NCDE CS summarizes strategies and actions that federal, state, and tribal authorities have pledged to undertake within the Demographic Monitoring Areas (DMA) that includes and surrounds the NCDE Recovery Zones (which would be renamed the Primary Conservation Area after delisting). The CS categorizes these commitments as Demographic Monitoring and Management (i.e., population management), Habitat Management and Monitoring, and Conflict Prevention and Response. FWP is primarily involved with the 1st and 3rd of these, tangentially involved with the 2nd. Commitments made by FWP related to Demographic Monitoring and Management were formalized by a public process and written into regulation by the Commission in ARM 12.9.1403.

CYE Conservation Strategy (CS)

Recovery criteria for delisting has not been met in the CYE, however, initial preparation of a CS for this ecosystem has begun.

BE Conservation Strategy (CS)

With no known bears established in the BE, a CS for the BE has yet to be developed. In the 2000 Record of Decision (ROD; 65 FR 69644), the USFWS stated they were going to translocate 25 grizzly bears in the BE but never did. Failure to adhere to the 2000 ROD or publish a supplemental EIS resulted in the recent ruling of CV 21-136-M-DWM. Judge Molloy ordered the USFWS to prepare a supplemental EIS associated with the 2000 EIS on grizzly bear recovery in the BE, a new ROD, and a Final Rule. Instead, the USFWS decided to initiate an entirely new NEPA process including a draft and final EIS as well as a new ROD, to which the plaintiffs and Judge Molloy agreed. Alternatives in this EIS may describe the translocation of bears into the BE or natural recolonization from GYE and NCDE populations. The USFWS have committed to a timeline to complete this EIS and ROD by 2026. Implementation of this EIS and ROD would likely require development of a CS for the BE. While Montana populations of grizzly bears will be a source for the BE population, recovery will be dependent mostly on

Idaho Department of Fish and Game due to the geography of this ecosystem. FWP will be involved to ensure connectivity with GYE and NCDE, and to mitigate conflict in the Bitterroot Valley.

Tri-State Memorandum of Agreement (MOA)

In August 2016, the Commission entered into a Memorandum of Agreement with the wildlife commissions of Wyoming and Idaho regarding the management, genetic health, and allocation of discretionary mortality of grizzly bears in the Greater Yellowstone Ecosystem. That document was revised and approved by the Commission in December 2021, to incorporate the refined Chao2 population estimate (IGBST 2021), and was revised again to incorporate the IPM methodology (see Appendix H). The revised Tri-State MOA describes the adoption of the Integrated Population Model (IPM) by the Interagency Grizzly Bear Study Team (IGBST) as the population estimator for the Greater Yellowstone Ecosystem. With the adoption of the IPM, the IGBST has recalibrated prior year population estimates so they are comparable over time. Additionally, vital rates and demographics for the GYE population may now be reviewed annually so that managers are able to make appropriate adjustments to mortality rates. The revised Tri-State MOA sets a population management objective within or above a range of 800-950 within the Demographic Monitoring Area of the GYE. The revised Tri-State MOA also uses the IPM to identify limits for discretionary mortality and allocation among the three states.

The purpose of the MOA was to define a process to coordinate management of grizzly bears across state lines, largely anticipating a possible future delisting of these animals. This plan and the accompanying EIS are fully consistent with that MOA. This MOA will become effective upon the date of signature of all Parties. It will remain in effect until it is terminated by the Parties. Any Party may terminate its participation in the MOA by providing one hundred-eighty (180) days' written notice to the other Parties, which notice shall be transmitted by hand or other means of delivery confirmation. Parties meet annually to review implementation of the MOA and to recommend any appropriate modifications to the MOA based on changes to the Strategy, state management plans or other pertinent regulatory documents. Any modification to the MOA will only become effective upon the written consent of all Parties.

FWP-USDA-WS Memorandum of Understanding (MOU)

In February 2020, FWP renewed a Memorandum of Understanding (MOU) with U.S.D.A. Wildlife Services (WS) outlining a cooperative program for management of wildlife damage from grizzly bears, wolves, black bears, and mountain lions in Montana. For grizzly bears, the importance of this MOU is largely to clarify that investigations of possible livestock depredations will be the responsibility of WS (in cooperation with FWP when possible). This MOU is renewed every 5 years, but could be done sooner if circumstances change (e.g., if grizzly bears are delisted).

U.S. Forest Service Plans

Decisions made by the U.S. Forest Service, which manages the largest single land-ownership category in Western Montana, have great influence on grizzly bear management and conservation. Forests with lands in the NCDE and GYE areas are incorporated by reference in the two respective Conservation Strategies.

Relationship of this plan to existing plans

Western Montana Plan (2006) and Southwest Montana Plan (2013)

This plan, when formally adopted, would supplant both of the following grizzly bear management plans:

- the Western Montana plan (Dood et al. 2006); and
- the Southwestern Montana plan (FWP 2013).

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APPENDICES

Appendix A.
Full text, 4d rule (CFR, 10-1-07 edition) governing take of nuisance grizzly bears

Special rules – mammals.

a) [Reserved]

(b) Grizzly bear (*Ursus arctos*)—(1) *Prohibitions.* The following prohibitions apply to the grizzly bear:

(i) *Taking.* (A) Except as provided in paragraphs (b)(1)(i)(B) through (F) of this section, no person shall take any grizzly bear in the 48 conterminous states of the United States.

(B) Grizzly bears may be taken in self-defense or in defense of others, but such taking shall be reported, within 5 days of occurrence, to the Assistant Regional Director, Division of Law Enforcement, U.S. Fish and Wildlife Service, P.O. Box 25486, Denver Federal Center, Denver, Colorado 80225 (303/236–7540 or FTS 776–7540), if occurring in Montana or Wyoming, or to the Assistant Regional Director, Division of Law Enforcement, U.S. Fish and Wildlife Service, Lloyd 500 Building, Suite 1490, 500 Northeast Multnomah Street, Portland, Oregon 97232 (503/231–6125 or FTS 429–6125), if occurring in Idaho or Washington, and to appropriate State and Indian Reservation Tribal authorities. Grizzly bears or their parts taken in self-defense or in defense of others shall not be possessed, delivered, carried, transported, shipped, exported, received, or sold, except by federal, state, or tribal authorities.

(C) *Removal of nuisance bears.* A grizzly bear constituting [sic] a demonstrable but non immediate threat to human safety or committing significant depredations to lawfully present livestock, crops, or beehives may be taken, but only if:

(*1*) It has not been reasonably possible to eliminate such threat or depredation by live-capturing and releasing unharmed in a remote area the grizzly bear involved; and

(*2*) The taking is done in a humane manner by authorized federal, state or tribal authorities, and in accordance with current inter-agency guidelines covering the taking of such nuisance bears; and

(*3*) The taking is reported within 5 days of occurrence to the appropriate Assistant Regional Director, Division of Law Enforcement, U.S. Fish and Wildlife Service, as indicated in paragraph (b)(1)(i)(B) of this section, and to appropriate State and Tribal authorities.

(D) *Federal, state, or tribal scientific or research activities.* Federal, state, or tribal authorities may take grizzly bears for scientific or research purposes, but only if such taking does not result in death or permanent injury to the bears involved. Such taking must be reported within 5 days of occurrence to the appropriate Assistant Regional Director, Division of Law Enforcement, U.S. Fish and Wildlife Service, as indicated in paragraph (b)(1)(i)(B) of this section, and to appropriate State and Tribal authorities.

(E) [Reserved]

(F) *National Parks.* The regulations of the National Park Service shall govern all taking of grizzly bears in National Parks.

(ii) *Unlawfully taken grizzly bears.* (A) Except as provided in paragraphs (b)(1)(ii)(B) and (iv) of this section, no person shall possess, deliver, carry, transport, ship, export, receive, or sell any unlawfully taken grizzly bear. Any unlawful taking of a grizzly bear shall be reported within 5 days of occurrence to the appropriate Assistant Regional Director, Division of Law Enforcement, U.S. Fish and Wildlife Service, as indicated in paragraph (b)(1)(i)(B) of this section, and to appropriate State and Tribal authorities.

(B) Authorized federal, state, or tribal employees, when acting in the course of their official duties, may, for scientific or research purposes, possess, deliver, carry, transport, ship, export, or receive unlawfully taken grizzly bears.

(iii) *Import or export.* Except as provided in paragraphs (b)(1)(iii) (A) and (B) and (iv) of this section, no person shall import any grizzly bear into the United States.

(A) *Federal, state, or tribal scientific or research activities.* Federal, state, or tribal authorities may import grizzly bears into the United States for scientific or research purposes.

(B) *Public zoological institution.* Public zoological institutions (see 50 CFR 10.12) may import grizzly bears into the United States.

(iv) *Commercial transactions.* (A) Except as provided in paragraph (b)(1)(iv)(B) of this section, no person shall, in the course of commercial activity, deliver, receive, carry, transport, or ship in interstate or foreign commerce any grizzly bear.

(B) A public zoological institution (see 50 CFR 10.12) dealing with other public zoological institutions may sell grizzly bears or offer them for sale in interstate or foreign commerce, and may, in the course of commercial activity, deliver, receive, carry, transport, or ship grizzly bears in interstate or foreign commerce.

(v) *Other violations.* No person shall attempt to commit, cause to be committed, or solicit another to commit any act prohibited by paragraph (b)(1) of this section.

(2) *Definitions.* As used in paragraph (b) of this section:

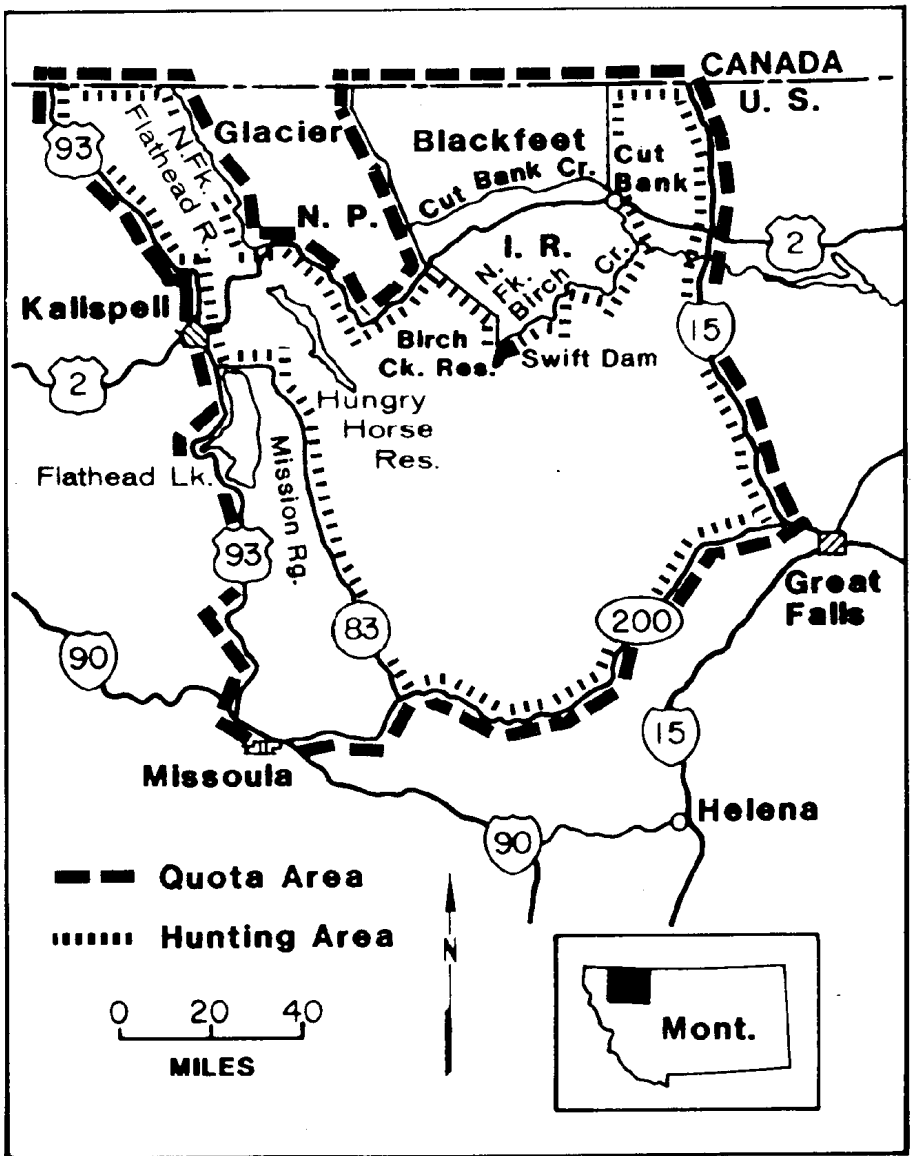
Grizzly bear means any member of the species *Ursus arctos* of the 48 conterminous States of the United States, including any part, offspring, dead body, part of a dead body, or product of such species.

Grizzly bear accompanied by young means any grizzly bear having offspring, including one or more cubs, yearlings, or 2-year-olds, in its immediate vicinity.

Identified means permanently marked or documented so as to be identifiable by law enforcement officials at a subsequent date.

State, Federal or Tribal authority means an employee of State, Federal, or Indian Tribal government who, as part of his/her official duties, normally handles grizzly bears.

Young grizzly bear means a cub, yearling, or 2-year-old grizzly bear.



Appendix B.
Summary, USFWS conflict response protocol and hazing guidance

U.S. Fish & Wildlife Service

Grizzly Bear Hazing Guidelines

Guidance for Livestock Owners, Homeowners and the General Public

Grizzly bears are listed as Threatened under the Endangered Species Act (ESA). As such, harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting grizzly bears is not permitted except for self-defense or in defense of others, as authorized by the grizzly bear 4(d) rule. *Harass* in the definition of "take" in the ESA means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Grizzly bears can pose a threat to human safety and should be discouraged from using areas near homes and other human-occupied areas. Hazing discourages undesirable behavior in wildlife, and when properly conducted, does not create a likelihood of injury to grizzly bears to such an extent as to significantly disrupt normal behavioral patterns.

Individuals may use the methods listed below to deter grizzly bears away from the immediate vicinity (200 yards) of a human-occupied residence or potential conflict area, such as a barn, livestock corral, chicken coop, grain bin, or schoolyard . Once bears have moved beyond the immediate vicinity (200 yards), hazing is unlikely to be effective and should stop. All measures must be taken to ensure proper use of methods and that the bear is not injured or killed. If there is immediate danger of attack, individuals may legally take a grizzly bear in self-defense or in defense of others. This includes lethal removal of such grizzly bears. Any such taking must be reported to the US Fish & Wildlife Service within five days.

Any person who uses the techniques described in these guidelines must use discretion and act safely and responsibly in confronting nuisance grizzly bears. All actions taken must comply with applicable laws and regulations, including local, state and tribal laws.

Acceptable Hazing Techniques:

Non-Projectile Auditory Deterrents: Yelling, clapping, banging pots or other objects, air horns, vehicle horns, vehicle sirens, and P.A. systems (vehicle-based or hand-held) are often sufficient to move bears short distances, and should be employed before other methods are tried.

Visual Stimuli/Deterrents: Sometimes simple visual stimuli, such as spotlights or flashing lights can frighten a bear away. Use in combination with yelling so the bear associates the stimuli with human presence.

Vehicle Threat Pressure: Vehicles can be an effective hazing tool. By driving vehicles slowly towards bears (without hitting them), it can apply enough threat pressure to get bears to leave the immediate vicinity (200 yards). The effectiveness of vehicle pressure can be enhanced by using it in combination with auditory deterrents such as sirens or horns. Caution must be taken that no contact is made between the vehicle and the bear. As soon as the bear is clear of the immediate vicinity, pressure and noise should be discontinued.

Dogs: Dogs, such as Karelian Bear Dogs or trained guard dogs used on a leash can be an effective deterrence tool.

Water: The use of water in a large steady stream has proven effective at temporarily displacing some bears from human use areas. Hoses with a nozzle that gives a high pressure, long-range stream, such as a fire hose, can be an effective deterrence tool. As with all deterrence techniques, use of water for hazing should be accompanied by yelling so the bear associates the experience with human presence.

March 2020

Stones or marbles: Can be either thrown or sent out of a slingshot. Wooden balls are also available for use with a sling shot. They should NOT be aimed at the face due to the danger of hitting an eye, but rather aimed at the rump of a bear. The maximum size of projectile should be the size of a golf ball. Range: 15-200+ ft.

Paintballs: Paintballs can also be used as a deterrent, avoiding injuring to the bear (when shot away from the face). An alternative to paintballs are rubber balls. Rubber balls are extremely cost effective and can be used repeatedly. Range: 30-150 ft. Note: Bears are attracted to paintball residue, therefore the area must be cleaned up after the use of paintballs.

Noise-making Projectiles: This category includes projectiles fired from a weapon that explode, creating a sudden loud noise, such as bangers and 12-gauge crackers. Range: 75-90 ft. (bangers); 180-250 ft. (cracker shells). The explosive noise of cracker shell or banger must occur between the shooter and the bear.

Guidelines for Use of Noise-Making Projectiles

The improper use of noise deterrents can cause injury to the individuals, bystanders, the bear, or nearby property. The following guidelines MUST be followed to prevent injuries:

- Always fire projectiles from a secure location (inside a hard-sided vehicle or from building).
- Always be aware of the line of fire and the backdrop. Ensure bear has an escape route away from people.
- Ensure the deterrent explodes between the operator and the bear – a noise deterrent that explodes behind the bear may drive him toward you or bystanders.
- All shooters must know the optimal range of their rounds as they can cause death at close distances.
- Noise deterrents should be fired into the air at a 45 degree angle above the ground.
- NEVER fire noise deterrents directly at or under a bear as penetration may occur sometimes resulting in internal explosion (particularly with 12 gauge crackers used at a close distance).
- Be aware of the potential for a ricochet.
- 12 gauge rounds should be used in un-choked barrels only - check the barrel of the gun after each shot to ensure there is no blockage that could result in a misfire.
- NEVER load 12 gauge crackers and lethal rounds into the same firearm. Deaths have resulted from confusion with regard to which round is chambered.
- Bear bangers discharged from a hand-held pen should be avoided as they are inaccurate and have been known to explode in people's hands.
- Cracker shells can start fires. Be aware of any fire related hazards when using explosive devices.

Unacceptable Deterrence Methods

- Screamers and Whistlers. Erratic flight pattern; higher fire risk in dry conditions.
- Rubber bullets and rubber batons. Higher risk of injury to the bear.
- Bean Bag and Aero Sock Rounds. Short range creates a human-safety threat.

Preventative Methods:

Livestock owners and homeowners should take measures to prevent or minimize losses from predation through good husbandry and strategic use of pro-active deterrent methods such as electric fence, guard animals, and human presence. More information is provided in the Loss Prevention Toolkit on the Montana Livestock Loss Board website: www.llb.mt.gov .

For more information on grizzly bear deterrence, please contact:

- USFWS Grizzly Bear Recovery Program at 406-243-4903
- USFWS Office of Law Enforcement at 406-247-7355

March 2020

Appendix C.
Full text, FWP / USFWS Memorandum of Agreement (MOA) re: MT SB 337

Memorandum of Agreement between Montana Fish, Wildlife & Parks and U.S. Fish & Wildlife Service regarding Grizzly Bear Management in Relation to Montana Senate Bill 337

Senate Bill 337, Section 1. (3)(b) *The department may respond to a grizzly bear listed under the federal Endangered Species Act (ESA), 25 16 U.S.C. 1531, et seq., that is causing conflict outside of a federal recovery zone. If the bear is to be relocated, the department may not relocate the bear.*

Purpose. The purpose of this Memorandum of Agreement (MOA) is to document the agency response process for Montana Fish, Wildlife & Parks (MTFWP), the U.S. Fish & Wildlife Service (FWS) and Wildlife Services (WS), including agency roles and coordination, for grizzly bears causing conflict outside of a federal recovery zone in light of Senate Bill 337 which will become effective date on March 1, 2022.

For purposes of this MOA, grizzly bear conflicts are defined as: incidents in which bears either do or attempt to: injure or kill people; damage property; kill or injure lawfully present livestock or poultry; damage beehives; obtain reasonably secured anthropogenic foods and other attractants; or damage agricultural crops.

This MOA relies on the collaborative relationship that already exists between MTFWP, FWS and WS. All efforts to manage grizzly bear conflicts will be conducted in collaboration with the FWS Grizzly Bear Recovery Program (GBRP) Coordinator and will be consistent with the conditions of the agency's 4(d) authorization letter (under 50 CFR § 1740) to MTFWP.

MTFWP and FWS agree that when managing grizzly bears in conflict:

1) For grizzly bears causing conflicts inside a federal recovery zone:
   a) MTFWP and WS will handle all aspects of the response, including trapping, processing, and carrying out the agreed upon management action, including removal and relocation to Montana Fish and Wildlife Commission-approved release sites. WS will respond to livestock conflicts according to the Memorandum of Understanding between MTFWP and WS.

2) For grizzly bears causing conflicts outside a federal recovery zone:
   a) MTFWP and/or WS (livestock) will respond to conflicts. MTFWP and WS will recommend management approach to FWS. If FWS approves trapping, MTFWP or WS will set traps. Traps will not be set until and unless approved by FWS.
   b) When a bear is trapped, MTFWP and/or WS (livestock) will process (tranquilize, mark, collar, collect biological data) bear. Processing the bear is needed to confirm sex, conflict history, and whether bear is the target bear. This information will inform a management decision.
   c) If the bear is determined to be in conflict:
      i) If, after consultation with USFWS, a decision is made to remove the bear, MTFWP or WS will carry out the removal.

ii) If, after consultation with FWS, a decision is made to relocate the bear, MTFWP or WS will place bear in trap for transport and hold the bear in a secure location as close to the capture site as possible. FWS will take possession of the bear within 6 hours and will relocate, unless otherwise explicitly agreed upon by agencies (bears are often held overnight to allow full recovery prior to relocating). MTFWP and WS agrees to ensure health and safety of bear until USFWS can take possession, including moving bear to protected area if/when needed due to exposure. FWS will notify MTFWP of the location where they relocated a bear within 12 hours of release.

d) If the bear is determined to NOT be in conflict (incidental catch), MTFWP will maintain possession of bear and will relocate bear to an agreed upon Fish and Wildlife Commission-approved site or release on site.

Potential Scenarios

-conducted in collaboration with the FWS GBRP Coordinator and consistent with the conditions of the agency's 4(d) authorization letter (under 50 CFR § 1740) to MTFWP.

1) Livestock depredation near Augusta (outside recovery zone)
   WS responds and sets traps. Grizzly bear is trapped. WS and/or MTFWP processes bear.
   a. If there is no information to confirm this bear is the target bear (or if it is known that this is not the target bear) and decision is made to relocate bear, MTFWP will relocate bear.
   b. If bear is target bear and decision is made to remove bear, MTFWP or WS will remove bear.
   c. If bear is target bear and decision is made to relocate bear, FWS will relocate bear.

2) Chicken conflict near Whitefish (outside recovery zone).
   MTFWP responds and sets traps. Grizzly bear is trapped. MTFWP processes bear.
   a. If bear is non-target bear and decision is made to relocate bear, MTFWP will relocate bear.
   b. If bear is target bear and decision is made to remove bear due to conflict history, MTFWP will remove bear.
   c. If bear is target bear and decision is made to relocate bear, FWS will relocate bear.

3) Site conflict outside Condon (inside recovery zone).
   MTFWP responds and sets traps. Grizzly bear is trapped. MTFWP processes bear.
   a. If bear is non-target bear and decision is made to relocate bear, MTFWP will relocate bear.
   b. If bear is target bear and decision is made to remove bear due to conflict history, MTFWP will remove bear.
   c. If bear is target bear and decision is made to relocate bear, MTFWP will relocate bear.

4) Dead cow being fed on by grizzly bears is reported (outside recovery zone). Upon investigation, four bears are identified. It is unknown, which, if any, were involved in a depredation. Feeding on dead livestock is not a conflict, however WS sets traps because of recent depredations in the area.
   a. If bear(s) are captured and there is no information to determine whether these bears were involved in previous depredations, MTFWP may relocate.
   b. If bear(s) are captured and there is information to suggest the bears were not involved in a depredation, MTFWP may relocate.
   c. If bear(s) are captured and there is information to suggest the bears were involved in killing this cow or in recent depredations in the area, and the decision is made to relocate bear, FWS will relocate.

Effective Dates: This MOA is effective upon signature by both parties through October 31, 2023 and may be renewed annually.

Signatures

Hank Worsech, Director
Montana Fish, Wildlife and Parks

12/9/21
Date

Hilary Cooley, Grizzly Bear Recovery Coordinator
U.S. Fish and Wildlife Service

12/13/21
Date

Attachment: SB 337

Appendix D.
Full text, Governor's Executive Order creating citizens' grizzly bear advisory council (GBAC)

STATE OF MONTANA
OFFICE OF THE GOVERNOR
EXECUTIVE ORDER No. 9-2019

EXECUTIVE ORDER CREATING THE GRIZZLY BEAR CONSERVATION AND MANAGEMENT ADVISORY COUNCIL

WHEREAS, grizzly bears are valued by people and cultures across Montana and around the world;

WHEREAS, grizzly bears are also feared and can affect people's livelihoods and safety;

WHEREAS, grizzly bear numbers in Montana continue to increase, and have expanded into areas where they have not
been for decades, including places key to connecting their populations;

WHEREAS, despite this success, long-term coexistence of people and grizzly bears across the landscape will remain a challenge;

WHEREAS, existing management plans did not fully anticipate grizzly bear distribution across the landscape and as Montana's human population continues to grow, we can expect conflicts between bears and people to increase in frequency and complexity;

WHEREAS, the U.S. Fish and Wildlife Service, in cooperation with the Montana Department of Fish, Wildlife and Parks (FWP), the U.S. Forest Service, the National Parks Service, the Bureau of Land Management, the Blackfeet Tribe, and the Confederated Salish and Kootenai Tribes, currently manage grizzly bears in Montana as "threatened" under authority of the Endangered Species Act;

WHEREAS, four of the six recovery areas identified by the U.S. Fish and Wildlife Service in the Grizzly Bear Recovery Plan occur in whole or in part within Montana;

WHEREAS, recent litigation has created uncertainty about delisting of grizzly bears from the Endangered Species Act;

WHEREAS, it is timely that Montanans work together to determine how the state and its partners will collectively manage and conserve grizzly bears;

WHEREAS, it is important to recognize existing grizzly bear management objectives and existing intra-agency and inter-agency commitments already in place, including conservation strategies, monitoring protocols, recovery plan criteria, and forest plans;

WHEREAS, the future of grizzly bear management in Montana must maintain scientific integrity, and balance diverse interests and values;

WHEREAS, Montana remains committed to maintaining the long-term viability of grizzly bears and balancing their needs with those of people;

WHEREAS, it is important for the public to have ownership and confidence in grizzly bear management in Montana;

WHEREAS, to ensure its citizens have a voice in the future of grizzly bears, Montana must provide meaningful opportunities for people to engage in a public discussion around grizzly bear management, recovery and conservation; and

WHEREAS , it is in the best interests of all Montanans to bring stakeholders and experts together to recommend statewide strategies for conserving and managing grizzly bears for today and the future;

NOW, THEREFORE, I, STEVE BULLOCK, Governor of the State of Montana, pursuant to the authority vested in me under the Constitution and the laws of the State of Montana, Title 2, Chapter 15, MCA, do hereby create the Governor's Grizzly Bear Conservation and Management Advisory Council (Council).

PURPOSE

The purpose of the Council is to develop recommendations for fundamental guidance and direction on key issues and
challenges related to the conservation and management of grizzly bears in Montana, particularly those issues on which there is significant social disagreement.

DUTIES

1. The Council shall produce a Final Report with discrete, actionable recommendations that provides clear and meaningful guidance to the Governor's Office, FWP, the Fish and Wildlife Commission, and other entities with responsibility for grizzly bear management and conservation in Montana.

2. The Council shall recognize grizzly bear management objectives and existing intra-agency and inter-agency commitments already in place, including conservation strategies, monitoring protocols, commission policies, recovery plan criteria, and forest plans.

3. The Council shall utilize a transparent process that maximizes engagement among people with diverse values and interests. The Council shall consider public input on its recommendations.

4. The Council's recommendations shall identify strategies that achieve the following broad, strategic objectives:
   a) Maintain and enhance human safety;
   b) Ensure a healthy and sustainable grizzly bear population;
   c) Improve timely and effective response to conflicts involving grizzly bears;
   d) Engage all partners in grizzly-related outreach and conflict prevention; and
   e) Improve intergovernmental, inter-agency, and tribal coordination.

5. The Council shall have the discretion to examine grizzly bear-related issues that it deems to be important, including at a minimum the following topics critical to its objectives:

   a) Grizzly bear distribution within Montana (including outside of established recovery zones);
   b) Connectivity between ecosystems;
   c) Conflict prevention;
   d) Response protocols to grizzly conflict in different parts of the state;
   e) Transplant protocols;
   f) Role of hunting; and
   g) Resources for long-term sustainability of grizzly bear conservation.

COMPOSITION AND ORGANIZATION

1. The Council members shall be solicited through an application process and appointed by and serve at the pleasure of the Governor.
2. The Council members shall be a cross-section of Montanans representative of different geographic areas and interest categories involved in or affected by grizzly bear conservation and management, including livestock producers, wildlife enthusiasts, conservation groups, hunters, community leaders, tribal members, and outdoor industry professionals.
3. The Governor shall appoint a council member as chairperson.

4. Council members shall serve in an individual capacity.
5. The Office of the Governor, with support from FWP, will engage to further the objectives of this Council. The Council will be attached to FWP for administrative purposes.
6. FWP shall convene an interdisciplinary, inter-agency technical advisory committee to serve the Council and provide biological, legal, and policy information.
7. The Council may establish procedural bylaws to aid in the performance of its duties.
8. The Council may establish subcommittees comprised of members of the Council to aid in the performance of its duties.

FWP ROLES AND RESPONSIBILITIES

1. FWP shall provide staff to assist the Council in completing its work.
2. FWP shall make available experts who can support the Council with technical, scientific, social, policy, and legal matters.
3. As the Council begins its work, specific decisions for implementation of management strategies will continue to be the responsibility of FWP.

OTHER

1. The Council may request consultation, information, and technical expertise from directors or their designees of state and federal agencies, the university system, the public, and other entities related to grizzly bear management and conservation.
2. The Council is not a regulatory body; its recommendations are advisory only.

COMPENSATION

All Council members shall be reimbursed for travel, meals, and lodging related to Council duties pursuant to Section 2-15-122, MCA.

DURATION
The Council shall complete its Final Report and provide its recommendations to the Governor by August 31, 2020. The Council shall then disband unless continued by subsequent executive order.

This Order is effective immediately.

GIVEN under my hand and the GREAT SEAL of the State of

Montana this 24th day of July 2019.

_____
STEVE BULLOCK, Governor

ATTEST :

_____
COREY STAPLETON , Secretary of State

Appendix E.
Full text, 2020 final report from GBAC

FINAL REPORT
Recommendations and Input on the Future of Grizzly Bear Management and Conservation in Montana

Preamble

Montana's heritage is intimately connected to grizzly bears, and many indigenous peoples have lived with grizzly bears from time immemorial. The Blackfeet Tribe and Confederated Salish and Kootenai s (CSKT) continue to play essential roles in grizzly bear management and conservation in cooperation with the U.S. Fish and Wildlife Service (US FWS), Montana Fish, Wildlife and Parks (FWP), the U.S. Forest Service (US FS), the Bureau of Land Management (BLM), USDA Wildlife Services, and the National Park Service (NPS). The Governor's Grizzly Bear Advisory Council (GBAC or the Council) respects and honors this long-standing relationship, as well as the traditional knowledge that continues to inform management and provide habitat for grizzly bears in Montana.

As grizzly bear populations have been reduced or extirpated throughout much of their historic range over the past century, the populations that continue to reside and expand in Montana are perceived by many from our state and around the world to hold both intrinsic and spiritual value, alongside a recognized ecological importance. The grizzly bears residing in Montana's four recovery Ecosystems are considered essential to the continued recovery of the species nationally. Significant progress toward the recovery of this species has occurred since grizzly bears were listed as protected by the Endangered Species Act in 1975.

Continued conservation and management efforts remain necessary. Montana is unique in the continental United States for its maintenance of grizzly bear populations and their core habitats that support connectivity and recovery in landscapes extending beyond primary conservation areas and state lines. The Council recognizes that alongside the wilderness, parks, and protected lands that have provided refuge for grizzly bears over the past century, there is an essential role for local communities and working lands, both public and private, in helping to maintain a landscape capable of supporting both people and grizzly bears. Grizzly bear expansion across the state has and will continue to bring challenges to traditional and emerging livelihoods as the human population of Montana increases simultaneously with the population of grizzly bears. The conservation of this species from past and ongoing management and cooperation, as well as future conservation and management, could offer the opportunity to make the goal of grizzly bear recovery a reality.

The GBAC was charged with developing citizen recommendations for fundamental guidance and direction on key issues and challenges related to the conservation and management of grizzly bears in Montana, particularly those issues on which there is significant social disagreement. The 18 Montanans that make up the Council acknowledge the important task with which we were charged, and worked to bring our diversity of livelihoods, backgrounds, community concerns, and connections to Montana's landscapes into our discussions when crafting our recommendations. We also acknowledge that our recommendations are just that, and stand beside many other agency, tribal, and public contributions. The Council worked to use all information provided by support staff, as well as public comment, to provide meaningful guidance and feedback that will inform, but not constrain, the management and conservation of grizzly bears into the future.

Vision

We envision fully recovered grizzly bear populations in the four identified recovery areas in Montana and landscapes in-between that accommodate grizzly bear presence and connectivity while maintaining the safety and quality of life of those that live, work, and play in Montana.

Guiding Principles

The following principles provide the underlying foundational understandings that inform all the Council's recommendations. These considerations should be accounted for in any decision or process related to grizzly bear management in the state of Montana and are representative of the communal voice existing among the diverse individual members of the Council.

1. All those living in or visiting Montana should expect the potential presence of grizzly bears on the landscape, and should have access to education, assistance, and resources involved with coexisting with grizzly bears.

2. The identification of areas between established recovery zones that best contribute to genetic and demographic connectivity is necessary to prioritize resource allocation, focus outreach and education efforts, build social tolerance, and proactively engage local communities and landowners.

3. As expansion occurs outside the four recovery Ecosystems and the landscapes in-between them in Montana, FWP and relevant agencies will have to balance this expansion with the need to prioritize resources that support both public and private lands. This would include resources, personnel, and conflict prevention/ mitigation strategies well ahead of grizzly bear expansion into unprepared areas.

4. The best available science should inform decisions in all aspects of grizzly bear management and conservation.

5. Strategies and tools aimed at proactively preventing or reducing conflicts are often effective and can be less expensive than compensating for conflict after the fact.

6. Strict enforcement of poaching is necessary for the long term conservation of grizzly bears.

7. Grizzly bear management requires communication, coordination, and timely consultation among governmental agencies, tribal entities, private landowners, and the public.

8. Montana's diverse landscapes and complex circumstances require flexibility in grizzly bear management decisions.

9. Cooperation with and consideration of working landscapes is essential to the successful expansion and connectivity of grizzly bears. These communities are an important part of the decision-making process.

10. Social tolerance is not uniform; it is a complex topic that is dynamic and variable across space and time. FWP and relevant agencies should strive to cultivate social tolerance through sound management decisions and conflict prevention measures.

11. Addressing the challenges to working landscapes, recreationists, and local communities on both public and private lands will require an inclusive and proactive effort.

12. Voluntary, incentive-based conservation efforts on lands should be encouraged and supported.

13. Both genetic and demographic connectivity are important to the long-term sustainability, persistence, and resiliency of grizzly bears. Connectivity areas will exist in diverse social and environmental settings. Not all

these settings are conducive to permanent habitation but should be managed to promote genetic and demographic connectivity in biologically suitable habitat, being mindful that biologically suitable does not always mean acceptable.

14. Increasing recreational use on public lands is an emerging challenge to grizzly bear recovery and management and could negatively affect grizzly bear recovery.

15. The Council recognizes the importance of large tracts of remote secure habitat. Sustaining and improving habitat security, managing road densities, and identifying and protecting natural food resources and other needs will contribute to long-term survival and resiliency of grizzly bears.

16. The effects of climate change should be considered when making decisions about grizzly bears.

17. In order to implement our recommendations, relevant agencies will need new funding from diverse entities and sources. Resources are key to the success of all our recommendations. As resources are developed and utilized, both public and private lands needs must be considered.

18. Grizzly bear conservation is a shared responsibility.

SECTION I.
Council Recommendations
Education and Outreach

The following recommendations were crafted with careful consideration and consensus from the 18 Council members. Education and outreach should engage all Montanans and visitors in the shared responsibility of grizzly bear conservation. In order to support, develop, and improve the range of grizzly bear education and outreach between FWP and the public, the Council offers the following recommendations:

1. In recognition of the grizzly bear being Montana's state animal and the strides made since the species was listed as protected under the Endangered Species Act in 1975, the Grizzly Bear Advisory Council recommends the Governor establish a date to annually celebrate and create awareness around the grizzly bear and the landscapes, communities, and continued collaborative efforts in Montana that have contributed to grizzly bear conservation.

2. FWP should provide easy access to education about hunting safely in grizzly bear country for resident and non-resident hunters in Montana.

3. All relevant agencies should provide residents and landowners with accurate information on the effective use of non-lethal methods to haze grizzly bears.

4. Relevant agencies should provide consistent messaging when communicating with the public about the differences among the terminology around relocation, reintroduction, and augmentation, and when each might be necessary or utilized.

5. Relevant agencies should create open and accessible communication channels between bear managers and the public to encourage communal efforts around bear awareness and conflict prevention.

a. Support bear managers as they create reliable and easy reports of bear sightings and conflicts near human settlements, towns, and cities.

b. Grizzly bear management on working lands will not be a static process. Communication is key to mutual understanding, innovative solutions, and trust. The council recommends regular engagement with working lands managers to inform grizzly bear management and policy.

6. FWP, in coordination with relevant agencies, should create consistency and timeliness around public access to grizzly bear mortality data across recovery Ecosystems.

7. FWP, together with partners, should explore ways to inform, promote, and incentivize Bear Aware programs in communities.

8. Relevant agencies should support educational efforts to build a common understanding of perspectives between agricultural producers and urban communities.

9. Relevant agencies should create and use consistent messaging around the use and effectiveness of bear spray.
    a. FWP should encourage bear spray distribution and training programs across the state, including but not limited to the following:
        i. Work with Inter-agency Grizzly Bear Committee (IGBC) and professionals in the outdoor industries to provide bear spray and training and to explore best management practices for businesses around bear safety for employees and clients;
        ii. Partner with outdoor recreation companies and retailers to offer grizzly bear safety training;

iii. Coordinate messaging on the efficacy and use of bear spray with the Montana Office of Outdoor Recreation and the Montana Office of Tourism; and
iv. Provide a bear identification and safety video including proper use of bear spray and couple it with the bear identification test online.

10. The Governor's office and FWP should work to fund and create a full time and permanent Grizzly Bear Information, Education, and Outreach Coordinator to support and contribute to the broader efforts of FWP's Wildlife Stewardship Outreach Specialist. The following considerations were identified by the Council for this position but should be pursued by the appropriate FWP staff regardless of this position being in place.

a. Develop and maintain a statewide Bear Aware program.

i. Together with partners, work to establish a statewide program and a way to certify Bear Aware businesses and communities.

b. Create a centralized location within FWP that includes available resources and a catalog of educational materials.

c. Coordinate with stakeholders to provide bear safety information and outreach.
i. Identify gaps where additional bear safety information and outreach is needed

d. Work with agency partners to address outreach and education needs on public lands.

e. Continue the FWP Grizzly Bear Education and Outreach Summit to:
i. Address conflict prevention, resource concerns, and ongoing challenges; and
ii. Create, report, and share consistent messaging and effective strategies.

f. Work with the Montana Office of Public Instruction, local teachers, agencies, and tribal partners to create and implement a K-12 grizzly bear curriculum.

Conflict Prevention and Reduction

Preventing conflicts with grizzly bears is essential to the development of social acceptance and the continued conservation of grizzly bears. Proactive, inclusive efforts to mitigate conflict can engage communities, protect private property, maintain human safety, and be an efficient use of limited resources, while minimizing associated bear mortality. The following recommendations are actionable items that can strengthen or support existing efforts.

11. Human/Grizzly Conflicts in and around Developed Areas

a. In areas where grizzly bears are or may be present:

i. FWP, along with local state, federal, and tribal entities, should: provide guidance for land use planning to prevent human/grizzly conflicts;

ii. Proactively recommend actions to governing bodies on how to minimize grizzly bear conflicts;

iii. Help local communities identify and use available local grants for conflict prevention; and

iv. Review and update all FWP subdivision recommendations (2012).[4]

b. FWP and IGBC should make the research, development, and funding of new and innovative tools and techniques for conflict prevention and aversive conditioning a high priority.

c. The Governor's office and FWP should work with partners to increase access to federal dollars for grizzly bear conservation and management that includes conflict prevention actions.

12. Agriculture

a. We strongly recommend the Governor's Office and the 2021 Montana Legislature fully fund the Livestock Loss Board (LL B) to provide dedicated conflict prevention dollars in order for the LL B to allocate funding for conflict reduction tools and practices.

b. All relevant state and federal agricultural and wildlife agencies should research and make recommendations on best management practices that help reduce depredations on livestock and non-livestock commercial losses.

c. Relevant agencies should integrate technology to allow for timely reporting of agricultural conflicts to neighboring farms and ranches.

d. FWP should increase and diversify partnerships, funding, and support for community-based groups and other organizations to:

i. Support conflict mitigation efforts and monitoring;

ii. Expand outreach efforts;

iii. Provide salary cost shares with local groups; and

iv. Provide proper resources for livestock producers to implement appropriate conflict prevention

13. Public and State Land

a. In areas where grizzly bears are or may be present:

i. Relevant agencies should create and enforce consistent food storage requirements across state and federal lands;

ii. Relevant agencies should work with partners to make bear resistant infrastructure available at all federal, state, and local campgrounds and other public recreation areas;

iii. FWP and relevant agencies should continue to work with partners to research and closely monitor impacts to grizzly bears from road densities and other human activity on public and state lands; and

iv. FWP should coordinate with public land managers to develop plans to address the general and seasonal impacts to wildlife from recreational use and to prevent conflicts between grizzly bears and people on the landscape, including but not limited to the following:

1. Encourage reduced maximum group sizes for public and special event use in recovery Ecosystems;

2. Encourage temporary trail closures and limit special use permits in areas with critical habitat conditions during appropriate times of year;

3. Consider future areas of connectivity in land management decisions;

4. Require that commercial or special use permit applications include specific plans to meet food storage order regulations, manage and reduce conflicts, contain attractants, and minimize impacts to grizzly bear habitat and food resources;

5. Consider identifying areas of Montana with minimal impacts to grizzly bear habitat and minimal risk of conflict to proactively prepare for participation in recreation planning processes; and

6. Ensure appropriate and timely analysis for new and proposed recreation activities n designated core grizzly habitat and connectivity areas on public lands, and move or reroute activities as determined by the analysis.

14. Waste Management/Sanitation

a. In areas where grizzly bears are or may be present:

i. FWP and relevant agencies should support the development of consistent local sanitation ordinances that require attractants to be stored in a bear-resistant manner and includes entities for enforcement.

ii. Counties and local governments are encouraged to work with local sanitation companies to explore the use of bear-resistant sanitation storage options. Sanitation efforts should be coupled with outreach, monitoring, and maintenance of infrastructure.

b. Outside of areas where grizzly bears are or may be present:

i. Communities and planning boards should proactively explore local sanitation practices.

Conflict Response and Protocols

Timely and consistent conflict response is necessary to build and maintain relationships between FWP and the communities where grizzly bears exist. Building these relationships prior to conflict will help to promote open communication and sharing of information if the need for response should occur. These recommendations are intended to increase FWP and other relevant agencies' abilities to facilitate positive engagement with those living with grizzly bears.

15. The State Legislature and FWP should make bear management specialists Full Time Equivalent (FTE) positions included in permanent base funding, provide each specialist with a year-round technician, and create more of these fully funded positions as needed. This would:

a. Allow for transfer of expertise from bear managers to bear managers-in-training;

b. Improve response time;

c. Allow bear managers to be proactive and mitigate conflicts; and

d. Allow time for relationship building, outreach, and communication with landowners, agriculture producers, and local communities.

16. Conflicts should be monitored and reported in a consistent manner across relevant agencies to effectively identify new and/or emerging areas of concern.

17. US FWS and relevant agencies should clarify management protocols for conflict bears and continue to share them with landowners, livestock producers, and communities to maximize transparency.

18. Relevant agencies should periodically review inter-agency Memorandums of Understanding (MOU s) for opportunities to improve efficiency and capacity for conflict response.

Grizzly Bear Distribution, Relocation, and Connectivity

Genetic and demographic connectivity among Montana's four recovery zones is important to the long-term viability of grizzly bear populations in the continental United States. These recommendations intend to balance the continued importance of public lands with the need for the involvement of private lands to support our vision for an interconnected metapopulation of grizzly bears in Montana.

19. FWP should continue to allow natural movement to new areas between all four identified recovery zones in Montana.

20. FWP and all relevant agencies should clearly define the "landscapes in-between" the four recovery zones in Montana that are important for genetic and demographic connectivity and the long-term sustainability of the grizzly bear.

21. FWP, in coordination with relevant agencies and through a public process, should evaluate and identify those landscapes that can reasonably be considered important for grizzly bear recovery and connectivity from those that cannot, and clearly distinguish these in its management plan. Such a distinction is necessary for determining appropriate relocation sites between the four recovery zones, as well as for prioritizing resources for outreach and education, transportation upgrades, and conflict prevention, reduction, and response efforts. These decisions should be in accordance with current Conservation Strategies.

22. In areas where grizzly bears are or may be present, FWP and relevant agencies should increase and promote research on habitat conditions that could support grizzly bear occupancy in order to better understand and track distribution trends.

23. Relevant agencies should expedite work with landowners, agricultural producers, and communities to prioritize the creation of new suitable relocation areas inside and between recovery Ecosystems which further the conservation, connection, and recovery of grizzly bears in Montana while ensuring existing land uses are supported.

24. Any new and existing agreements regarding population augmentation should be evaluated on a regular basis.

25. All transportation entities should coordinate with the Montana Wildlife and Transportation Steering Committee's efforts and the Federal Railroad Administration to reduce transportation mortalities, facilitate movement, and enhance public safety, including but not limited to the following:

a. Work with partners to develop a wildlife transportation safety campaign;

b. Work with appropriate entities to explore ways to minimize train/bear collisions due to grain spills and carcasses near train tracks;
c. Identify and model potentially important grizzly bear crossing points on major highways and seek funding to incorporate wildlife connectivity into the transportation system as infrastructure upgrades are made; and
d. Encourage voluntary incentive-based conservation practices in areas identified as important to wildlife passage and support allocating state and federal funding for such efforts.

Resources

The Council recognizes that current grizzly bear management and conservation resources are inadequate. Moreover, the Council sees the issue of resources as the greatest limitation, and therefore the greatest challenge, in working toward its vision of a landscape that supports both grizzly bears and people. Addressing these resource challenges will require a multipronged and long-lasting approach and needs to include public, private, and philanthropic efforts. The Council kept the issue of resources in mind throughout the process of drafting recommendations, and specific resource-related recommendations are included in the relevant sections of this document.

In an effort to start meeting the broader challenge of providing adequate resources, the Council would like to call attention to several of the most critical needs and suggest several ideas that can be used to inform future conversations. Recognizing that there are numerous, creative ways to meet resource needs, the Council focused much of its discussion on identifying existing gaps and systemic needs. By focusing on broad needs rather than on discrete opportunities, the Council hopes multiple funding pathways will be pursued. The Council feels that by fostering and supporting multiple, coordinated efforts, the state stands the best chance of meeting the resource needs it faces.

Needs:
1. A greater diversity of funding sources as well as greater stability in the resources generated;

2. Increased FWP staff capacity to meet the scope and scale of conservation and management needs and opportunities;

3. Improved access to and an overall increase in resources and tools necessary for the implementation and long term maintenance of education, outreach, and conflict prevention;

4. Full funding for the Montana Livestock Loss Board compensation program to compensate ranchers for the losses of livestock to grizzly bears;

5. Full funding of the Montana Livestock Loss Board's Livestock Loss Reduction and Conflict Mitigation Trust Fund;

6. Increased funding and support for voluntary, incentive-based conservation efforts undertaken by communities and individuals to improve habitat and/or reduce conflicts;

7. Increased funding and coordination for landscape level wildlife-friendly transportation projects;

8. Funding and support for community-wide bear-resistant sanitation programs to include ongoing monitoring, outreach, and maintenance;

9. Additional public relations efforts around grizzly bear conservation and management; and

10. Funding and support for grizzly bear research and the development of new and innovative tools and techniques for conflict prevention and aversive conditioning.

In addition to identifying these broad needs, the Council developed an initial list of possible sources and ideas to explore to meet these needs. We recognize there are many entities working on this issue in different ways. It would be beneficial for FWP to facilitate further analysis, coordination, and communication between partners around the challenge of resources. Ideas discussed by the Council that merited further research, analysis, and discussion included the following:

1. FWP should continue to explore ways to diversify agency funding. This is important to consider as Montana looks at potential income like the Recovering America's Wildlife and Wildlife Corridors Acts and the match that would be necessary to take advantage of these potential new funding opportunities.

2. Grizzly bears are part of the allure of Montana, bringing millions of tourists to the state each year. Analysis on

ways to access tourism related dollars is needed. Other states are also exploring this idea, and could be a resource in this process.

a. Work with Montana Office of Outdoor Recreation to explore ideas for funding wildlife conservation through the rapidly growing outdoor recreation community.

3. Establishing diverse, alternative, and sustainable economic streams would benefit both grizzly bears and people.

4. Natural Resources Conservation Service (NRCS) conservation practices do not currently cover grizzly bear conflict prevention actions. We encourage the NRCS to modify or add new "Conservation Practices:" e.g., carcass pickup and composting, electric fencing, livestock guard dogs, range riding, and other conflict prevention tools.

5. FWP should initiate improved coordination and collaboration to link and leverage existing efforts, tools, and resources and to ensure better prioritization of need.

6. Wildlife friendly transportation infrastructure is important to landscape connectivity and requires significant funding. We encourage FWP and the Montana Department of Transportation (MDT) to continue to work with partners to explore and expand ways to meet connectivity and transportation-related goals.

7. Work with state and national partners to explore, create, and implement a dedicated federally-appropriated grizzly bear conservation fund.

8. In an effort to provide a long-term and stable funding source, the Council considered whether a portion of existing tax revenue could be targeted toward grizzly bear conservation. We encourage broad and inclusive partnerships to continue the exploration of this idea.

9. Voluntary and/or opt-in fundraiser ideas at both the state and federal level should be explored as mechanisms to increase funding for grizzly bear conservation and management.

10. Explore the use of social media to garner funds for education and outreach programs.

11. The Council recommends the continuation of the $1.38 million federal appropriation Congress allocated in FY20 to pay for nonlethal conflict-prevention specialists employed by Wildlife Services in Montana and other states.

12. The federal government, state legislature, and public stakeholders should encourage an excise tax on outdoor recreation gear and equipment like the Pittman-Robertson and Dingell-Johnson Acts have done with hunting and fishing gear.

13. Expand the US FWS Wolf Livestock Demonstration Grant Project to include grizzly bears and increase the annual amount of program funding available.

14. To save agency time and effort, the Council recommends the establishment of a voluntary, inclusive citizens' working group to research funding possibilities and create pathways to obtain them.

SECTION II.
Council Input

Section II contains input from the Council for items that received substantial consideration but did not lead to full consensus among the members of the Council.

Council Discussion around the Role of Hunting

Substantial deliberation was given to the role of hunting; however, because of the diversity of interpretations of available science, backgrounds, values, and opinions individually held by Council members, we cannot reach consensus that hunting has a role in grizzly bear management. The Council received a large number of public comments regarding hunting. The comments also represented a large disparity of views and were acknowledged in our conversations. Our process is presented as such and includes opposing views and discussion for context and consideration. The conversation on the role of hunting focused on two threads: (1) consideration of the role of hunting; and (2) beyond the question of whether there should be a hunt, what guidance would the Council like to provide, without consensus, in the event that the Montana Fish and Wildlife Commission moves forward with hunting regulations.

Considerations around the Role of Hunting

Considerations supporting the role of hunting	**Considerations opposing the role of hunting**
A grizzly bear hunt would not take place until ESA protections have been removed and grizzly bears are put under state management. At that time, a conservative, scientifically-sound hunt of grizzly bears could take place like other predator species. While hunting can be a useful tool in managing grizzly bear populations, it will not replace the need for conflict prevention. If a hunting season is under consideration, cooperating agencies should focus on sharing expertise, best available science, knowledge of geographic areas, and the status of connectivity. Although specifics regarding the hunting of a recovered grizzly bear population will be unique to the ecosystem and legal jurisdictions involved, we support hunting regulations that reflect the best available science, are adaptable to changing factors, are established in a public process, and are consistent with standards in the ecosystem specific Conservation Strategies. Regulated hunting can provide a tool to manage grizzly bears. Council members participated in the FWP social science survey concerning grizzly bears, and 14 of 18 members answered in support of an eventual grizzly bear hunt in Montana. Montana has a history of hunters being at the forefront of wildlife restoration and conservation by providing funding, management, and habitat protection that have helped us achieve the wildlife abundance we enjoy today. Offering regulated hunting of grizzly bears could solicit, build, and retain support for continued grizzly bear management from the sportsmen groups who have historically funded the wildlife management programs. Citations: *https://drive.google.com/file/d/1LJYub0Xd6hh__daq3UhfaftC-Abfs8q6/view*	Public comments made to the GBAC show that hunting of grizzly bears is a highly divisive issue. A grizzly bear hunt could be socially divisive at a time when Montanans need to work together in support of conservation, management, and those challenged with living with grizzly bears. A grizzly bear hunt will not remedy the financial needs of FWP for grizzly bear management and could jeopardize public support for alternative funding mechanisms. Concern over the implementation of an immediate grizzly bear hunt has contributed to public opposition to removal of ESA protections for grizzly bears in the Northern Rockies. Hunting grizzly bears might not increase their acceptance, but scientific evidence does show that increased conflict prevention measures and education increase social acceptance of grizzly bears. Scientific evidence shows that low hunter-harvest rates, as would be proposed by FWP, do not reduce human–bear conflicts or increase the safety of people around grizzly bears. Hunting could be an impediment to movement and population linkage and could threaten the distribution, abundance, and social structure of grizzly bear subpopulations. Scientific evidence shows that heavy hunter harvest can reduce bear numbers and distribution, but the low harvest rates focused on males proposed by FWP would likely play a minor role in managing grizzly populations. Hunting does not target problem grizzly bears. Citations: *https://drive.google.com/file/d/1VfJIOkNaDEBhZ5QsN8_2mObYYG98dsUL/view*

Considerations for a Proposed Grizzly Bear Hunt

The Governor's Executive Order requested the Council address the role of a grizzly bear hunt, if a hunt were to occur. The following guidelines were provided by a significant number of Council members.* We acknowledge that hunting is not likely to be an effective tool for conflict prevention or reduction.

• We encourage the take of bears where the desired outcome is a lower bear density, recognizing that it will not mean no bears in those areas, but where the management challenges are significant.

• Female grizzly bears with dependent young, as well as dependent young, should be protected from hunter harvest.
• Hunting season(s) may also be timed to reduce exposure of females to harvest. Early spring and late fall hunts tend to focus hunting pressure on males.

• Regulations should include dynamic season closure prior to tag delivery based on static population levels.

• Hunting should be limited and follow the North American Model of Wildlife Conservation. Grizzly bear license fees should be modeled on moose, bighorn sheep, and mountain goats, with the non-refundable drawing fee going to grizzly bear management and conservation.

  ° Tags could include a governor's tag to sell and a SuperTag for everyday people for a chance to draw;

  ° Tags should be once-in-a-lifetime tags;

  ° Out-of-state hunters must have a licensed guide;

  ° No baiting or any use of anthropogenic attractants can be used;

  ° Hunters should be strongly encouraged to carry bear spray;

  ° People that draw a grizzly bear license should be required to participate in training on grizzly bear ecology, identification, and safety; and

  ° Grizzly bear harvests should be reported immediately.

* 14 of the 18 council members contributed to these guidelines.]

Appendix F.
FWP policies and protocols re: grizzly bear orphan cubs

Purpose of Policy and Protocols

This document is intended to serve two purposes: 1) as a proposed section of the Statewide Grizzly Bear Plan, currently just underway but not expected to be completed until sometime in 2022, and 2) as stand-alone statement of policy that will provide clarity and standardization prior to formal adoption of the larger statewide plan.

These policies and procedures are intended to complement and support the FWP "Montana Wildlife Rehabilitation Center Intake Policy" (Intake Policy 2020, hereafter), which was approved on December 31, 2020 and should be consulted in conjunction with this document.

This document has two intended audiences:

a) Internally, for FWP staff, to clarify roles and responsibilities, and to reduce uncertainty during what is typically a stressful situation; and

b) Externally, to the general public, to clarify the process and to explain the rationale for decisions that may at first seem poorly considered or counter intuitive.

Background and Need Statement

FWP has a long history of temporarily caring for, and subsequently releasing into the wild orphaned black bear (Ursus americanus) cubs. It has also, on occasion, come into possession of grizzly bear (U. arctos) cubs, and faced decisions about how to best proceed. To date, however, FWP planning has not standardized or formalized protocols for making these decisions.

This policy will provide guidance for field practitioners (typically 'bear managers', but potentially wardens or other biologists), regional wildlife program managers, regional directors, Montana Wildlife Rehabilitation Center (MWRC) staff, and other Helena-based staff. While grizzly bears are listed under the ESA, it will also provide a useful reference for USFWS staff who may be required to consult or approve FWP actions. Finally, it can serve an informational role to the public who may have legitimate questions about the basis for decisions FWP makes on these difficult issues.

Nomenclature and Definitions

In this document, the following nomenclature and definitions are used:

- "Cub" means a bear not having reached its first birthday. By convention, grizzly bears are considered to be born on ~ 1 February. "Cub" in this document is identical in meaning to "Grizzly bears (< 12 months of age)" as used in the Intake Policy (2020).
- "COY" is often used elsewhere to mean "cub-of-the-year." This document does not use that terminology, and instead defines "cub" specifically.
- "DMA" means demographic monitoring area, as mapped in NCDE and GYE conservation strategies.
- "FWP" means Montana Fish, Wildlife and Parks staff
- "MWRC" means the Montana Wildlife Rehabilitation and Education Center, a part of the Montana Wild facility, owned and operated by FWP.

- "Offspring" in this document refers generally to either cubs or yearlings.
- "Orphan" means a juvenile bear whose mother has died while still caring for that year's offspring.
- "Rear" (or "captive reared") refers to the temporary care and feeding of bear offspring, typically with the intention, if possible, of releasing the animal back into the wild at some appropriate time.
- "Rehabilitate" is defined by Beecham (2006) as "treatment and temporary care of injured, diseased, and/or displaced indigenous animals, and the subsequent release of healthy animals to appropriate habitats in the wild", and is thus very similar to the term "rear" as used in this document. Despite its common use, we avoid the term "rehabilitate" as part of policies and procedures for grizzly bears because it implies that the animal has done something wrong and because releasing orphans back to the wild after captive rearing is NOT currently approved by FWP.
- "Rewild" in common usage refers to releasing back into the wild an animal that has been held in captivity temporarily. Despite its common use, we avoid the term "rewild" here because of its use in other contexts.
- "Yearling" means bears older than cub, but not yet having reached its 2nd birthday. By convention, grizzly bears are considered to be born on ~ 1 February.

Options for Orphaned Grizzly Bear Cubs

As articulated by Beecham (2006), and frequently incorporated into other jurisdictions' policies and procedures on orphaned black bears, there are four alternative courses of action facing a management agency responsible for responding to orphan bear offspring: 1) releasing in the wild, either onsite or nearby, 2) capturing and placing permanently in a captive facility, 3) capturing and rearing temporarily in a suitable facility with the objective of future release into the wild, and 4) euthanasia. Advantages, drawbacks and issues surrounding each are summarized here:

1) Releasing orphaned offspring (or simply declining to attempt a capture) at or near their capture site should always be considered and in **most situations is FWP's preferred approach.** Although grizzly bear cubs captured in their first spring are unlikely to survive their first winter, cubs older than 6 months of age have non-negligible survival probability, with that probability with increasing proximity to the time they would normally have followed their mothers to winter hibernation dens. Recent work has indicated that orphaned black bear cubs released this young have survival rates similar to non-orphaned offspring. Anecdotal evidence from Montana also indicates that grizzly bear cubs orphaned late in summer or fall have survived at least through their first winter and possibly longer (W. Kasworm, unpublished, 2020; a cub orphaned in fall was documented to survive to adulthood by J. Jonkel in Yellowstone; an orphaned cub was documented as surviving on its own near Freezout Lake by M. Madel). Draft guidance on dealing with orphaned grizzly bear cubs in British Columbia uses 1 August as a cut-off; after this date, priority for orphaned cubs is to allow them a chance to survive in the wild. Some members of the public may object to releasing animals near their capture site, particularly if their mother had been involved in human-bear conflicts, or was considered to be a nuisance[7]. Other members of the public

[7] Although data are sparse, there is currently no evidence that young cubs of a nuisance bear are more likely to become nuisance bears themselves than any other bear. All available evidence suggests that nuisance behavior is learned rather than inherited. Thus, if a cub is orphaned at a young enough age to have had no opportunity to learn the behavior that led to bear–human conflict, it can be considered innocent of any misdeeds of its mother.

may object to releasing to the wild an animal with a high probability of dying shortly afterward. However, retaining the option for these animals to survive in the wild in their native habitat is consistent with FWP's fundamental approach of managing populations rather than individual animals, and to the degree possible, keeping wild animals wild.

2) As per Intake Policy (2020), FWP is authorized to accept, and has in the past accepted orphaned grizzly bear cubs (but not yearlings) for permanent captive placement[8]. However, MWRC is **not designed, equipped, or able** to care for grizzly bears permanently, and its capability to handle such animals temporarily is also severely limited (currently a maximum of 4 grizzly bear cubs). In recent years, FWP has found it increasingly difficult to find placement for grizzly bears at suitable long-term captive facilities. Few facilities that include grizzly bears in their collection need them, in part because they generally want only a few, and captive bears live many years; we anticipate this situation will continue. Some people object to keeping grizzly bears in captivity, but even when viewed as an acceptable outcome it should not be assumed to be possible. Caring for such bears, even for a short time, and arranging for a long-term captive solution is time and resource intensive, require staff to spend many hours finding placement and coordinating transfer of cubs if placement is found, and thus necessarily reduces time and resources available for other MWRC activities. For these reasons, Intake Policy (2020) stipulates that MWRC will not accept cubs that are unlikely to be placed permanently in an approved captive setting.
3) Orphan bears can be cared for in special captive situations for a limited time, during which stringent measure are taken to minimize the chance of habituation to people, and subsequently released into the wild. Current policy is that grizzly bears may not be transferred to a facility (MWRC or other) and later released to the wild except for an accepted, approved recovery project in which augmentation or reintroduction is a clearly articulated method for achieving conservation/management objectives in the specified area. There is much less experience doing this with grizzly bears than with black bears in North America. Documentation is scanty, and success has been < 50%. Captive rearing and subsequent release of grizzly bears is best considered an experimental approach as of this writing, thus choosing this route should be considered, at least in large part, to be a research project. If possible, some members of the public are likely to object to a program in which a bear that has been captively-reared is released near them, fearing problem behaviors or bears generally. Other members of the public are likely to support this option because they see it has a humane and caring solution. This option (rearing and subsequently releasing to the wild orphaned cubs) is not currently available because no facilities in North America have both the capacity and necessary permitting to provide this service; we do not expect this situation to change in the near future.
4) Euthanizing orphan bears is always an option, particularly when the above three options are foreclosed. It is not technically difficult to do, and educational uses for hides and skulls can generally be found without great

[8] An FWP approved facility is a facility accredited by the American Zoological Association and/or facility approved by the FWP Wildlife and Enforcement Divisions to possibly include Zoological Association of America facilities. Other certifications may be considered on a case by case basis and facility by facility basis when the care of the subject animal can be assured to meet AZA or ZAA level of care for the species involved.

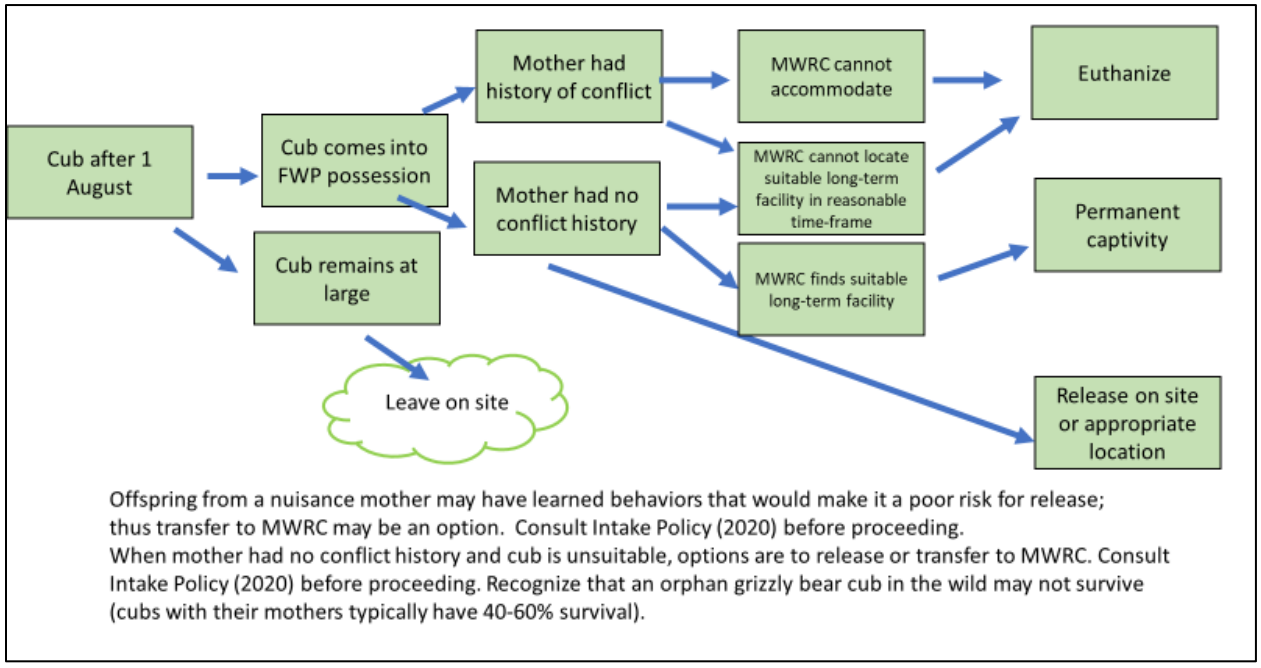
difficulty. Some members of the public who oppose having wild animals in captivity find euthanasia the least objectionable option, and argue that it can be more humane than other options. Other members of the public find euthanizing young animals with no history of conflict repugnant.

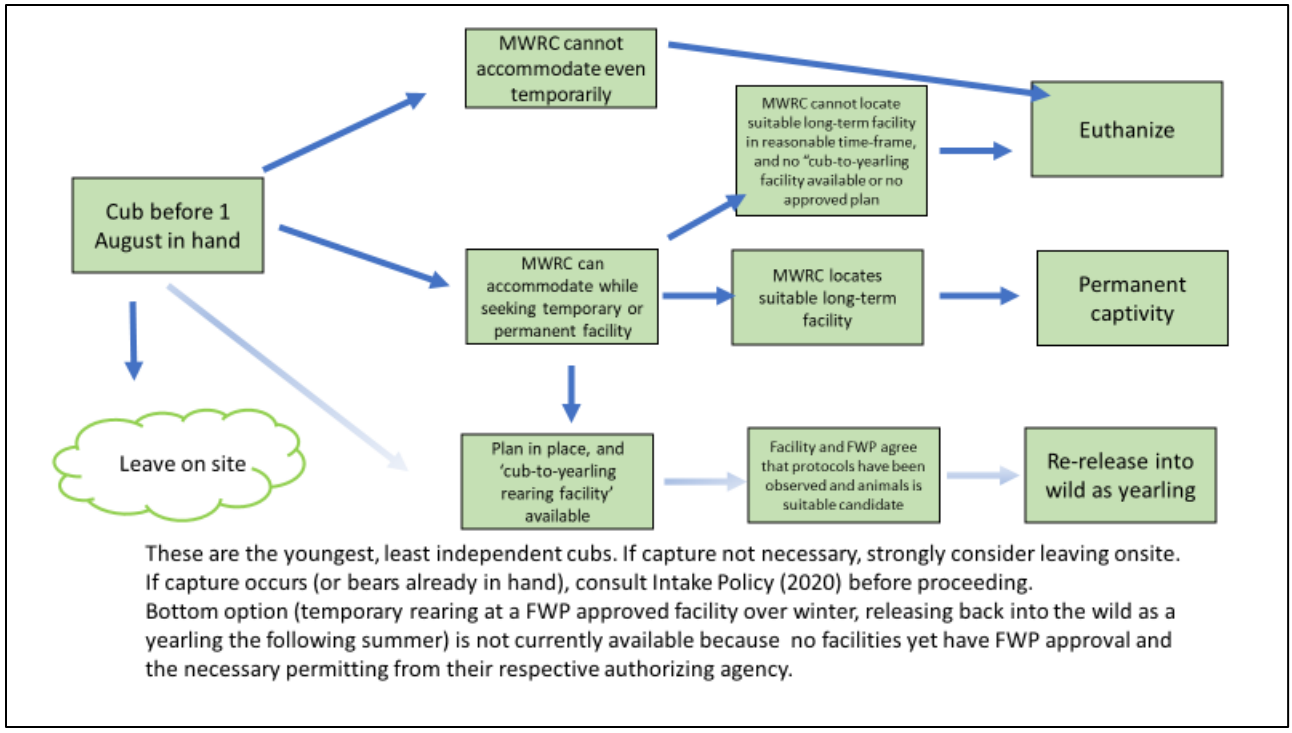
A possible fifth option, cross-fostering with either grizzly bear or black bear females, has been tried with limited success in black bears, but is considered too untested and resource-intensive to be considered further in this document).

Responsibly caring for grizzly bear cubs in captivity is considerably more specialized, intensive, and difficult than doing so for black bear cubs. The difficulties increase if the intention of rearing cubs is ultimately release into the wild (e.g., having holding enclosures located at a site that are far removed from the public and staff/volunteers, and having only a single individual to perform all care and feeding, ensuring bears do not become habituated). (It is much more difficult to prevent habituation in grizzly bear cubs than in black bear cubs). MWRC has limited capacity to care for grizzly bear cubs temporarily while transport to an approved permanent captive facility is arranged (see Intake Policy 2020) and is not designed for, or capable of, rearing grizzly bear cubs for release back into the wild. Some limited capacity for provisional holding pending permanent captive placement may also exist at the Grizzly and Wolf Discovery Center in West Yellowstone. MWRC is also initiating a process of regular communication with AZA representatives to facilitate information flow regarding the zoo community's capacity to accept grizzly bears for permanent placement. Although there exist numerous facilities capable of handling black bear cubs, FWP is aware of only a single facility in North America doing so for grizzly bears (see below), and it is not currently permitted to accept Montana grizzly bears.

Process flow-chart

Step-down plans are provided here for field and agency decisions on grizzly bear orphans in hand. Two flow-charts, depending on age of orphan under consideration (from older to younger). Under listed status, approval from USFWS is required. Deviations from this step-down plan will occur only with approval from both Regional Supervisor and Wildlife Division.





Public Information Plans

FWP recognizes and respects the high level of public attention that often attends incidents involving bear cubs. One purpose of this policy is to provide transparency and clarity to the interested public. That said, each situation will have its unique characteristics; thus, information flow from Regional staff on the ground to Helena-based communication managers will be essential. At the same time, staff on the ground should not have to carry the entire burden of messaging actions that may engender public unhappiness. Thus, the CommEd Division in Helena will work closely with Regional staff to understand each situation in detail, and will serve as a clearinghouse for information requests from the public.

Deviations from these Policies and Protocols

Any deviation from this policy requires prior written authorization by the FWP Director in consultation with the Wildlife Administrator, Enforcement Administrator, and Communication & Education Administrator and the appropriate FWP Region. It is the responsibility of the FWP Region to initiate an exception due to an extenuating circumstance. Extenuating circumstances must be clearly articulated through written documentation.

Appendix 1:
Brief summary of relevant research and experience with grizzly bear orphan cubs

In North America, considerable experience has been gained in reintroducing orphaned black bear cubs into the wild starting as early as the 1970s (Alt and Beecham 1984). Clark et al. (2002) reported high survival of orphaned black bear juveniles released in the Smoky Mountains of Tennessee and North Carolina as late-year cubs or mid-summer yearlings. Smith et al. (2016) reported that orphaned black bear cubs released in New Hampshire during the months of May and June survived at acceptable rates and stayed out of conflict situations in a year in which natural foods were abundant, but not in a

year when natural foods were scarce. Blair et al. (2019) documented 100% annual survival among yearlings and 64% annual among black bear cubs (released just prior to winter denning) during their first-year post-release in Tennessee and North Carolina. Three of the 42 bears were later involved in conflict situations, all of which had mothers with a history of such conflict prior to being orphaned.

Jonkel et al. (1980) reported on an early experiment with a grizzly bear cub in Montana. A female cub obtained after its mother was killed on July 31, 1975 was transferred first to the precursor facility to MWRC in Helena, and later to the University of Montana in Missoula, where it was fed and cared for. It was radio-collared and placed in an artificially constructed den on November 11, at a weight of approximately 51 kg (112 lbs.). The cub stayed in the vicinity of the artificial den for a few days, dropped the collar, but then moved away and evidently denned elsewhere. The animal was observed a few times the following spring, and appeared to be in good condition. Palomero et al. (1997) reported normal denning and survival at least through May of the following year of 3 unmarked brown bear cub orphans in Spain (one cub was documented to have survived at least until November). Swenson et al. (1998) reported survival of and normal development of 5 orphaned brown bear cubs in Sweden. Extrapolation of these results to North American grizzlies should be made with caution however, because in some ways the life-history characteristics of U. arctos in Europe more closely resembles that of American black bears, who typically leave disperse from their mothers a year earlier than North American grizzlies (Zedrosser et al. 2011, Steyaert et al. 2012).

A recent and authoritative review of releasing yearling bears that had been orphaned as cubs back into wild habitat after having spent time in captive facilities is was provided by Beecham et al. (2015). Most information on orphaned U. arctos cubs reared in captivity from some months and released as yearlings came from Romania. Survival was similar to best estimates of non-orphaned yearlings, and conflicts were reported as rare. Breck et al. (2008) provided analyses indicating that food conditioning in black bears is neither inherited nor learned from their mothers. Morehouse et al. (2016) provided evidence that conflict behavior in brown bears is learned from their mothers rather than inherited. These authors did not address the implications of their findings for orphaned cubs, but it seems reasonable to conclude that the amount of time a cub spends with its mother before being orphaned would thus influence it probability of adopting conflict behavior.

Appendix 2 [currently not available]: Details on option 3 – temporary rearing followed by release

Additional detail and policies are provided on Option 3 because it is controversial (many people having strong opinions favoring or opposing it), it is experimental in North America, and experience with it in Montana in rare.

As of this writing, no facility has both the capability to rear grizzly bear cubs for subsequent release into the wild and a permit to accept cubs from Montana. The Northern Lights Rescue facility in Smithers, British Columbia, has expressed interest in obtaining provincial permitting to begin such work, but is not currently permitted to accept and rear cubs obtained from outside British Columbia. Additionally, current FWP policy is that grizzly bears may not be transferred to a facility (MWRC or other) and later released to the wild except for an accepted, approved recovery project in which augmentation or reintroduction is a clearly articulated method for achieving conservation/management objectives in the specified area.

Summary of Northern Lights Wildlife Shelter, Smithers, British Columbia, as a potential rearing location for orphaned Montana grizzly bear cubs

From 2007 through June 2020, Northern Lights Wildlife Shelter (NLWS) has accepted 26 grizzly bear cubs, all the results of orphaning events within British Columbia. Two of those died shortly after intake. All of the remaining 24 have been reared at NLWS. Five additional cubs were accepted in 2020 for release in 2021. The NLWS protocol has focused on getting cubs as large as possible before their planned release in mid-summer of the year following intake in order to minimize their vulnerability to intraspecific predation. To this end, cubs are fed throughout the winter which obviates their physiological need to hibernate. To minimize the opportunity for habituation to humans, NLWS policy has been to limit caretakers to 1; however, this has not always been strictly enforced. NLWS is a fenced facility, however, at least a couple of escapes have been documented.

All 24 living cubs have been released as yearlings. However, little is known regarding the survival and conflict history post-release of these 22 bears. Ten (42%) experienced collar failure or lost their collar prior to their first winter (quite possibly because they lost, rather than gained weight post-release as a result of their atypical winter feeding); 3 (15%) additional bears dropped their collars while in hibernation or shortly after emergence. Seven of the 24 were known to have died within a year: 1 by a hunter, 1 killed illegally, 1 evidently killed by another bear, 1 hit by vehicle, and 3 (15%) were removed due to human–bear conflicts. Two other animals were released without tracking collars.

The need for better understanding successes and failures of this program is now being addressed through a cooperative study headed by Dr. Lana Ciarniello, and funded largely by the (Canadian-based) Grizzly Bear Foundation. Intensive efforts will be made to follow released yearlings, including re-capture attempts for animals losing their collars but surviving through their first post-release winter.

Under B.C. policy, all releases must occur within 50 km of the site of initial capture. NLWS is not currently permitted to accept bears from outside the Province; this could change in future. For the immediate present, however, B.C. policy is to prioritize B.C. bears, and to support the captive-rearing and release efforts in a research context.

Should NLWS be permitted **at some future time** to accept and rear Montana-born grizzly bear cubs and B.C. government permit the movement of these bears across the international border, the following considerations would apply:

1) Current policy is that grizzly bears may not be transferred to a facility (MWRC or other) and later released to the wild except for an accepted, approved recovery project in which augmentation or reintroduction is a clearly articulated method for achieving conservation/management objectives in the specified area. Grizzly cubs would only be considered for release if it was for an approved recovery need, such as reestablishing bears in new areas or augmenting a low population such as in the Cabinet-Yaak.
2) As is currently the case, FWP would view all releases as experiments, and prioritize learning from each. As is currently the case in B.C., FWP would coordinate closely with Dr. Ciarniello to assure that data collection protocols were similar to those in B.C., and that these animals would contribute to long-term understanding of captive rearing and release.
3) Unlike the current NLWS protocol, Montana bears would not be fed over-winter, but instead, would be allowed to enter their normal hibernation state. NLWS is currently prioritizing the size of released yearlings, in an attempt to maximize survival. However, cubs fed during the winter of their 1st birthday grow to > 300 lbs., and thereafter are destined to larger-than-average body size, necessitating high caloric intake to avoid hunger for the remainder of their life. Their higher than average foraging requirements, in turn, make these animals more vulnerable to the temptations offered by anthropogenic sources of food, and thus conflicts with people. In short, there is a trade-off between minimizing intraspecific predation and minimizing the probability of conflict behavior. Optimizing the former argues for getting bears as large as possible prior to release; optimizing the latter argues for a more typical winter-hibernation period, even if that means release at a smaller (and more vulnerable) size. B.C. has opted to maximize survival at the risk of conflict. In Montana, this calculus differs, because if experimentally captive-reared yearlings become conflict

bears, the negativity of that would redound to all grizzlies, not just to those yearlings. Thus, Montana bears housed by NLWS would be allowed to hibernate, even if that means they face higher risk of intraspecific predation after release.

4) Unlike in B.C., Montana would not require bears to be released within a specified radius of their capture or orphaning site. As stated above, they would only be released in areas where there is an approved recovery need such as to augment a low population, where they have the best chance to contribute to population growth (which will also reduce their likelihood of encountering infanticidal conspecifics)

The following guidelines would apply, should permitting by Northern Lights or a similar facility approved by FWP occur in future.

1) An articulated and approved recovery need must be in place describing the role of cubs in the recovery effort. The release site must be approved by the Fish and Wildlife Commission, and if a new site, the proposal must also undergo MEPA review.
2) A written, post-rearing release plan must be approved by the regional supervisor in the region which release is planned, as well as by the FWP Director or authorized representative. The plan must include:
   a. A first, second, and third option indicating the precise location (in latitude/longitude coordinates) where the bear(s) would be released;
   b. A public version of that location, providing the general location but not the specific latitude/longitude;
   c. Evidence that the bear(s) in question are not habituated to people;
   d. The date, plus or minus 10 days, of the planned release;
   e. Written documentation of plans for complying with 87-5-725, MCA, requiring public notice on the FWP website and, where practical, by personal contact, of the general area where the animal will be released, as well as how that information can be accessed; and written documentation of landowners permission, if release is to occur on private property;
   f. Written documentation of at least 1 public meeting in the county or neighboring county of the planned release having been completed, including a summary of public reaction to the concept of releasing a yearling captively raised from orphaning as a cub. This would typically be done as part of required MEPA process.
   g. A clear plan for monitoring the movements, survival, and potential conflict behavior of the released animals. All animals will be ear-tagged and permanently tattooed. In addition, a minimum tracking requirement for yearlings released after captive rearing is VHF telemetry equipment that is expected to be retained by the animal and transmit for at least 3 months.
3) General policies on geographic placement of orphaned cubs and reared in a FWP-approved facility:
   a. Animals obtained as cubs from within the DMA surrounding the GYE will not be released within the GYE DMA.
   b. Animals obtained as cubs from within the DMA surrounding the NCDE will not be released within the NCDE DMA, but may be released within the GYE DMA (i.e., with the intent of potentially adding to allelic diversity in the latter).
4) Other considerations
   i. Hard release only, no soft release

ii. Funding

1. The captive facility would be responsible for the costs of rearing the orphan.
2. FWP would be responsible for transportation costs.
3. We anticipate that, because of public sentiment, finding funds for rearing orphan cubs from private sources will not be difficult. FWP policy is that, because a higher priority remains preventing human–bear conflict, resources spent soliciting financial support will prioritize bear management operations.
4. Cross-border permits and CITES permits would be a collaborative effort.

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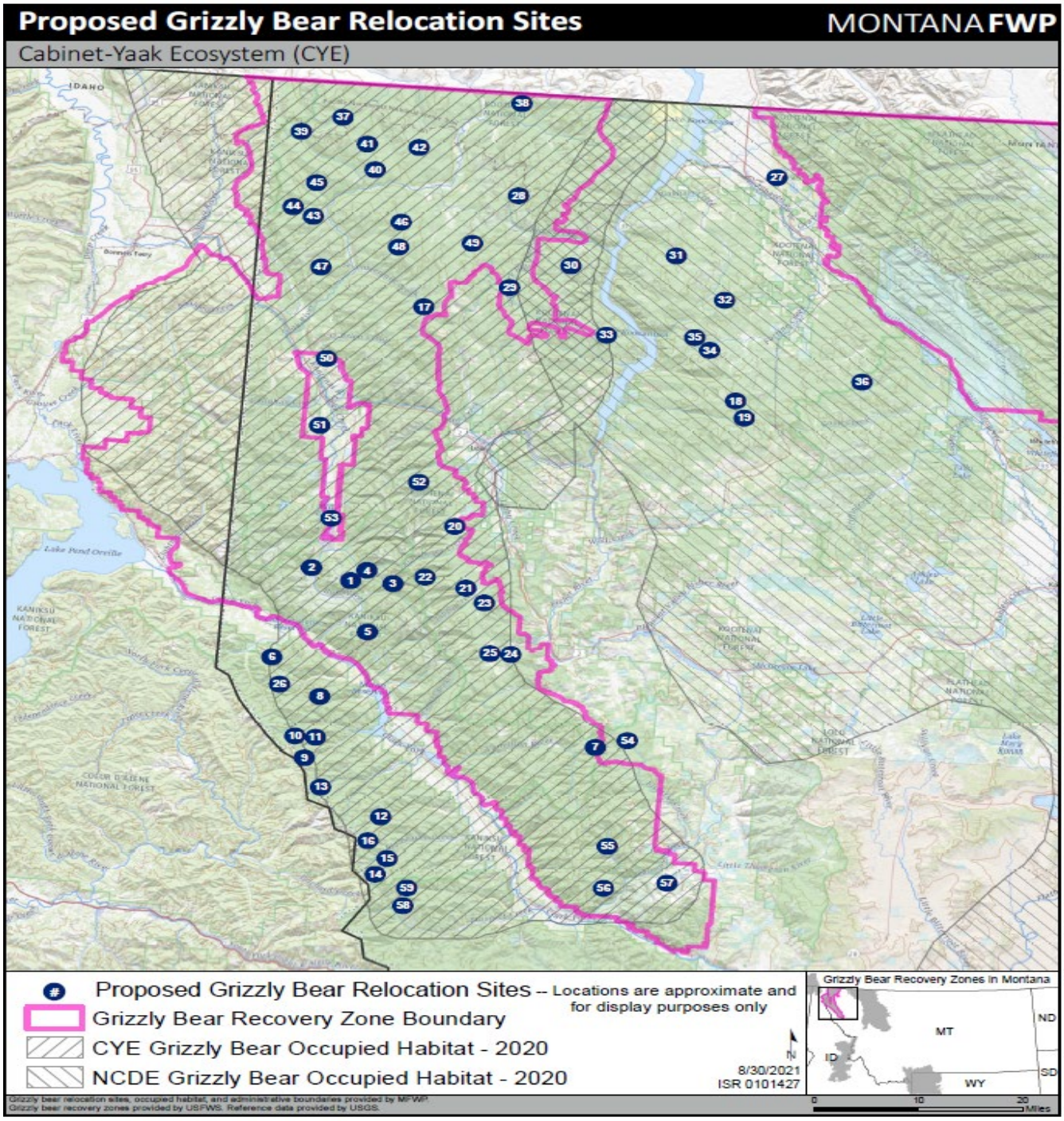
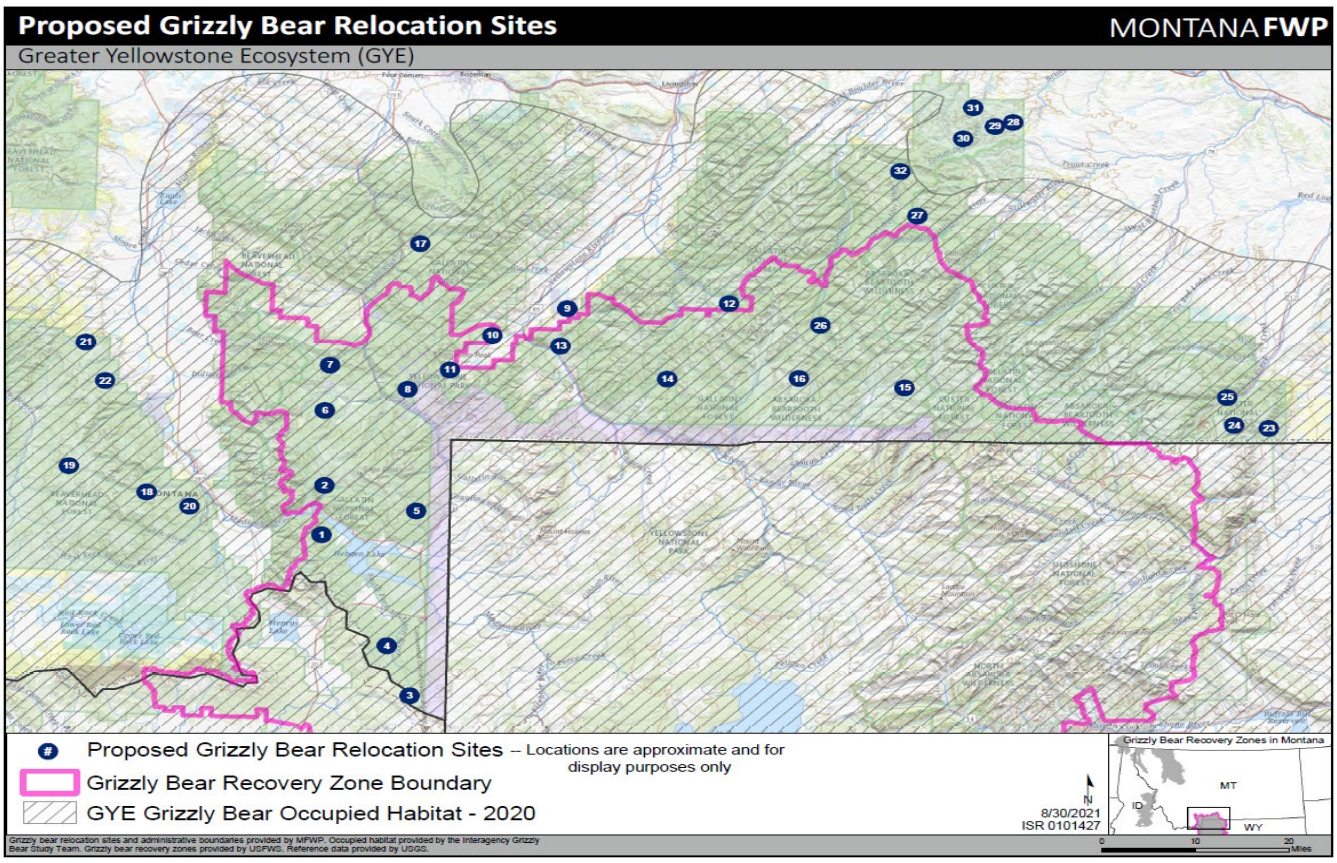
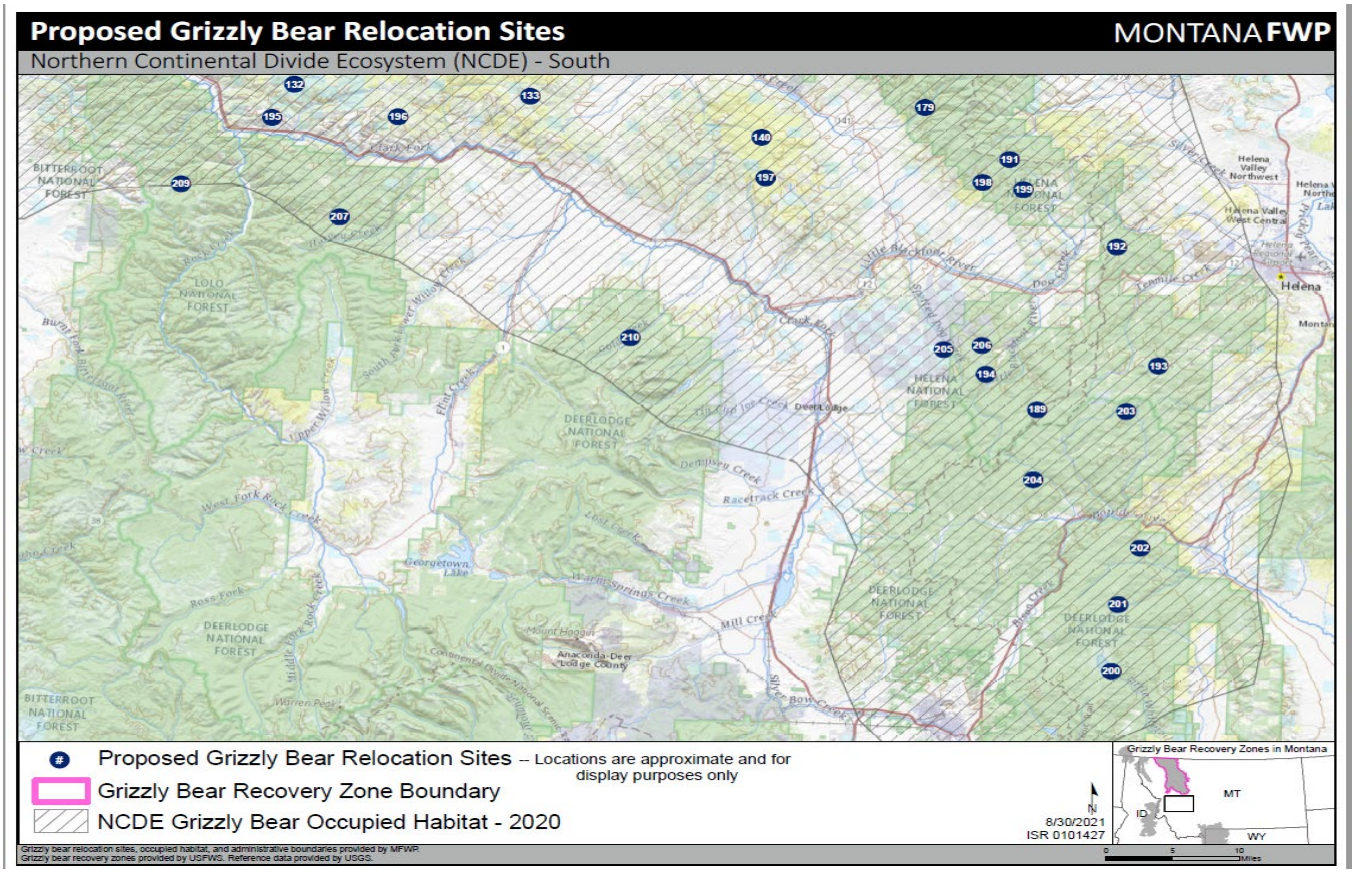
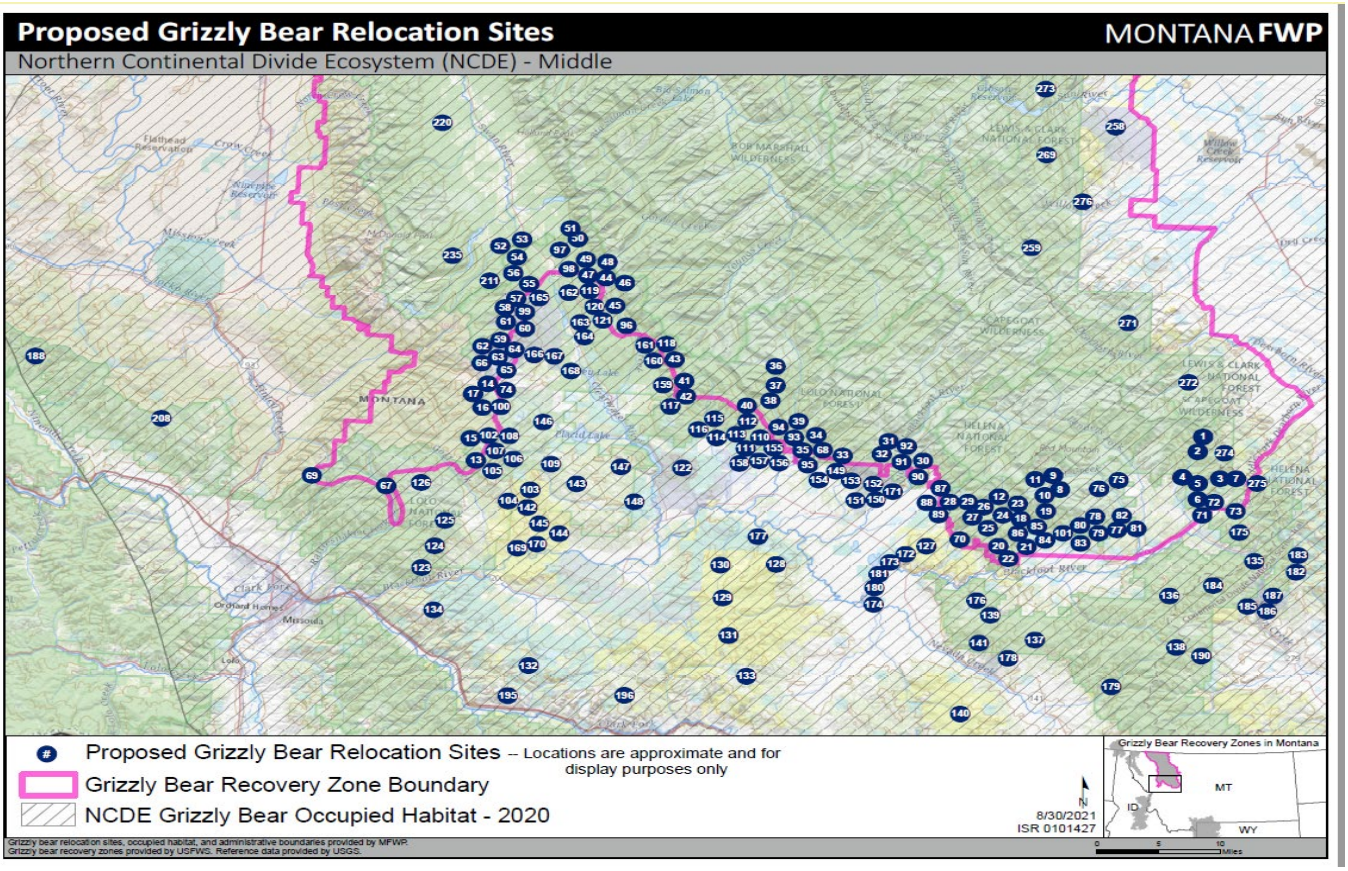
Appendix G.
Maps of Commission-approved sites for release of grizzly bears

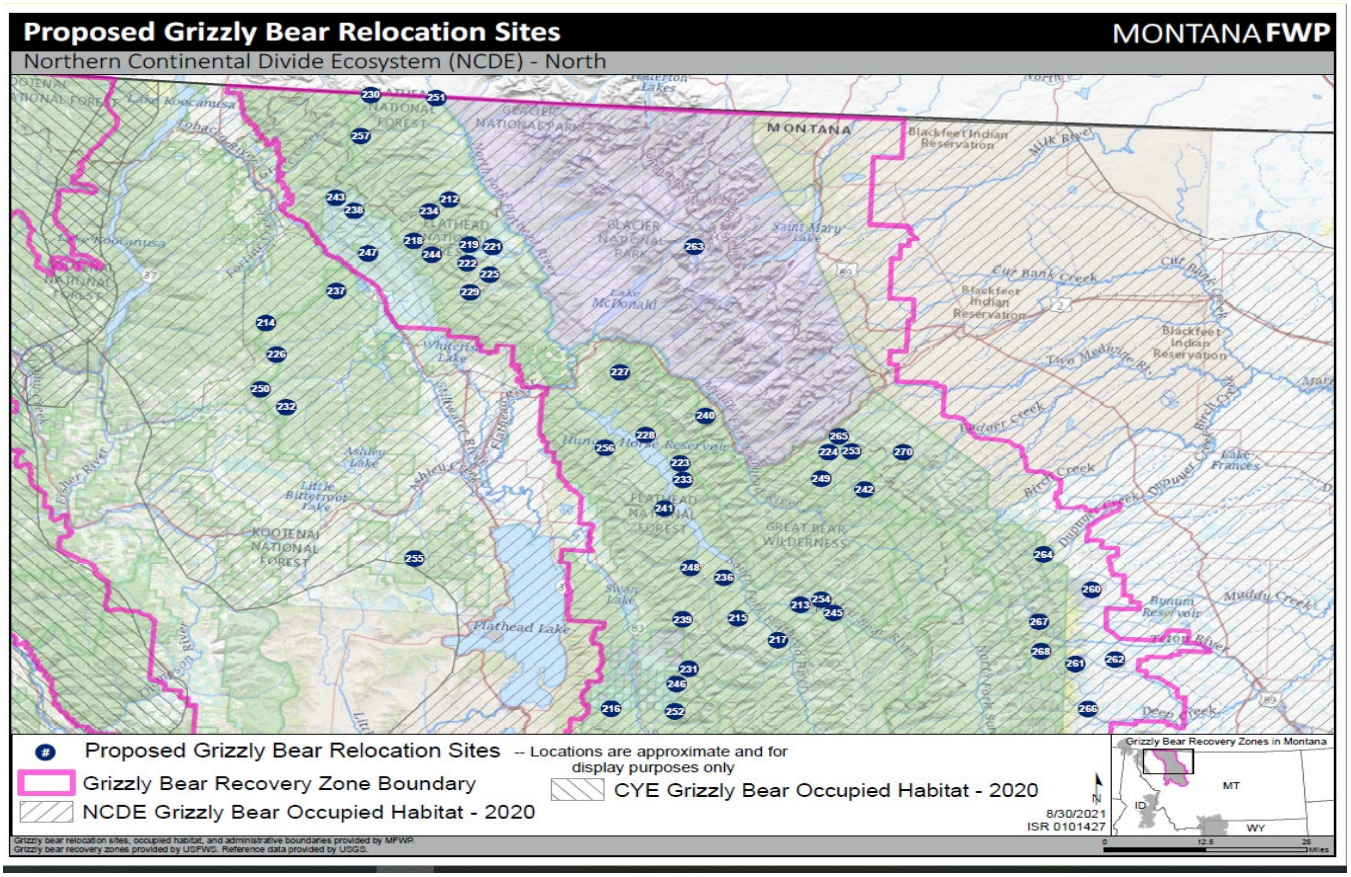
The below series of maps show proposed, Commission-approved sites for release of grizzly bears. Maps may be updated with Commission pre-approval as the known range of grizzly bears change. The outermost boundaries of Occupied range are revised annually or biennially using newly obtained data.




Proposed Grizzly Bear Relocation Sites
MONTANA FWP
Greater Yellowstone Ecosystem (GYE)
Proposed Grizzly Bear Relocation Sites -- Locations are approximate and for display purposes only
Grizzly Bear Recovery Zone Boundary
GYE Grizzly Bear Occupied Habitat - 2020
Grizzly Bear Recovery Zones in Montana
MT
ID
WY
8/30/2021
ISR 0101427
Grizzly bear relocation sites and administrative boundaries provided by MFWP. Occupied habitat provided by the Interagency Grizzly Bear Study Team. Grizzly bear recovery zones provided by USFWS. Reference data provided by USGS.


Proposed Grizzly Bear Relocation Sites
MONTANA FWP
Northern Continental Divide Ecosystem (NCDE) - South
Proposed Grizzly Bear Relocation Sites -- Locations are approximate and for display purposes only
Grizzly Bear Recovery Zone Boundary
NCDE Grizzly Bear Occupied Habitat - 2020
Grizzly Bear Recovery Zones in Montana
MT
ID
WY
8/30/2021
ISR 0101427
Grizzly bear relocation sites, occupied habitat, and administrative boundaries provided by MFWP. Grizzly bear recovery zones provided by USFWS. Reference data provided by USGS.


Proposed Grizzly Bear Relocation Sites
MONTANA FWP
Northern Continental Divide Ecosystem (NCDE) - Middle
Proposed Grizzly Bear Relocation Sites -- Locations are approximate and for display purposes only
Grizzly Bear Recovery Zone Boundary
NCDE Grizzly Bear Occupied Habitat - 2020
Grizzly Bear Recovery Zones in Montana
MT
ID
WY
8/30/2021
ISR 0101427
Grizzly bear relocation sites, occupied habitat, and administrative boundaries provided by MFWP.
Grizzly bear recovery zones provided by USFWS. Reference data provided by USGS.


Proposed Grizzly Bear Relocation Sites
MONTANA FWP
Northern Continental Divide Ecosystem (NCDE) - North
Proposed Grizzly Bear Relocation Sites -- Locations are approximate and for display purposes only
Grizzly Bear Recovery Zone Boundary
NCDE Grizzly Bear Occupied Habitat - 2020
CYE Grizzly Bear Occupied Habitat - 2020
Grizzly Bear Recovery Zones in Montana
MT
ID
WY
8/30/2021
ISR 0101427
Grizzly bear relocation sites, occupied habitat, and administrative boundaries provided by MFWP.
Grizzly bear recovery zones provided by USFWS. Reference data provided by USGS.

Appendix H.
Tri-State (WY, MT, ID) Memorandum of Agreement (MOA) re: GYE

NOTE: This MOA will be revised to incorporate anticipated revisions in the GYE CS in response to adoption of the IPM methodology for estimating the population size of the GYE population.

Tri-State Memorandum of Agreement Regarding the Management, Genetic Health, and Allocation of Discretionary Mortality of Grizzly Bears in the Greater Yellowstone Ecosystem

Among

Wyoming Game and Fish Commission, Wyoming Game and Fish Department, Montana Fish and Wildlife Commission, Montana Fish, Wildlife and Parks, Idaho Fish and Game Commission, and Idaho Department of Fish and Game

This Memorandum of Agreement (MOA) is made and entered into by and among the Wyoming Game and Fish Commission and the Wyoming Game and Fish Department (collectively WGFD), the Montana Fish and Wildlife Commission and Montana Fish, Wildlife and Parks (collectively MFWP), and the Idaho Fish and Game Commission and the Idaho Department of Fish and Game (collectively IDFG), collectively referred to as the Parties.

I. Purpose

The purpose of this MOA is to define the process by which the Parties will coordinate the management and allocation of discretionary mortality of grizzly bears in the Greater Yellowstone Ecosystem (GYE) to ensure the long-term genetic health, viability, and sustainability of the GYE grizzly bear population (GYE population). The Parties enter into this MOA in support of the designation of the Distinct Population Segment (DPS) of GYE grizzly bears and removal of the DPS from the federal list of endangered and threatened wildlife under the Endangered Species Act. The Parties intend this MOA to be consistent with the *Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem* (Strategy) and individual state management plans, as these documents may be revised in conjunction with the delisting process.

The Parties amend the 2016 version of their MOA to resolve items identified in the July 2020 Ninth Circuit Court decision warranting vacatur and remand of the U.S. Fish and Wildlife Service (USFWS) 2017 final rule designating and delisting the GYE DPS of grizzly bears: (1) to ensure long-term genetic diversity of the GYE population, Parties commit to mechanisms for genetic augmentation through translocation; and (2) should a new population estimation method be incorporated to estimate abundance and evaluate survival/mortality of the GYE population, the Parties commit to recalibrate GYE population metrics and mortality limits.

II. Background

The GYE Inter-agency Conservation Strategy Team, with the participation of the Parties and various federal agencies, developed the Strategy to implement regulatory mechanisms, inter-agency cooperation, population and habitat management and monitoring, and other actions to ensure continued recovery and sustainable management of the GYE population post-delisting. The Strategy was subject to public comment and scientific peer review. The Strategy's key mechanisms for maintaining a recovered GYE population are its population and habitat standards, which are based on USFWS recovery criteria for the GYE population. The Strategy incorporated the Parties' individual state management plans that have different, but compatible, management objectives.

For purposes of this MOA, the Parties adopt the Demographic Monitoring Area (DMA) identified in the USFWS 2017 Supplement to the Grizzly Bear Recovery Plan (Supplement) as the geographic area used to monitor continued achievement of population and distribution objectives for the GYE population. The Inter-agency Grizzly Bear Study Team (IGBST) and the Yellowstone Ecosystem Subcommittee (YES) of the Inter-agency Grizzly Bear Committee (IGBC) have recommended the use of the DMA for monitoring GYE population demographics.

The demographics and vital rates of the GYE population have changed over time, and the IGBST has periodically reviewed and adjusted mortality limits to ensure a total GYE population of at least 500 bears and to meet the occupancy criterion for female bears. The GYE population has far surpassed the minimum requirement for genetic diversity represented by 500 bears.

For purposes of this MOA, the Parties identified tiered limits (based on population size) for human-caused mortality to support managing the GYE population within the DMA at levels around 932 grizzly bears (the tri-state management objective for the DMA, based on the refined Chao2 average population estimate for 2002-2019; 95% Confidence Intervals = 831 to 1,033 grizzly bears) (see Paragraph IV below). Tiered mortality rates enable the Parties to address higher grizzly bear densities and human–bear conflict levels that may occur when the GYE population is above 932 grizzly bears in the DMA, which is well above the recovery criterion of a minimum population size of 500 animals in the GYE.

The IGBST uses the Chao2 estimator and a model averaging process to calculate GYE population size on an annual basis. As the GYE population has grown, the model-averaged Chao2 estimates have become increasingly conservative (*i.e.*, prone to underestimation). IGBST has recently conducted an in-depth analysis that revises ruleset parameters and averaging techniques based on current empirical data to derive a more accurate estimate of the GYE population while still using approved Chao2 methodologies. For purposes of this MOA, the Parties assume that USFWS will, as a matter of best available science, rely on the refined Chao2[9] population estimates. The Parties commit to implementing appropriate revisions to methods for GYE population estimation as new methods are scientifically vetted and accepted.

III. Definitions

1. "Discretionary mortality" is the amount of human-caused grizzly bear mortality over which agencies have discretionary authority, such as management removals and regulated harvest.

2. "Non-Discretionary mortality" is documented loss over which agencies do not have discretionary authority, such as naturally occurring mortality or human-caused mortality such as illegal shootings, defense-of-human-life shootings, and vehicle collisions.

3. "Greater Yellowstone Ecosystem" (GYE) is defined as that portion of Idaho that is east

of Interstate Highway 15 and north of U.S. Highway 30; that portion of Montana that is east of Interstate Highway 15 and south of Interstate Highway 90; that portion of Wyoming south of Interstate Highway 90, west of Interstate Highway 25, Wyoming State Highway 220, and U.S. Highway 287 south of Three Forks (at the 220 and 287 intersection), and north of Interstate Highway 80 and U.S. Highway 30. This is the same GYE definition that USFWS used in its 2007 and 2017 rules to designate and delist a DPS of grizzly bears under the Endangered Species Act, both of which rules USFWS vacated in response to court decisions based on grounds other than the DPS designation. The Parties assume USFWS will re-designate a grizzly bear DPS for the GYE geographic area as defined herein.

4. The "Primary Conservation Area" (PCA) is the area whose boundaries are approximately depicted on the map attached hereto as Attachment A; the PCA is divided into 18 Bear Management Units.

[9] In 2021, the IGBST refined the Chao2 population estimator based on information from the report entitled *A reassessment of Chao2 estimates for population monitoring of grizzly bears in the Greater Yellowstone Ecosystem*. For the sake of this MOA, the 2002-2019 timeframe was chosen to reflect the period when population trajectory decreased and to reflect the data provided in the report.

5. The “Demographic Monitoring Area” (DMA) is the area that includes the PCA and an additional area surrounding the PCA. The DMA is approximately 19,279 square miles in area, whose boundaries are depicted on the map attached hereto as Attachment A. The DMA is based on suitable habitat. The DMA is the area within which the GYE population is annually surveyed and estimated and within which the total mortality limits will apply.

6. “Chao2” is the population estimation technique currently used for the GYE population. IGBST recently conducted an in-depth analysis that revises ruleset parameters and averaging techniques based on current empirical data to derive a more accurate “refined Chao2” estimate of the GYE population while still using approved Chao2 methodologies.

IV. Responsibilities

1. **Science-based Adaptive Management.** The Parties will use best available science and adaptive management approaches to manage the GYE population collectively and cooperatively.

2. **Tri-State Population Management Objectives.** The Parties agree to monitor and manage the GYE population to ensure achievement of the three USFWS demographic recovery criteria (minimum population size, breeding female occupancy, and mortality limits).

As an additional level of protection, the Parties will manage the GYE population within the DMA to maintain a relatively stable population around 932 grizzly bears. This management objective is consistent with the refined Chao2 average grizzly bear population estimates in the DMA from 2002-2019 (associated 95% confidence intervals from 831 to 1,033 grizzly bears). To achieve this population objective for the DMA, the Parties will apply mortality limits (described in subparagraph 3c below) developed by the IGBST to maintain a relatively stable population around the 2002-2019 average population estimates in the DMA. If the estimated population falls below 932 bears, the mortality limits become more conservative, and should result in a population increase.
If the annual population estimate within the DMA falls below 831 (the lower bounds of the 95% confidence interval), the Parties will request IGBST biology and monitoring review, and the

Parties will close the DMA within their respective jurisdictions to hunting until the population increases. The Parties will consider the results of the IGBST review in determining appropriate changes to the management framework.

3. **Relationship of Tri-State Management Objectives to USFWS Demographic Recovery Criteria.**

a. **USFWS Demographic Recovery Criterion 1 (Minimum Population Size)** is to maintain a minimum population size of at least 500 bears within the DMA (for genetic fitness). The Parties’ agreement in Paragraph IV.2 to manage the GYE population within the DMA around 932 grizzly bears, based on the refined Chao2 average GYE population estimates from 2002-2019 (95% CI = 831-1,033), provides an additional level of protection above USFWS Demographic Recovery Criterion 1 and will ensure this criterion is met.

b. **USFWS Demographic Recovery Criterion 2 (Breeding Female Occupancy)** is to ensure that 16 of the 18 Bear Management Units within the PCA are occupied by at least one female with offspring over a six-year period, with no two adjacent Bear Management Units unoccupied over a six-year period. The Parties’ agreement in Paragraph IV.2. to monitor and manage for breeding female occupancy will ensure it is met.

c. **USFWS Demographic Recovery Criterion 3 (Mortality Limits)**[10] is to ensure annual total mortality rates are not exceeded within the DMA for independent males, independent females and dependent young. In addition to the Parties' agreement in Paragraph IV.2 to manage the GYE population within the DMA around 932 grizzly bears (95% CI = 831 - 1,033), the Parties agree to apply mortality limits as set forth in the following table to ensure achievement of this management objective.

Should the Parties adopt a new population estimation method to estimate abundance and evaluate survival/mortality of the GYE population, the Parties commit to recalibrate population metrics and mortality limits therein.

Total Grizzly Bear Population Estimate in the DMA			
	≤ 932 (note: hunting closure < 831)	932-1033	> 1033
Total mortality rate for independent FEMALES.	<7.6%	9%	10%
Total mortality rate for independent MALES.	<15%	20%	22%
Total mortality rate for dependent young.	<7.6%	9%	10%

4. **Additional Mortality Management.** In addition, the Parties' management will include, but not be limited to, the following:

• At a minimum of every 5 years, the Parties will coordinate with IGBST to review vital rates and demographics for the GYE population and make any appropriate adjustments to mortality rates (as presented in Paragraph IV.3 above).

• The Parties will prohibit hunting of females accompanied by young, and young accompanied by females, and discretionary mortality of such animals will only occur for management removals. • At any population level greater than 831, if total allowable independent male or female mortality is exceeded, the number exceeding the total allowable mortality will be subtracted from the next year's discretionary mortality available for harvest for that sex.

• If a state meets any of its allocated regulated harvest limits at any time of the year (see IV.7 below), the respective state will close that state's portion of the DMA to hunting for the remainder of the year.

• If the population within the DMA is less than 600, which the Parties do not expect to occur based on their commitments under this MOA and other inter-agency commitments such as those described in the Strategy, discretionary mortality under the Parties' respective authorities will not occur, except for management removals to address human safety issues.

5. **Genetic Fitness.** The Parties agree to translocate grizzly bears between the GYE and other grizzly bear populations, when necessary for genetic fitness of a distinct grizzly bear population occurring within the three states, and subject to applicable requirements of federal, state, or tribal law and to consistency with applicable demographic recovery criteria for a population listed or previously listed under the ESA.

[10]The GYE population estimates identified in this subparagraph applies the IGBST's revised population estimates (refined Chao2 estimator) for 2002-2019; the 2017 USFWS Recovery Criterion 3 and Strategy have not yet been revised to incorporate these estimates.

a. As a cooperative effort of the IGBST, the Parties will continue to conduct genetic sampling of GYE grizzly bears (*i.e*., biological samples will be acquired from grizzly bear captures, mortality investigations, or other methods), and will analyze these samples to evaluate genetic diversity and connectivity with other grizzly bear populations.

b. To further ensure genetic viability of the GYE population, the Parties adopt the following mechanisms to provide for genetic augmentation through translocation:
By 2025, the Parties will translocate at least two grizzly bears from outside the GYE into the GYE, unless migration from outside the GYE is detected in the interim. Genetic monitoring of the GYE population will continue, and genetic diversity and effective population size (N_e) will be re-assessed at least every 14 years (*i.e*., one generation). If effective migration is not detected, the Parties will continue to make additional translocations from outside the GYE.

6. **Monitoring.** The Parties will support the IGBST in the annual monitoring of the GYE population.

7. **Coordination and Allocation of Discretionary Mortality.**

a. The Parties will meet annually (preferably in the month of January) to review population monitoring data supplied by IGBST and collectively establish discretionary mortality limits for maximum regulated harvest for each jurisdiction (MT, ID, WY) in the DMA, so DMA mortality limits not exceeded, based upon the following allocation protocol:

i. Begin with the refined Chao2 total population estimate and estimates for independent males, independent females, and dependent young (demographic classes) in the DMA for the previous calendar year, as reported by the IGBST.

ii. Determine the maximum allowable mortality limit for each demographic class based on the mortality rates identified in the table above (IV.3).

iii. Determine total mortality during the previous calendar year for each demographic class.

iv. Subtract the previous year's total mortality from the maximum allowable mortality limit for each demographic class. If the difference is negative (*i.e.,* a DMA annual mortality limit is exceeded for any of the three classes), the number of mortalities above the limit will be subtracted from the corresponding DMA discretionary mortality limit for that class for the current year.

v. Allocate maximum discretionary mortality available for regulated harvest for independent males and females to each management jurisdiction as provided in the following table.

Management Jurisdiction*	**% of DMA outside NPS lands**
WY inside DMA	58%*
MT inside DMA	34%
ID inside DMA	8%

*Four percent (4%) of the DMA outside of National Park System lands in Wyoming is under the jurisdiction of the tribes governing the Wind River Reservation.
b. The Parties may agree to adjust their respective individual allocation of discretionary mortality based on management objectives and spatial and temporal circumstances. Each party has discretion as to how it applies its allocation of discretionary mortality pursuant to its respective regulatory processes and management plan.

c. If, for any reason, a state opts not to implement some or all of its allocation for regulated harvest, that harvest is not available to another state for additional harvest unless agreed to by the state with unused allocation.

d. The Parties will confer with the National Park Service (NPS) and United States Forest Service (USFS) annually. The Parties will invite representatives of both GYE National Parks, the NPS regional office, GYE USFS Forest Supervisors, and the Wind River Reservation to attend the states' annual meeting.

e. The Parties will monitor mortality throughout the year, and will communicate and coordinate with each other, tribal and federal land management agencies as appropriate to minimize the likelihood of exceeding mortality limits.

f. Each Party will designate one representative as a respective Point of Contact for purposes of achieving the objectives of this MOA.

V. Authorities and Regulatory Mechanisms

The Parties enter into this MOA pursuant to their respective state authorities as set forth in Title 87, Montana Code Annotated; Title 23, Wyoming Statutes Annotated; and Title 36, Idaho Code.

The Parties have the authority, capability and biological data to implement appropriate hunting restrictions, management relocations and removals, and population management. The Parties will use their respective individual authorities to regulate discretionary mortality as allocated to their jurisdictions under this MOA.

The Parties' respective regulatory mechanisms to manage, monitor, restrict, and adjust mortality include, but are not limited to, those identified in Attachment B.

This MOA in no way restricts the Parties from participating in similar activities with other states, agencies, tribes, local governments, or private entities.

Each Party has discretion to manage grizzly bears within its jurisdiction of the GYE that are outside the DMA pursuant to its respective regulatory processes and state management plan.

VI. No Obligation of Funds

This MOA is neither a fiscal nor a funds obligation document. Any endeavor or transfer of anything of value involving reimbursement or contribution of funds among the Parties will be handled in accordance with applicable laws, regulations, and procedures and such endeavors will be outlined in separate agreements or contracts made in writing by representatives of the Parties. This MOA does not provide such authority.

VII. Term, Termination and Effective Date

This MOA will become effective upon the date of signature of all Parties. It will remain in effect until it is terminated by the Parties. Any Party may terminate its participation in the MOA by providing one hundred-eighty (180) days' written notice to the other Parties, which notice shall be transmitted by hand or other means of delivery confirmation.

VIII. Amendment

The Parties will meet annually to review implementation of the MOA and to recommend any appropriate modifications to the MOA based on changes to the Strategy, state management plans or other pertinent regulatory documents. Any modification to the MOA will only become effective upon the written consent of all Parties.

IX. No Third-Party Beneficiary

Nothing contained herein shall be construed as granting, vesting, creating or conferring any right of action or any other right or benefit upon any third party.

X. Severability

Should any portion of this MOA be judicially determined to be illegal or unenforceable, the remainder of the MOA will continue in full force and effect.

XI. Sovereign Immunity

The states of Wyoming, Montana, and Idaho do not waive their sovereign immunity by entering into this MOA, and each fully retains all immunities and defenses provided by law with respect to any action based on or occurring as a result of this MOA.

In Witness Thereof, the Parties hereto have executed this MOA as of the last written date below.

_____ _____
President, Wyoming Game and Fish Commission Date

_____ _____
Director, Wyoming Game and Fish Department Date

_____ _____
Chairman, Montana Fish and Wildlife Commission Date

_____ _____
Director, Montana Fish, Wildlife and Parks Date

Appendix I.

Protocol and Considerations for Genetic Augmentation of Grizzly Bears in the Greater Yellowstone Ecosystem

Protocol and Considerations for Genetic Augmentation of Grizzly Bears in the Greater Yellowstone Ecosystem

December 2022

This working document was coordinated by Rich Harris (MFWP), with considerable input from the editorial team of Cecily Costello (MFWP), Frank van Manen (USFS), and Hilary Cooley (USFWS). Substantive input was also received from Mark Haroldson (USGS), Dan Thompson (WDFG), Dan Bjornlie (WDFG), Jeremy Nicholson (IDFG), Jeremiah Smith (MFWP), Tim Manley (MFWP, retired), Wesley Sarmento (MFWP), Chad White (MFWP), Kari Eneas (CSKT), Jennifer Fortin-Noreus (USFWS), Wayne Kasworm (USFWS), Scott Jackson (USFS) and Kerry Gunther (YNP). This or earlier drafts have been reviewed by Kim Annis (MFWP), Jamie Jonkel (MFWP), Lori Roberts (MFWP), Camel Whisper-Means (CKST), Jeff Horn (Blackfeet Tribe Wildlife), Ken McDonald (MFWP), Justin Schwabedissen (GTNP), Rory Trimbo (MFWP), John Waller (GNP), Dan Tyers (USFS) and Kate Wilmot (GTNP).

INTRODUCTION

The Yellowstone Ecosystem Subcommittee of the Interagency Grizzly Bear Committee proposes adopting a process that would assist the long-term genetic health of the grizzly bear population in the Greater Yellowstone Ecosystem (GYE) via the occasional translocation of non-conflict grizzly bears from the Northern Continental Divide Ecosystem (NCDE). This document lays out the processes required to allow this to occur, how we envision field operations to follow from that, and also provides the biological rationale for taking this action. A more detailed step-down providing guidance for field operations is also included. This is consistent with the commitments made by the States of Montana, Wyoming, and Idaho.

Briefly, biologists have long recognized the long-term risks that wildlife populations face when they are isolated from other populations. The importance of ultimately providing biological connectivity between bears in the GYE and those further north has been recognized for many years (e.g., Allendorf and Servheen 1986). Because both the GYE and NCDE populations of grizzly bears have expanded in abundance and distribution, they are closer to becoming connected via natural movements of bears than at any time during at least the past 50 years. Natural movements of bears into the GYE have been recognized as desirable by Montana Fish, Wildlife and Parks for many years (Dood et al. 2006, MFWP 2013:41). Management zones committed to by federal and state managers are intended to facilitate occasional migration (NCDE Subcommittee 2021), and conflict prevention and reduction activities continue that may ultimately allow these movements to occur.

Similar programs have been considered in the past but not yet implemented. The "Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area" of March 2007 (since superseded by the one signed by participants in December 2016) noted that migration of grizzly bears into the GYE could occur either via natural movements or artificial transplantation. In the proposed delisting rule of 2007, USFWS pledged to "continue efforts to reestablish natural connectivity, but our partners… [presumably including MFWP]… will transplant one to two effective migrants per generation if no movement or genetic exchange is documented by 2020…". USFWS further stated that "Augmentation is proposed as a precautionary measure based on the recommendations of Miller and Waits (2003, p. 4338) to maintain current levels of genetic diversity, should grizzly bear movement into the GYA not occur over the next 20 years."

The USFWS (2021:181) also contemplated possible translocation, suggesting confidence that "…translocation, if necessary, will address the ability of future GYE bears to adapt evolutionarily." Regarding accountability and monitoring, USFWS (2021:181) stated that "The IGBST also monitors genetic diversity of the GYE grizzly bear population so that a possible reduction in genetic diversity will be detected and responded to accordingly with translocation of grizzly bears into the GYE originating from another population in the lower-48 States. In addition to possible translocations, measures described in the 2016 GYE Conservation Strategy are and will continue to be used to promote genetic connectivity through natural movements. These measures include habitat protections, population standards, mortality control, outreach efforts, and adaptive management."

BACKGROUND

Grizzly bears living in the Greater Yellowstone Ecosystem (GYE) have been isolated from other grizzly bear populations for possibly over 100 years, and their continued genetic isolation is a long-term conservation concern. The rate of inbreeding has been very low (0.2% over 25 years), and no inbreeding effects have been detected. Additionally, effective population size has increased well above the level where short-term genetic effects would be expected, and is approaching criteria for long-term population viability. Nonetheless, with lower genetic diversity than other North American grizzly bear populations, it is recognized that infusion of genetic material from other populations would enhance the adaptive capacity and long-term persistence of the GYE population. Although no evidence of immigration has been documented since genetic monitoring began, the potential for natural movement into the population by bears from the Northern Continental Divide Ecosystem (NCDE) is increasing over time. Due to population growth and geographic expansion, the distance between the nearest portions of estimated occupied ranges of the NCDE and GYE had diminished to only 57 km by 2020.

One option for increasing genetic diversity in the GYE is to assist the natural immigration process via occasional human-aided translocation of bears from the Northern Continental Divide Ecosystem. However, translocation of bears, especially between populations separated by human-dominated landscapes, is not without risks. Not all translocated bears survive or settle in the release area. Translocated bears often exhibit unusual movement patterns, likely motivated by their homing instinct or because of spatial competition from resident bears and difficulty in finding a vacant space to settle. Post-translocation movements of grizzly bears can be extensive, often increasing their mortality risk (e.g., vehicle collisions, poor nutrition) or the likelihood of encountering human settlements and engaging in human-bear conflict. If human-aided translocation is implemented, an imperative is to minimize the probability that translocated bears come into conflict with people.

If a translocation option is acceptable to cooperating agencies, careful planning with respect to selection of candidate individuals, timing, and locations will help decrease these risks and increase the likelihood of successfully adding to the genetic diversity of the GYE population.

This working document is intended to guide field practitioners (and to inform wildlife managers, land managers, and the interested public) regarding our collected expertise on 'best practices' likely to result in success. Ultimately, successful implementation would entail translocated bear(s) staying within the GYE and producing or siring cubs that themselves survive long enough to attain survival rates comparable to resident bears. Documenting such success, however, is likely to be a difficult and long-term process, will require statistical procedures such as assignment tests based on DNA samples. More immediate metrics of success, such as documenting an individual's fidelity to the new location, will help inform future translocation procedures (if needed).

We emphasize that the objective of any translocation of grizzly bears into the GYE is for ensuring that genetic diversity is sufficient to provide long-term evolutionary potential. The objective is not to increase population size in the GYE generally.

PROCESS CONSIDERATIONS

Whether or not migrant grizzly bears move into Yellowstone and ultimately contribute genetically, FWP, in cooperation with others, can undertake measures that would, if successful, have a similar biological effect. Process considerations include:

FWP would, on an on-going and continuing basis, translocate conflict-free bears from other populations in Montana to pre-selected and pre-approved areas within the GYE. Areas chosen for release would be those judged most likely to allow individuals to meet their biological needs without conflicts with humans, and also most likely to encounter and breed with individuals of the opposite sex.

Trapping would be conducted to capture and move bears as resources allow.

The sex/age of bears that would be augmentation candidates, exactly where they would be released within the GYE, and whether there are times of year when augmentation would be inadvisable are biological considerations that are crucial to the ultimate success of the initiative. Those considerations are discussed in greater detail below.

Bears whose presence is deemed to have greater biological value to the source population than the GYE would not be considered candidates for this program.

FWP or USFWS staff in northwestern Montana would coordinate with counterparts in the GYE on the details of transportation and release.

The frequency with which such animals would become available would vary annually, and not be predictable. The expectation is that approximately 2 to 4 candidate bears would become available and be moved every 10 years. There would be no additional expectations or requirements for the timing beyond that. For example, if opportunities presented themselves, more than one might be moved in any given year; conversely, a few years might pass with no good opportunities.

This magnitude of capturing and moving bears would result in approximately 3 to 6 bears being moved to the GYE per grizzly bear generation (see below). If one-half of the bears moved stayed in the Yellowstone, survived long enough to reproduce, and produced (or sired) a cub that survived to adulthood, approximately 1.5-3 effective migrants per generation would gradually be added to the Yellowstone population. (See below for additional information and justification).

If subsequent monitoring (see below) indicated the need for additional bears, additional trapping would be considered. If subsequent monitoring indicated greater fidelity and survival among augmented bears than anticipated, fewer might be moved.

All individuals translocated would be fitted with a GPS collar, micro-chipped, and tissues for DNA monitoring would be obtained. The IGBST (or cooperating staff) would track any translocated individuals as part of their routine telemetry monitoring program. Attempts would be made to continue monitoring females post-denning, to document presence of litters. We anticipate, however, that direct observation of offspring from augmentees will be difficult and incomplete. Thus, the genetic monitoring program that is currently in place would continue to document and quantify any reproductive contribution from translocated animals.

Translocated individuals would be considered experimental animals, and either moved or euthanized should they cause conflicts with humans.

For any translocated individuals that survive and remain in the GYE Demographic Monitoring Area (DMA) at least 1 year, that year's allowable mortality limit for that gender for the GYE (as per the GYE Conservation Strategy) would be increased by one to account for the unanticipated addition of that individual, reinforcing that the augmentation is for genetic, not demographic purposes.

As per the NCDE Conservation Strategy, a bear removed from within the NCDE DMA would count against the NCDE's mortality limit (albeit could be accompanied by an asterisk to clarify that the bear might not have died, thus helping inform a potential programmatic review).

Required Permissions and Suggested Processes/Protocols

Permissions and approvals

1. While federally listed, USFWS approves all relocations and translocations of grizzly bears in the contiguous 48 states. With limited exceptions, grizzly bears have not previously been moved from one "ecosystem" to another. To expedite real-time decision making, an omnibus approval of this program from USFWS is part of this process.

2. Landowner approval. FWP only releases grizzly bears where the landowner has provided pre-approval. Although there is no particular reason to consider 'northern' grizzly bears differently from those coming from closer by, because this would be a new program, we would anticipate obtaining specific approval from landowners in the GYE (typically USFS) and affected states for releases of these bears.

3. Newly enacted legislation requires that, while federally listed, the Montana Fish and Wildlife Commission pre-approve sites for any grizzly bear releases that would occur within Montana. A list of 32 potential relocation sites in the GYE (anticipating possible relocations of conflict animals) was presented to the Commission for consideration on October 28, 2021 and approved for a five-year period on February 4, 2022.

4. FWP operates its grizzly bear conflict response program under annually renewed memoranda of agreement with the USFWS; thus, no new permits or addenda to these annual agreements would appear to be required.

Biological Considerations

Acknowledging at the outset that 'biological' considerations are not entirely separable from 'social' considerations (and that both are important), we categorize biological issues into four: 1) characteristics of a candidate bear, 2) where captured, 3) where released, and 4) when captured/released.

1) Characteristics of bears being considered (sex/age/history)

a) Management history: Bears with a history of involvement in bear-human conflict, even as offspring, will not be considered candidates for translocation. Furthermore, bears captured away from human settlements will be the best candidates to minimize the likelihood of post-release bear-human conflict.

b) Age/sex of bear: Knowledge of bear behavior and information about post-release movements help inform which sex and age categories are most likely to result in success. Younger bears, primarily between the ages of 2 and 5, often undergo natal dispersal whereby they move away from their natal home range to settle in their own permanent home range. In general, male bears are very likely to disperse, tend to disperse large distances, and can be highly transient for more than a year. In contrast, female bears are more likely to remain near their natal range, rarely disperse large distances, and are less transient than males. Nonetheless, occasional long-distance female dispersal does occur. This natural tendency for movement by young bears of both sexes, in the pursuit of finding and establishing their own permanent home range, is associated with less frequent homing and higher fidelity to release areas when they are translocated. Continued transiency and wide-ranging movements following translocation are not uncommon until bears settle in their permanent home range. In the Cabinet Mountain augmentation program, all of the translocated bears known to have successfully bred were translocated when they were within this age group: three females and one male were translocated as 2-year-olds and one male was translocated as a 4-year-old. Overall, both female and male bears in the 2-5- year-old age class are good candidates for translocation, as long as evidence indicates they have not previously reproduced. It is likely that eventual reproduction by females would be easier to document via direct observations, whereas male reproduction will be detected through genetic analysis. Successful female reproduction is constrained to litters every 3 years, but successful males have the potential, but of course not the certainty, of breeding every year and fathering offspring with multiple females.

By the time bears reach the age of 6 or 7 years, most have established a permanent home range and have become reproductively active. Consequently, when adult bears are translocated, they frequently return or attempt to return to their home range, even when moved distances >200 km, and even when accompanied by offspring. Homing bears generally move in a linear fashion even though it may take them some time to determine the correct direction toward their home range. When translocated long distance, it is not unusual for bears to take more than a year to return home. Overall, reproductively active adult bears are not good candidates for translocation to augment the GYE population.

Cub and yearling bears are usually still dependent on their mother, however survival of orphaned or early-independent bears in these age classes has been observed. When translocated independently of their mother, initial movements of cub and yearling bears are usually more restricted than those of older bears, but they can also become more transient over time, consistent with their natural dispersal behaviors. They likely have a good probability of settling in the release area, however their survival is likely to be lower than older bears. Their survival and ability to settle in a home range is probably most compromised where the resident bear population density is high. Orphaned cub or yearling bears may be good candidates for translocation, as long as their body size and condition suggest good potential for survival on their own. Given that these bears are unlikely to reproduce for at least 4 years, recapture or genetic analyses would likely be required to document any eventual reproduction. There are no sex/age combinations that would automatically disqualify a bear from consideration. However, evidence and experience suggest that some are better choices than others given other considerations, and that each comes with unique sets of attributes:

i) Sub-adult female (age ~ 2 to 5, as estimated in the field). These bears are generally the strongest candidates because they are relatively likely to remain in the target area without conflict with humans. A 4-year-old female would likely be among the

easiest to monitor (collar longevity is good) for survival and reproduction. If later bred, her offspring would most likely be hybrids (sired by a GYE male, i.e., she'd be an effective genetic migrant), but even if pregnant when moved, she and any surviving offspring could mate with GYE in future years. Downsides are that it may require 1-3 years before she is mature enough to breed (particularly if younger). If younger (i.e., <4), collar retention could be problematic. However, younger NCDE sub-adults (aged 2-3) that were translocated > 4 times their sex-specific home range radiuses displayed slightly greater fidelity to areas in which they were released than females aged 4 or 5. If it is possible to capture the independent offspring of females known to be free of conflict (e.g., if collared for trend monitoring), such an animal would probably be unfamiliar with human-related attractants, and thus likely to remain conflict-free. Both managers and the public should be aware, however, that even bears in this optimal sex/age group may display homing movements, or wander considerably before settling down.

ii) Sub-adult male (age ~2 to 5, as estimated in the field). These bears are generally less suitable candidates than females of similar ages (above), because a) they are more likely than females to get into conflict situations, b) they are more likely than females of similar age to suffer mortality, even without an obvious human-conflict, c) they are more likely than females of similar age to become displaced by larger males, and thus possibly leave the GYE entirely, d) it may require some time before they can establish themselves as breeders if they are not displaced, and e) collar retention is not as good as among females. However, in the unlikely event that a subadult male can safely establish itself, it could breed at a younger age than a subadult female (have less time exposed to risk before it makes a genetic contribution). At least 2 male Cabinet augmentees are known to have later sired cubs. Sub-adult males are an option if other considerations are strongly positive.

iii) Orphaned cub of the year (either sex). Although there is documentation that some orphaned cubs can survive without their mothers, our assessment is that the additional stress of putting them into a unique environment makes their survival unlikely. Orphaned cubs should not be considered candidates.

iv) Orphaned yearling (either sex). The likelihood of orphaned yearlings surviving and finding a new home in the GYE is probably higher than of orphaned cubs. Yearlings of a female that had a history of conflict would not be candidates due to the likelihood that they already learned unacceptable behavior. However, yearlings orphaned as a result of mortalities of non-conflict mothers could be considered candidates. If >1 yearling was captured and moved together, their survival would probably be higher than for a single animal and would also double the potential of ultimately producing an effective genetic migrant. However, yearlings would require more years (probably 4) before they could breed, and would be even more difficult to monitor long-term via telemetry than subadults.

v) Adult female (age 5+, as estimated in the field). An adult female unaccompanied by cubs in mid-summer has high likelihood of already being bred; thus, cubs she might produce overwinter in the GYE would not be genetically effective migrants (and would not constitute success). However, those cubs would carry NCDE genes, and thus any that survived to become breeders themselves would increase the pool of potential effective migrants. An adult female in mid-summer who'd lost a litter would be very likely to be bred by a GYE male the following spring, assuming she survives and stays in the target area that long. Adult females would offer the greatest opportunity for monitoring their genetic success, an important criterion because they are most amenable to long-term radio-monitoring, and can sometimes be observed visually (and if accompanied by cubs, reproduction documented). However, adult females generally are the most likely to exhibit homing movements (see above), and thus are poor candidates for this program.

vi) Adult male (age 5+, as estimated in the field). Although generally not considered an optimal choice due to concerns about potential human-bear conflicts and competition with resident adult males in the release area, there could occasionally be situations in which an adult male could be considered. An adult male that survived and avoided conflict could conceivably mate during the breeding season immediately following translocation, and if it became established, make a disproportionately large genetic contribution. A downside is that documenting effective migration of males would require long-term genetic data and not be assured; it is also difficult to keep collars on adult males. Consider if a) a translocation site can be found at which potential for conflict is low, and/or b) capture is very late in the season, such that the animal has already built up fat reserves and dens shortly after release. Late-season releases would be constrained where big-game hunting is still occurring.

2) Areas for capture

i) Although habitat similarity to the GYE (another consideration) could be greatest for an animal captured at the southeastern extent of the NCDE distribution (and such bears might appear to be "trying" to get to the GYE on their own), such an animal could have a higher likelihood of returning (i.e., not remaining within the target area).

ii) We take it as a given that habitat characteristics of the release site will differ from those at the capture site, and challenges translocated animals will face are factored into the expected probability of success. Although 'matching' habitat of the donor to recipient area would be ideal, it's not a critical consideration given how adaptable bears are. That said, bears living in the relatively mesic, huckleberry-dominated areas in the northwest portion of the NCDE are probably not the best candidates, at least initially. As well, potential candidate bears in this area are high priorities for the Cabinet augmentation program.

iii) A likely constraint for capture areas is the need to use culvert traps (so that bears can easily be moved from the site), and thus road access (unless culverts could be flown into remote locations).

iv) A female bear originating in a Bear Management Unit (BMU) or Occupancy Unit (OU) where meeting occupancy standards has been a concern should not be a strong candidate.

v) As with any grizzly bear capture operation, good communication and close coordination with local land managers is critical.

3) Release areas

At this point in the process, we consider areas at a coarse geographic scale. Specific release sites should be well-vetted, and offer the lowest possible opportunity for released bears to find trouble, while recognizing that bears generally don't stay in the immediate area where they are released. Appropriate sites would be within the GYE DMA, but not otherwise be constrained geographically at this coarse level of consideration. That said, bears released where a large expanse of relatively undeveloped landscape exists between the site and the bear's original home range are less likely to engage in conflict behavior or exhibit homing.

We seek areas with enough bears that translocated animals can find (or be found by) mates, but not such a high density that competition or aggression from resident bears will increase the chance of intraspecific predation or displacement outside the GYE DMA. If possible, local density estimates such as produced by Bjornlie et al. (2014) and IGBST (unpublished data) should be consulted, but qualitative assessments made by locally-based staff will be crucial as well. Expecting that translocated bears may not remain close to the release site, an important consideration is the spatial extent and configuration of habitat surrounding the release site where conflicts with humans are unlikely.

As with any grizzly bear translocation, good communication and close coordination with local land managers is critical.

i) Yellowstone National Park. Because livestock are absent and attractants generally well controlled, YNP should be strongly considered at the outset of this program. Challenges would be identifying areas where resident grizzly bears are not too dense (see above, e.g., not Hayden Valley), and where recreationists are not highly concentrated.

ii) Wyoming, outside of YNP. There may be areas, particularly in the northern portions of the BTNF, where attractants are rare or well-managed, and where a translocated bear would have a good chance to mate with other bears without coming into conflict. Potential areas include the southeastern portions of Blackrock, Togwotee Pass, and Moccasin Basin, where cattle allotments have been bought out or retired, but there is still gated road access to move a bear far from any developed areas (but not further south where cattle density increases).

iii) Montana, outside of YNP. Generally, areas where an augmentee might be released in the Montana portion of the GYE DMA are closer to humans (recreationists, livestock, homesites). Thus, we recommend gaining some experience with the program before considering sites in Montana.

iv) Idaho, outside of YNP. Not a candidate translocation recipient at this time.

iv) Grand Teton National Park. Not a candidate translocation recipient at this time.

4) Time of year

i) Biologists have typically considered it unwise to transport animals early after den emergence, as bears that time of year are particularly hungry, many plants-based food sources are not yet available, and livestock young are small and vulnerable. Snow typically reduces road access early in the bear-year, which in turn means that capture and release sites are likely closer to people. Spring black bear hunting can also constrain grizzly bear captures.

ii) July and August are typically considered the optimal months to translocate bears, as plant-based food sources are peaking, and bears are not yet in hyperphagia. Eighteen of the 22 Cabinet augmentees were moved in July or August to match the peak of huckleberry production. However, the mast peak seen in the Cabinets does not characterize the GYE, so a somewhat earlier time window should be considered.

iii) September through mid-October are generally avoided because i) some bears in hyperphagia descend to low elevations where human attractants are common, and ii) of overlap with big-game hunting. The latter concern would be lower if released centrally within YNP.

iv) Although few data are available to inform it, the possibility that grizzly bears might be successfully translocated very late in the active year, just prior to expected denning, holds promise. Such a bear should have already fattened up, and even in an unfamiliar place we do not expect it to have difficulty finding a place to den. Upon emergence, it may then be more likely to consider its denning area a new home.

In summary, we recommend that for the first few years of this program, managers adopt a conservative approach, moving only bears that are most likely to stay in the GYE, survive, and breed; moved only during the optimum time of year; and released where success is most likely. With time and experience, criteria for acceptable candidate bears, source locations, release locations, and timing of movements can all be revisited if new information becomes available, and this protocol updated and revised if appropriate.

Other considerations

1. FWP and USFWS have cooperated on augmentation of grizzly bears in the Cabinet Mountains since 2005. Ideally, agencies can identify appropriate bears for all augmentation planned for a given year. Involved agencies will determine priorities in the event appropriate bears are not available to support all augmentation plans.

2. Bears removed (live) from the NCDE for augmentation are counted as “mortalities” following the NCDE Conservation Strategy when assessing whether thresholds have been exceeded. Typically, capture efforts for augmentation would occur before that year’s total mortality has been documented; it is thus possible for mortalities occurring later in the year to put that year’s total “over” the threshold. However, the threshold is calculated on a 6-year running average, and because the total reported and unreported estimate would be known for the previous 5 years, the likelihood of reaching the threshold because of live removals can be estimated (albeit with some uncertainty). Because this GYE augmentation is intended to produce 1 or 2 effective migrants per bear generation length (i.e., need not occur rapidly), it would be reasonable to hold off capture efforts in years in which removing more NCDE bears could cause the threshold to be exceeded.

3. Given considerations outlined in this document, we anticipate that trapping efforts for appropriate bears would be planned and deliberate or be associated with ongoing research and monitoring efforts. It is very unlikely that an appropriate bear would be captured in the course of conflict response work. Thus, additional resources will be required from donor agencies.

4. If released in Montana by MFWP (outside YNP) while bears are ESA-listed, the release site would have to be one previously approved by the Montana Fish and Wildlife Commission.

5. If released in Wyoming (outside a NP), WGFD must notify the county sheriff of the county in which the release takes place within 5 days and issue a press release (W.S. 86 § 1).

6. Released bears will undergo standard data collection and processing, including collection of genetic samples, and must be PIT-tagged, ear-tagged, and outfitted with a GPS telemetry device.

DETAILED BIOLOGICAL BACKGROUND

Grizzly bears living in the GYE have been isolated from other grizzly bear populations possibly for over 100 years, and thus the genetic effects of small population size raise concerns. No immigrants into the GYE population have been documented to date (Haroldson et al. 2010; M. Haroldson, USGS, pers. comm., 2021), and heterozygosity and allelic diversity are lower than most other North American grizzly bear populations for which data are available. However, these 2 metrics of genetic diversity declined very slowly if at all from 1985 to 2010. The rate of inbreeding has been very low since 1985, and no physiological, behavioral, or demographic effects indicative or associated with inbreeding have been detected. Importantly, estimates are that effective population size (the summary metric best suited to consider genetic effects) has increased over the estimates of 1910-1960, continued to increase during 1985-2007, and is well above the level where the short-term effects of reduced genetic diversity (i.e., inbreeding, genetic drift) would be expected.

Thus, all indications are that Yellowstone grizzly bears are genetically well-adapted to their existing environment and facing no immediate threat related to population genetics. However, the Yellowstone population is sufficiently small from a genetic perspective that isolation from other populations poses risks for its long-term viability (> 100 years). Although no genetic issues currently limit the ability of grizzly bears in Yellowstone to survive and reproduce normally, their ability to respond evolutionarily to unknown future environmental or other challenges may be limited by low allelic diversity combined with isolation. Thus, introduction of genetic material from other grizzly bear populations would reduce the long-term risks associated with loss of allelic diversity in the Yellowstone grizzly bear population.

Best estimates are that any long-term genetic risks can be ameliorated by the effective migration into Yellowstone of as few as 1 to 2 animals per generation (10-15 years) if continued indefinitely into the future. Thus, although connectivity is required over the long-term to alleviate risks, such genetic connectivity can be thought of as a slow and continuous trickle of bears rather than a sudden and dramatic increase of gene flow. Recent geographic expansions of GYE grizzly bears in a northwesterly direction, and of NCDE area grizzly bears in a southeasterly direction have increased the probability of natural genetic connectivity in the future. A major impediment to achieving connectivity is Interstate Highway 90, and in particular the rapidly increasing level of human development associated with the greater Bozeman area.

Why do we think that genetic augmentation is necessary, and why do we think the relatively few animals we suggest here will suffice? Consider the question “How many animals are enough to ensure long-term persistence” by focusing on minimizing the chance that erosion of genetic diversity within a small, isolated population will render it unable to evolve, if needed, to changed conditions in the future. We know that larger populations generally have more genetic diversity — more options available from which to develop adaptations to differing conditions — than smaller ones. But how large is large enough to maintain needed evolutionary potential? We don’t have the luxury of observing a variety of wild populations subjected to changing conditions to see which ones successfully coped and which did not. Instead, we need to depend on theory, augmented by well-considered simulation models.

In 1980, geneticist Ian Franklin postulated that an effective population of 500 would be large enough to allow beneficial mutations to balance genetic erosion (in particular, “genetic drift”) indefinitely, and was thus a useful rule of thumb for answering the question “How many are enough to retain the evolutionary potential to cope with future change” (Franklin 1980)? Since then, some scientific dispute about the “500 long-term rule” has emerged (Jamieson and Allendorf 2012, 2013; Frankham et al. 2013); FWP agrees with Jamieson and Allendorf (2013) that it retains usefulness in considering long-term needs for population size.

Importantly however, the 500 number refers to the “effective” size, not the number of animals. The effective population size (Ne) is defined as that which will lose genetic variability at the same rate as an “ideal” population[2]. Because in almost all wild populations, Ne is smaller than the actual (census) number of animals (Nc), more than 500 animals would be needed in order to satisfy Franklin’s rule-of-thumb. Advances in genetics and theory have allowed better and more data-driven estimates of Ne for the GYE grizzly bear population. Kamath et al. (2015), estimated that the Ne/Nc ratio had, in recent years, been between 0.42 and 0.66 (suggesting between 760 and 1,190 bears needed to satisfy Franklin’s rule of thumb). The long-term benefit for occasional genetic interchange between geographically discrete grizzly populations has not seriously been questioned by GYE management agencies.

A related question follows: if a population is isolated but capable of being reached by occasional migrants from another presumably larger and more genetically diverse population, how many migrants are needed to effectively link the two genetically, and how often must such immigrations occur, in order for the entire assemblage to both be genetically secure while retaining any adaptive divergence? Sewell Wright, one of the founders of modern conservation genetics, had proposed decades ago that, under a number of simplifying assumptions, a single migrant per generation would be sufficient to prevent loss of heterozygosity and allelic diversity within a vulnerable subpopulation while still allowing it to respond adaptively to local conditions (Wright 1931). This noteworthy result derives from fact that a single migrant would provide a relatively large infusion of genetic material to a small population, and although it would provide a proportionally smaller benefit to a larger population, the very fact of large size would reduce the need for the immigration. A number of simulation studies later confirmed that the one-migrant-per-generation (OMPG) rule-of-thumb maintained its validity under a variety of assumption violations typical of real-world populations (Mills and Allendorf 1996, Wang 2004), and thus that OMPG, or perhaps slightly more than one, remained a useful long-term goal. A genetic metric to reflect the balancing between assuring that the target population would maintain its evolutionary potential while still maintaining necessary local adaptations is called FST, which under OMPG would, after a sufficient number of years, equilibrate at 0.2

Of course, a "migrant" in this sense is not merely an animal that travels from one population to another. For it to perform as the OMPG theory predicts, the migrating animal must contribute to the gene pool after arriving, i.e., breed with a resident. Put another way, the 'M' in OMPG must be an "effective migrant." What about the 'G' in OMPG? How long is a generation for grizzly bears? Using similar methods to those used to estimate Ne for Yellowstone grizzly bears, Kamath et al. (2015) estimated it at about 14 years. To date, we have no evidence that any migrants, effective or otherwise, have made it from the NCDE to GYE area populations.

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[1] Not to be confused with the legal definition of an “experimental population” in ESA 10(j) sense.

[2] Defined as one with discrete, non-overlapping generations, that doesn’t vary in size annually, and in which the contributions of each member to the succeeding generation are randomly distributed (i.e., described by a Poisson distribution).