U.S. Fish & Wildlife Service

Grizzly Bear Recovery Program

2018 Annual Report

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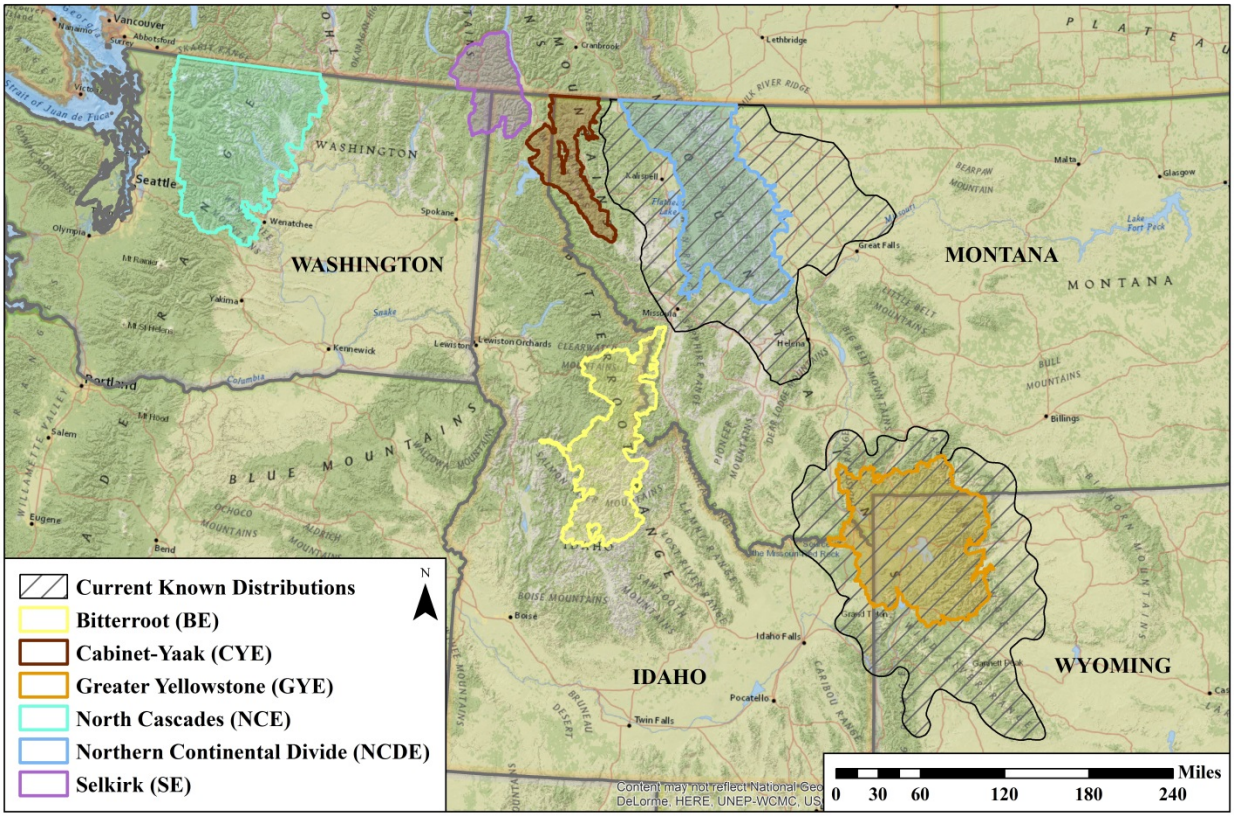
GRIZZLY BEAR RECOVERY PROGRAM MISSION

The mission of the Grizzly Bear Recovery Program (GBRP) is to recover grizzly bears in the lower 48 States by implementing the 1993 Grizzly Bear Recovery Plan (USFWS 1993) and coordinating research, management, and recovery efforts. To accomplish this mission, we collaborate with the Interagency Grizzly Bear Committee (IGBC), Federal, State, and Tribal agencies, the provinces of British Columbia and Alberta, as well as non-governmental organizations (NGOs).

In 1975, the U.S. Fish and Wildlife Service (Service) listed the grizzly bear as a threatened species in the lower 48 States under the Endangered Species Act. The Grizzly Bear Recovery Plan outlines six recovery areas, including the Greater Yellowstone Ecosystem (GYE), Northern Continental Divide Ecosystem (NCDE), Cabinet-Yaak Ecosystem (CYE), Selkirk Ecosystem (SE), North Cascades Ecosystem (NCE), and Bitterroot Ecosystem (BE). Principle recovery efforts focus on conflict reduction, information and education, establishment of habitat protections, and other efforts to prevent and reduce human-caused mortality.

Grizzly Bear Recovery Zones and Distribution

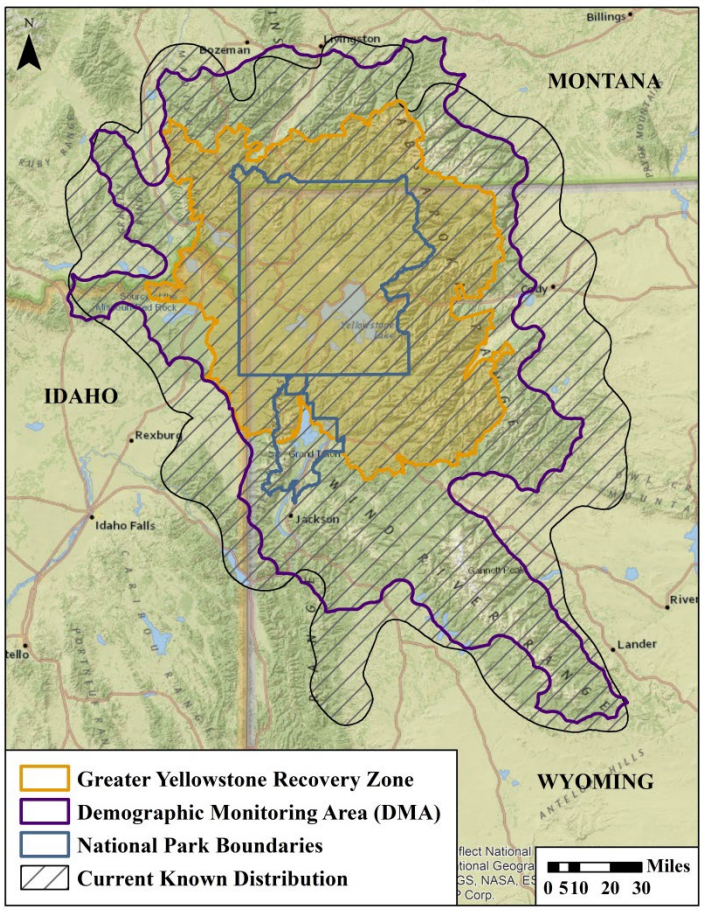


Estimated distributions are current as of 2018 for the GYE and the NCDE and are current as of 2017 for the CYE and the SE. The distribution for the NCDE is currently unknown and a draft EIS was released in early 2017 to examine recovery options. The BE is currently unoccupied with a reintruduction proposal wtih a non-essential experimental population status.

GRIZZLY BEAR ECOSYSTEM UPDATES

Greater Yellowstone Ecosystem

The Yellowstone Recovery Zone (23,853 km^2) is located in northwest Wyoming, eastern Idaho, and southwest Montana. Ninety-eight percent of the recovery zone is federally-managed land, including all of Yellowstone National Park, as well as portions of Grand Teton National Park, the Shoshone, Beaverhead-Deer Lodge, Bridger-Teton, Caribou-Targhee, and Custer National Forests (including 7 Wilderness Areas). The Demographic Monitoring Area (DMA) encompasses an additional 23,131 km^2 of suitable habitat around the recovery zone. Monitoring of population size and mortality limits occurs within the DMA (USFWS 2017). Monitoring of distribution of females with young and secure habitat occurs within the Recovery Zone (USFWS 2007, USFWS 2017).



Population Status

Bears currently occupy 68,736 km^2, which includes 49,931 km^2 inside the DMA (98 percent of the DMA) and 18,805 km^2 outside the DMA.

Recovery Criterion 1: Maintain a minimum population size of 500 animals and at least 48 females with cubs-of-the-year within the DMA. Progress: There were an estimated 709 bears and 55 unique females with cubs in the DMA in 2018. This criterion has been met.

Recovery Criterion 2: 16 of 18 BMUs within the PCA must be occupied by females with young, with no 2 adjacent BMUs unoccupied, during a 6-year sum of observations. Progress: 18 of 18 Bear Management Units occupied by females with young in 2018. This criterion has been met.

Recovery Criterion 3: Maintain the population within the DMA around the 2002–2014 model-averaged Chao 2 estimate (average = 674; 95% CI = 600–747; 90% CI = 612–735) by maintaining annual mortality limits for independent females, independent males, and dependent young. The 2018 mortality limits were 9% for independent females and dependent young, and 20% for independent males. Progress: 2018 mortality rates were 6.1% for independent females, 15.5% for independent males, and 5.0% for independent young; all of which are under current recovery criteria thresholds.

Secure habitat levels have been maintained since 1998. The GYE grizzly bear population is currently isolated from other grizzly bear populations, with no documented genetic interchange between the GYE and NCDE. Despite this isolation, the genetic health of the GYE population has not declined due to increasing size of the population over the last several decades (Miller and Waits 2003, Kamath *et al*. 2015). Additionally, natural connectivity is expected to occur in the near future as both the GYE and NCDE populations expand in distribution. Based on 2018 distributions, the two populations are now only 75 km apart, with additional verified locations between the two distributions. This distance has steadily and significantly decreased in the last decade as they were approximately 122 km apart in 2006.

The Interagency Grizzly Bear Study Team (IGBST) is an interdisciplinary group of State, Tribal, and Federal scientists responsible for long-term monitoring and research on grizzly bears in the GYE. Detailed monitoring information, including annual reports and research results, can be found on the IGBST website.

Delisting Status

On June 30, 2017, the Service announced that the GYE grizzly bear population had met recovery targets and then designated and delisted the GYE grizzly bear Distinct Population Segment (DPS), returning management to the States and Tribes. Six lawsuits were filed against the Service over this decision. On September 24, 2018, the U.S. District Court of Montana vacated and remanded our 2017 delisting rule, putting the GYE grizzly population back on the Endangered Species List (as Threatened) as part of the lower 48 States listed entity.

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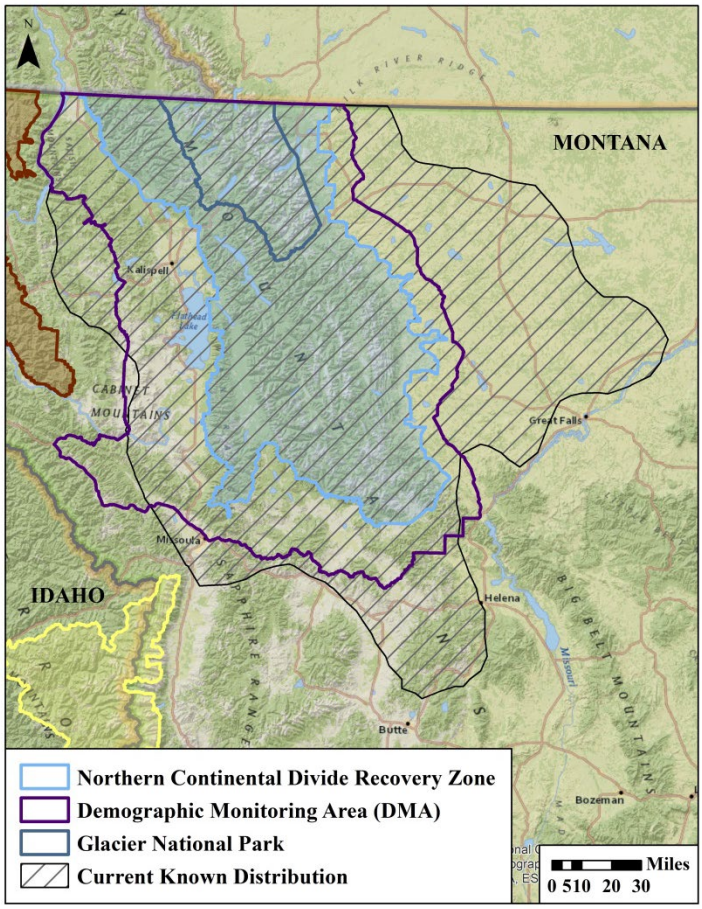
Northern Continental Divide Ecosystem

The Northern Continental Divide Recovery Zone (23,135 km^2) is located in northwest Montana and is well connected to large populations in Canada. It includes all of Glacier National Park, as well as portions of the Flathead, Helena-Lewis and Clark, Kootenai, and Lolo National Forests (including 4 Wilderness Areas), and the Flathead and Blackfeet Indian Reservations. The Demographic Monitoring Area (DMA) encompasses the recovery zone and a 19,444 km^2 buffer (Zone 1). Monitoring of population size and mortality limits occurs within the DMA (USFWS 1993). Monitoring of distribution of females with young and secure habitat occurs within the recovery zone (USFWS 1993, USFWS 2018).



Population Status

As of 2018, approximately 1,029 bears occupied the NCDE. Bears currently occupy 63,924 km^2, which includes 41,051 km^2 inside the DMA (96 percent of the DMA), and 22,873 km^2 outside the DMA.

Recovery Criterion 1: 10 females with cubs inside GNP and 12 females with cubs outside Glacier National Park over a running 6-year average both inside the Recovery Zone and within a 10 mile area surrounding the Recovery Zone. This equates to a minimum of 391 grizzly bears. Progress: Sightings of females with cubs have not been consistently collected since 2004 because of poor sightability in forested habitat. Instead, we use DNA data in combination with radio-telemetry data to project population size. There were approximately 1,044 (95% CI: 892-1,218) bears in the NCDE in 2017. This recovery target has been met.

Recovery Criterion 2: 21 of 23 BMUs within the recovery zone must be occupied by females with young, with no two adjacent BMU's unoccupied, during a 6-year sum of observations. Progress: For the 6-year period 2013-2018, all BMUs were occupied by females with young. This recovery target has been met.

Recovery Criterion 3: The running 6-year average of known, human-caused mortality shall be ≤ 4% of the population estimate; and ≤ 30% shall be females. The current mortality limit is 35.7 bears and 10.7 females/year. Progress: Average human caused mortality for 2013-2018 was 23.8 bears/year and 9.7 females/year. This recovery target has been met.

Secure habitat levels have been maintained since 2011. Due to its connectivity to large populations in Canada, the NCDE has the potential to serve as an important genetic corridor between Canadian grizzly bear populations and the GYE, the BE, and the CYE, and is a potential source population for the BE, which is currently unoccupied. We believe the NCDE has recovered and we are now in a process to evaluate whether delisting is warranted.

Montana Fish, Wildlife and Parks (MFWP), in collaboration with Glacier National Park, the Confederated Salish & Kootenai Tribes, and the Blackfeet Nation are the primary agencies responsible for monitoring of the NCDE grizzly bear population. Additional details, annual reports, and select publications are available on the MFWP website.

Habitat-Based Recovery Criteria

In 2018, the Service finalized objective and measurable habitat-based recovery criteria (HBRC) for the NCDE that will maintain or improve upon 2011 levels of secure core habitat, motorized routes, developed sites, and livestock allotments. Habitat conditions in 2011 are believed to be representative of conditions that supported and contributed to the healthy population growth observed from 2004 to 2011. For more details, see the full HBRC.

Montana Fish, Wildlife & Parks

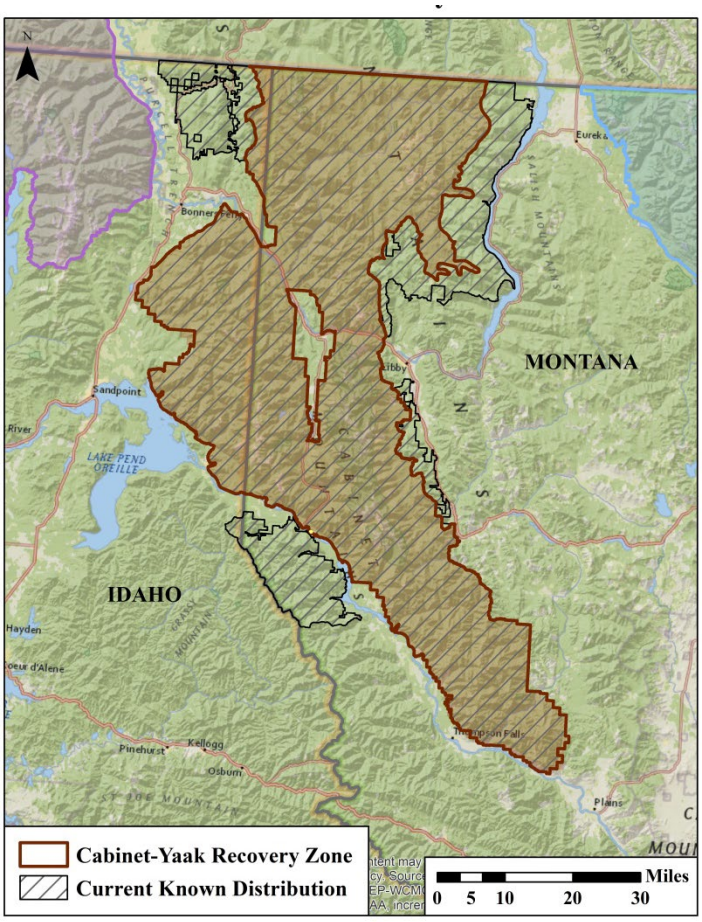
Conservation Strategy

The NCDE subcommittee of the IGBC finalized the Conservation Strategy in 2018, which will guide management and monitoring after delisting. The overarching goal of the Conservation Strategy, and the signatory agencies, is to maintain a recovered, genetically diverse grizzly bear population throughout the

DMA while maintaining demographic and genetic connections with Canadian populations and providing the opportunity for demographic and/or genetic connectivity with other ecosystems (CYE, BE, GYE).

Cabinet-Yaak Ecosystem

The Cabinet-Yaak Recovery Zone (6,705 km^2) is located in northwest Montana and northeast Idaho. Blocks of contiguous habitat extend into British Columbia, making this an international population. The recovery zone includes portions of the Kootenai, Idaho Panhandle, and Lolo National Forests (including 1 Wilderness Area). The Kootenai River bisects the CYE, with the Cabinet Mountains to the south and the Yaak River drainage to the north. The degree of grizzly bear movement between the Cabinet Mountains and Yaak River drainage is believed to be minimal but several movements by males into the Cabinet Mountains from the Yaak River and the Selkirk Mountains have occurred since 2012.



Population Status

The current population size is estimated at 55-60 individuals with approximately half of these in the Cabinet Mountains and half in the Yaak River portions of the recovery area. The population is growing at approximately 1% per year.

Recovery target 1: 6 females with cubs over a running 6-year average both inside the recovery zone and within a 10 mile area immediately surrounding the recovery zone. Progress: Unduplicated females with cubs averaged 2.7 per year from 2012-2017. This target has not been met.

Recovery target 2: 18 of 22 BMU's occupied by females with young from a running 6-year sum of verified evidence. Progress: 11 of 22 BMUs were occupied from 2012-2017. This recovery target has been met.

Recovery target 3: The running 6-year average of known, human-caused mortality shall be ≤ 4% of the population estimate; and ≤ 30% shall be females. The current mortality limit is 1.9 bears/year and 0.6 females/year. Progress: Average human caused mortality for 2012-2017 was 1 bear/year and 0.2 females/year. This target has been met.

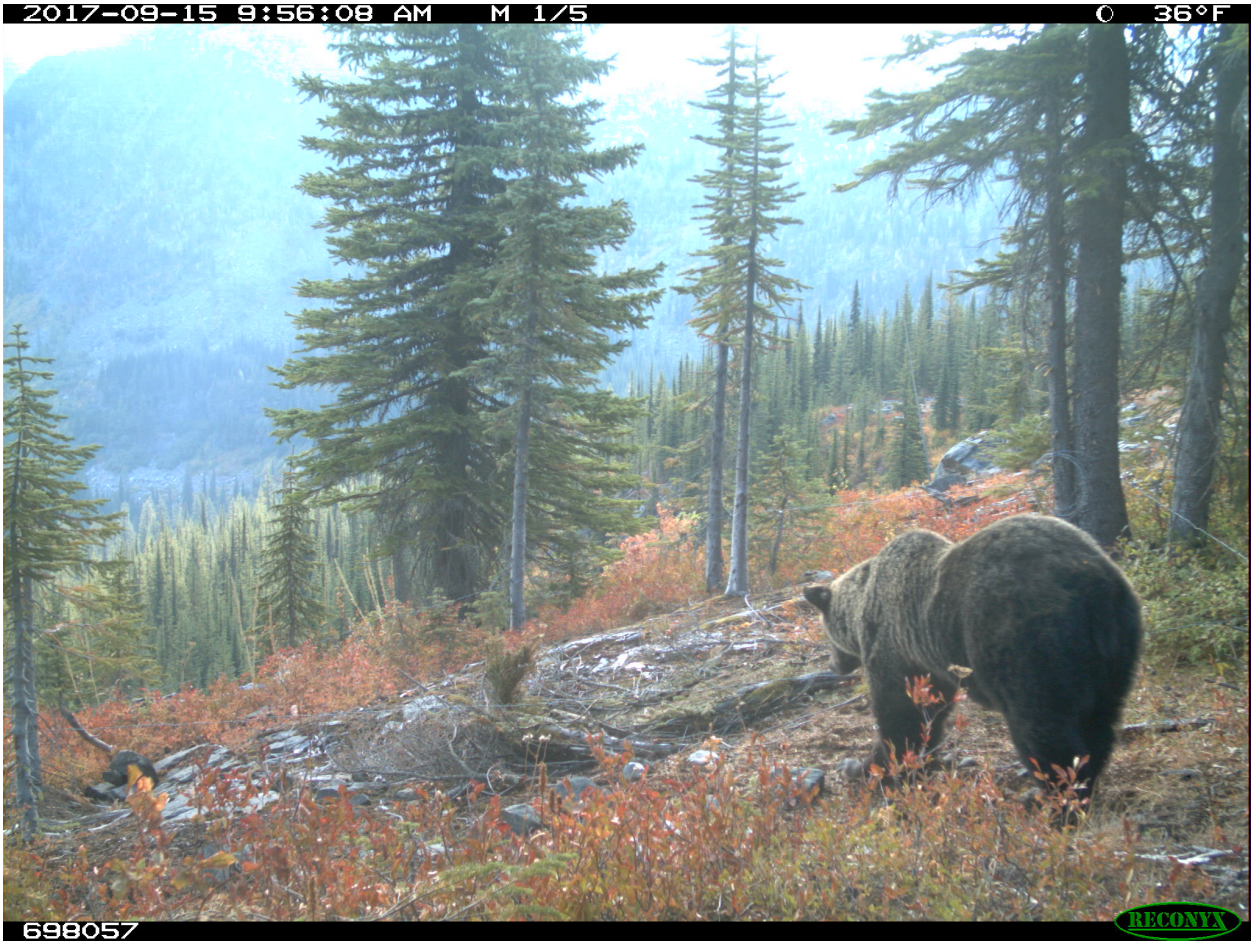
Population linkage (and more importantly, gene flow) is needed to achieve and maintain long-term genetic health. We have documented gene flow from sources unrelated to the augmentation program

(see below); three migrants, all originating from the Purcell Mountains north of HWY 3 in BC, have produced 4 offspring in the Cabinet-Yaak. One offspring is known to have recruited to adulthood (male), two are known dead, and the fourth suspected dead or emigrated. We have yet to document gene flow from other populations.

The Service has been leading research and monitoring in the CYE since 1988. Key research partners include Idaho Fish and Game, Montana Fish, Wildlife and Parks, Kootenai Tribe of Idaho, Idaho Panhandle National Forest, Kootenai National Forest, and Lolo National Forest. Further monitoring and research details can be found in the most recent Cabinet-Yaak Grizzly Bear Recovery Area Research and Monitoring Progress Report.

Augmentation Program

An augmentation program in the Cabinet Mountains portion of the population began in 1990 after research estimated fewer than 15 animals in the area. Primary objectives of the program are to bolster reproduction through the addition of female bears, and overall genetic diversity through the addition of female and male bears. Twenty bears have been added in the Cabinet Mountains since 1990. All bears have no history of conflicts with people and were moved in the summer to take advantage of developing food supplies in the form of huckleberries. Initial augmentation consisted of females but in recent years males have also been added. Six of these individuals are known to be dead and four others have left the target area. Reproduction has been identified by at least three of the transplanted bears with two females and 1 male that are known to have produced at least 14 first generation offspring, 18 second generation offspring, and one third generation offspring.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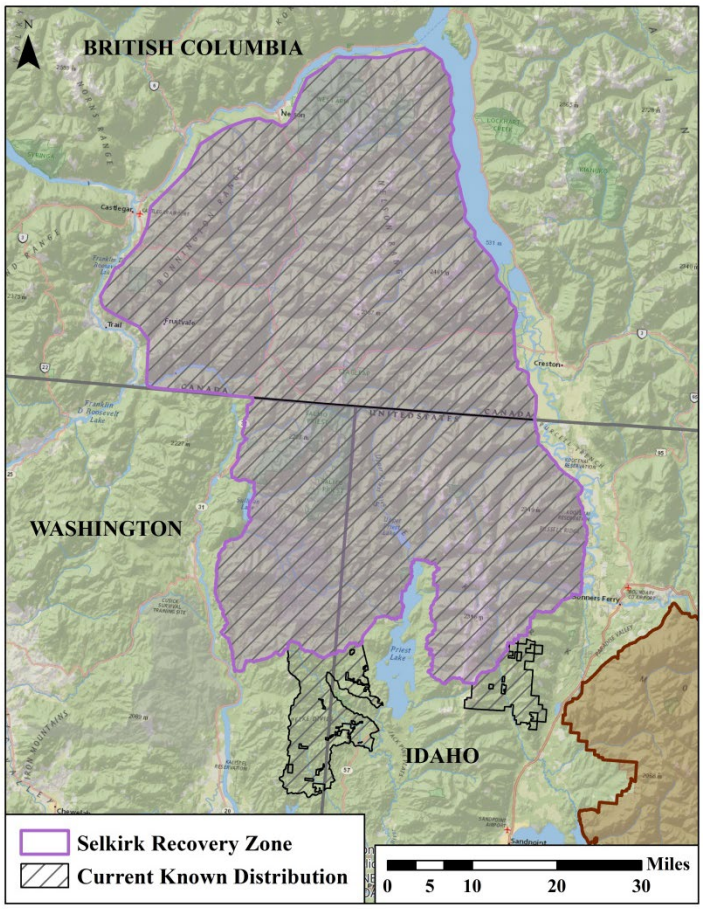
Selkirk Ecosystem

The Selkirk Mountains Grizzly Bear Recovery Zone (6,575 km^2) is located in northwest Idaho, northeast Washington, and southeast British Columbia (BC). It includes portions of the Idaho Panhandle and Colville National Forests (including 1 Wilderness Area) and the South Selkirks unit in BC.



Population Status

There are an estimated 75-80 bears in the U.S. and Canadian portions of the SE. The population is growing at approximately 1.8% per year.

Recovery target 1: 6 females with cubs over a running 6-year average both inside the recovery zone and within a 10 mile area immediately surrounding the recovery zone. Progress: Unduplicated females with cubs averaged 3.0 per year from 2012-2017. This target has not been met.

Recovery target 2: 7 of 10 BMUs occupied by females with young from a running 6-year sum of verified evidence. Progress: 7 of 10 BMUs were occupied during 2012-2017. This recovery target has been met.

Recovery target 3: The running 6-year average of known, human-caused mortality shall be ≤ 4% of the population estimate; and ≤ 30% shall be females. The current mortality limit is 2.4 bears/year and 0.7 females/year. Progress: Average human caused mortality for 2012-2017 was 1.8 bears/year and 0.8 females/year. Total mortality numbers for this period came in under the limit; but female mortalities exceeded the limit.

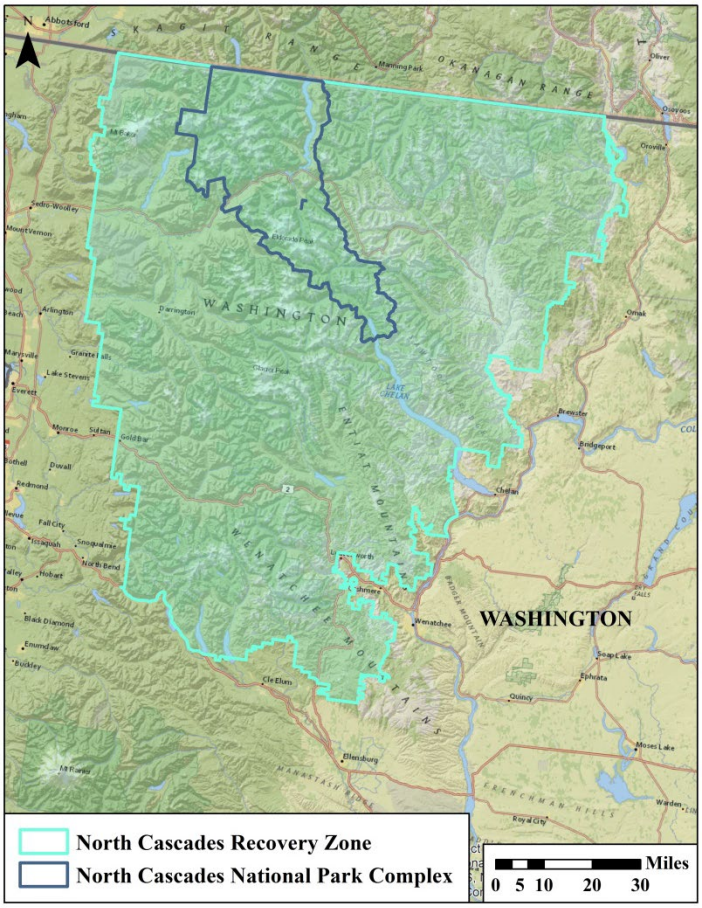
The SE is a historically isolated population, having among the lowest documented genetic diversity of interior North American populations (*H*=0.54, Proctor et al. 2012). Recently, we have documented movement between the Selkirk population and the Purcell Mountains population north of HWY 3 in BC. Perhaps more importantly, we have detected gene flow into the Selkirks from two migrant males from the Purcells. These two males have produced nine known offspring in the Selkirks (median birth year 2015).

The Service has been leading a grizzly bear monitoring and research program in the SE since 2012. Key research and funding cooperators include Idaho Department of Fish and Game, the Panhandle National Forest, the Colville National Forest, Idaho Department of Lands, the Kalispel Tribe, the Kootenai Tribe of Idaho, and Washington Department of Fish and Wildlife. The BC effort was led by Dr. Michael Proctor

with key funding provided by BC Habitat Conservation Trust Fund and BC Fish and Wildlife Compensation Fund. Further monitoring and research details can be found in the Selkirk Mountains Grizzly Bear Recovery Area 2017 Research and Monitoring Progress Report.

North Cascades Ecosystem

The North Cascades Recovery Zone (25,305 km^2) is located in northcentral Washington. It includes all of North Cascades National Park and portions of the Mount Baker-Snoqualmie, Wenatchee, and Okanogan National Forests (including 9 Wilderness Areas). The ecosystem extends north of the border into BC; however it is isolated from grizzly bear populations in other parts of the US and Canada.



Population Status

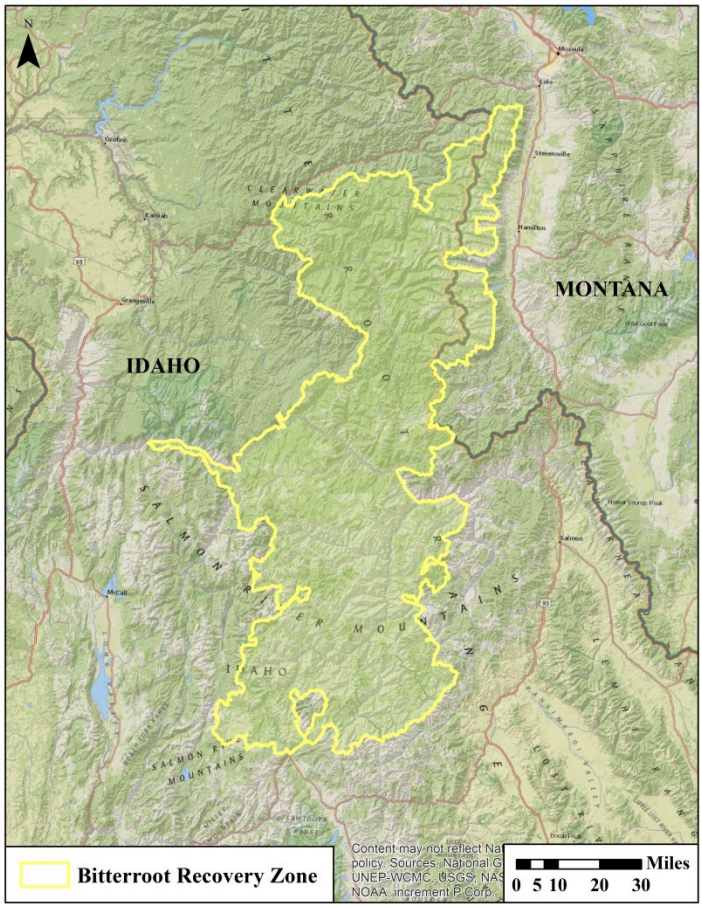
The overall population status of grizzly bears in the greater NCE is unknown; however, it is highly unlikely that the NCE contains a grizzly bear population. There have been only four confirmed detections of grizzly bears in the greater NCE in the past 10 years, all of which occurred in BC and may comprise only two individuals. There has been no confirmed evidence of grizzly bears within the US portion of the NCE since 1996.

Recovery Efforts

The Service is working with North Cascades National Park to finalize an Environmental Impact Statement (EIS) evaluating restoration options for grizzly bears in the unoccupied NCE. We released a draft EIS with proposed alternatives for public comment in 2017. We will likely be re-opening public comment on the EIS in 2019.

Bitterroot Ecosystem

The Bitterroot Recovery Zone (15,100 km^2), located in central Idaho and western Montana, is one of the largest contiguous blocks of Federal land in the lower 48 States. Ninety-eight percent of the Recovery Zone is contained within two Wilderness Areas in the Nez Perce-Clearwater and Salmon-Challis National Forests.



Population Status

The BE ecosystem is thought to be unoccupied by a grizzly bear population. However, as the GYE and NCDE populations continue to expand, grizzly bears have increasingly been confirmed nearby, including a grizzly bear captured in Stevensville, MT in October 2018. The ecosystem is within maximum dispersal distance of three ecosystems, including the GYE, CYE, and NCDE, and we expect grizzly bears to recolonize the BE, albeit slowly. It is possible that some undetected individuals are currently in the area and there is a need to survey the BE to determine occupancy and distribution. The Service is currently seeking funding for this effort.

GRIZZLY BEAR PROGRAM OUTREACH & EDUCATION

The Service regularly gives informational and educational presentations to community groups, schools, and professional meetings beyond our regular management meetings with governmental organizations. In 2018, the Recovery Program gave presentations to the following organizations:

University of Montana
Helena Education Foundation
Montana Woolgrowers
Montana Cattlemen's Association
Montana Bison Association
The Wildlife Society
Hamilton High School
Cub Scouts
Rattlesnake Elementary School
Friends of Scotchman Peak Wilderness
Avista Terrestrial Mitigation Committee
Kootenai Valley Resource Initiative
International Association for Bear Research and Management Conference
Human-Bear Conflicts Workshop, TN

GRIZZLY BEAR PROGRAM RESEARCH

Grizzly Bear Integrated Population Modeling and Interface Development

We are collaborating with Montana Fish, Wildlife & Parks, Wyoming Game & Fish Department, Idaho Fish & Game, the USGS, and researchers at the University of Montana to develop integrated population models (IPMs) to improve the reliability and precision of estimates of population size and trend. IPMs provide a statistical framework for combining multiple sources of data into a single model (Schaub and Abadi 2011), and will allow us to take advantage of the full suite of data collected on an annual basis.

Huckleberry Habitat Modeling

The GBRP is funding a graduate student at the University of Montana to model high quality huckleberry habitat in the Cabinet-Yaak and Selkirk recovery areas. The project is using habitat use patterns from collared bears to identify additional areas of expected use and examine the human or natural actions that may have created or maintained these sites (e.g. wildfire, prescribed fire, or timber harvest).

Assimilated Diets of NCDE Grizzly Bears

Since 2010, the GBRP has directed research quantifying assimilated diets (i.e., diet digestively absorbed) of grizzly bears in the NCDE. Because of the wide variation in diets of NCDE grizzly bears and the spatial breadth of the ecosystem, on-the-ground monitoring of availability of major foods is infeasible. Instead, stable isotope analysis of hair and blood samples allows us to integrate knowledge of foods available on

the landscape by estimating actual assimilated diets of bears — essentially letting the bear "sample" the landscape. For instance, ratios of nitrogen isotope ($\delta^{15}N$) become higher with increasing trophic level (indexed by percent animal matter in diet), allowing distinction between a plant-based, animal-based, or mixed diets.

Results from hundreds of hair and blood samples from captured bears in the NCDE indicate that trophic level varies widely across the ecosystem. Bears on the eastern, southern, and southwest periphery of the ecosystem have assimilated diets containing 3 times as much meat, proportionally, than those in the northwest of the ecosystem. We are currently researching whether these disparate trophic diets lead to differences in reproductive rates and influence population productivity.

Assimilated diets of SYE and SE grizzly bears

Similar to work in the NCDE, our program is producing and analyzing a hair and blood isotope dataset for the CYE and SE, including samples dating back to the early 1980s (N = 426). Using known isotopic ratios of plant and animal food items common to bears, we estimate assimilated diet of CYE grizzly bears include 10-22% animal meat, differing by age-class and sex. Diets of sampled SE bears have even lower proportions of animal meat (12%, on average). In comparison to other ecosystems, average summer diets of grizzly bears in the NCDE and GYE consist of 47% and 42% animal matter, respectively. The low use of meat by CYE and SE grizzlies is spatially homogenous when compared with areas in the NCDE, where grizzly bears have plant-based diets in northwestern part of ecosystem and animal-based diets in southern and eastern areas.

As a byproduct of collecting and analyzing food items in the CYE and SE, we find that berries (huckleberries in particular) carry a unique isotope signature. This allows us to estimate proportion of grizzly bear diets composed of berries, one of the more important foods to CYE and SE grizzly bears. Preliminary models estimate grizzly bears have diets of ~20% berries during the summer months; further samples and model development will shift this preliminary number. These diet estimates may predict or align with patterns of habitat use or individual reproductive fitness.

Army Cutworm Moths in the GYE

Army cutworm moth sites in the GYE have been well mapped and grizzly bear use of moth sites is monitored annually. Stable isotope analysis has previously been used to estimate assimilated meat and plant matter for GYE grizzly bear diets but intake of army cutworm moths by grizzly bears has not previously been quantified. We are investigating the feasibility of using stable isotope analysis to quantify the intake of army cutworm moths by grizzly bears in the GYE.

Grizzly Bear Attacks Database

The GBRP is working with a senior student at the University of Montana to compile and summarize information regarding fatal and nonfatal grizzly bear attacks on humans in the lower 48 States. No comprehensive summary or database of grizzly bear attacks currently exists, so this database will be extremely useful to the program.

GRIZZLY BEAR PROGRAM FUNDING

The GBRP supports a number of programs and projects to promote grizzly bear conservation in the lower 48 States. Population status assessment and science-based management are integral to conservation and recovery; the majority of our support goes towards these efforts (monitoring, management, research). Maintaining grizzly bears on the landscape requires tolerance. We fund various NGOs, groups, landowners, projects that promote awareness and understanding of grizzly bears, and work to prevent or reduce conflicts. The Service funds additional grizzly bear projects not mentioned here through other programs, including Tribal Wildlife Grants, Section 6 Agreements, and the Refuges program.

MANAGEMENT + MONITORING	**TOTAL $710,000**

Montana Fish, Wildlife & Parks
Wyoming Game & Fish Department
Idaho Fish & Game Department
US Geological Survey: Interagency Grizzly Bear Study Team
Forest Service: Interagency Grizzly Bear Committee
National Park Service: Grand Teton and Yellowstone

INFORMATION + EDUCATION	**TOTAL $67,500**

Be Bear Aware Campaign
Annual Bear Handling Workshop
Human-Bear Conflicts Workshop
Montana Bear Education Working Group

PREVENTATIVE PROJECTS	**TOTAL $54,000**

Landowner Fencing Projects: NCDE, Selkirk + C/Y Ecosystems
Landfill/Transfer Station Fencing Projects: NCDE + C/Y Ecosystem
Bear Proof Cans: NCDE
Grain Spill Vacuum: NCDE
Defenders of Wildlife: Electric Fencing Incentive Program
Blackfoot Challenge: Bear Ranger

RESEARCH	**TOTAL $220,000**

Integrated Population Modeling
University of Montana Masters Student Project
CYE and SE Monitoring & Research
Washington State University

2018 TOTAL	**$1,051,500**

RECENT PUBLICATIONS

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