Yellowstone Grizzly Bear Investigations 2024

Annual Report of the Interagency Grizzly Bear Study Team

USGS science for a changing world

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Some data contained in this report are preliminary or provisional and are subject to revision. They are being provided to meet the need for timely best science. Data in this report were collected and assembled by the consortium of the Interagency Grizzly Bear Study Team. The data are provided on the condition that neither U.S., State, nor Tribal Governments shall be held liable for any damages resulting from the authorized or unauthorized use of the data. Please obtain permission prior to citation. To give credit to authors, please cite the section within this report as a chapter in a book. Below is an example:

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YELLOWSTONE GRIZZLY BEAR INVESTIGATIONS

Annual Report of the Interagency Grizzly Bear Study Team

2024

U.S. Geological Survey
Wyoming Game and Fish Department
National Park Service
U.S. Fish and Wildlife Service
Montana Fish, Wildlife and Parks
U.S. Forest Service
Idaho Department of Fish and Game
Eastern Shoshone and Northern Arapaho Tribal Fish and Game Department

Edited by Matthew J. Gould, Frank T. van Manen, and Bryn E. Karabensh

U.S. Department of the Interior

U.S. Geological Survey

2026

IGBST Partner Websites

Interagency Grizzly Bear Study Team (U.S. Geological Survey):
https://www.usgs.gov/science/interagency-grizzly-bear-study-team

Grizzly Bear Recovery Program (U.S. Fish and Wildlife Service):
https://www.fws.gov/species/grizzly-bear-ursus-arctos-horribilis

U. S. Forest Service:
https://www.fs.usda.gov/visit/know-before-you-go/bears

Yellowstone National Park and Grand Teton National Park (National Park Service):
https://www.nps.gov/yell/learn/management/bear.htm
http://www.nps.gov/grte/planyourvisit/bearsafety.htm

Wyoming Game and Fish Department:
https://wgfd.wyo.gov/wyoming-wildlife/large-carnivore/grizzly-bears-wyoming

Montana Fish, Wildlife and Parks:
https://fwp.mt.gov/conservation/wildlife-management/bear

Idaho Department of Fish and Game:
http://fishandgame.idaho.gov/public/wildlife/?getPage=248

Eastern Shoshone and Northern Arapaho Tribal Fish and Game Department:
https://windriver.org/venue/shoshone-arapaho-fish-game/

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Abbreviations used in the report

BAU	bear analysis units
DMA	demographic monitoring area
et al.	and others
GPS	global positioning system
GTNP	Grand Teton National Park
GYE	Greater Yellowstone Ecosystem
GBRZ	grizzly bear recovery zone
IDFG	Idaho Department of Fish and Game
IGBC	Interagency Grizzly Bear Committee
IGBST	Interagency Grizzly Bear Study Team
IPM	integrated population model
NPS	National Park Service
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WGFD	Wyoming Game and Fish Department
YNP	Yellowstone National Park

Introduction

(Matthew J. Gould and Frank T. van Manen, U.S. Geological Survey, Interagency Grizzly Bear Study Team)

This Report

This annual report summarizes results of grizzly bear (*Ursus arctos*) research and monitoring conducted in the Greater Yellowstone Ecosystem (GYE) by the Interagency Grizzly Bear Study Team (IGBST) during 2024. Our efforts were focused on population estimation and demographic trends, in conjunction with monitoring important bear foods and habitats. This report also presents a summary of grizzly bear management actions to address conflict situations and agency outreach efforts. The information presented herein is a summary of annual data collections. Data, analyses, and summaries presented here supersede those published previously and may be subject to change contingent upon additional information, future publications, and the peer-review process.

A Robust and Resilient Grizzly Bear Population

For over four decades the IGBST has closely monitored the status of the GYE grizzly bear population through estimation of key demographic parameters. Because survival of different sex and age classes can be an important driver of population change, the IGBST tracks mortality numbers. For monitoring year 2024, we recorded 73 known and probable grizzly bear mortalities for the GYE population, surpassing the previous record of 70 in 2018 and 2021. Although not all mortalities occurred within the sampling year, the upward trend in annual mortalities continues. Raw mortality counts, however, can be misleading and must be referenced to population size and to the demographic monitoring area (DMA), where field-based monitoring of the population takes place. Because larger populations naturally tend to have higher frequency of mortality than smaller populations, we evaluate mortality rates (i.e., number of mortalities as a function of population abundance), rather than the total number of mortalities alone. Population estimates for 2024 show continued population growth and a record population size since monitoring began in the 1950s (White et al. 2017). Although population growth is slowing, these data indicate that mortality rates continue to be sustainable. The fact that the GYE population is growing despite record mortality indicates a robust and resilient population that serves as a testament to the decades of science-based recovery actions by Federal, State, and Tribal management agencies.

Population Monitoring

We follow monitoring protocols and recovery criteria established in the 2017 supplement to the Grizzly Bear Recovery Plan (USFWS 2017) and as revised under the 2024 Conservation Strategy (Yellowstone Ecosystem Subcommittee 2024). In 2024, the *Chao2* estimate based on implementation of the 16-km (kilometers) distance criterion was 84 females with cubs (see "***Estimating Number of Females with Cubs***") within the DMA, from which we estimated a total population size of 1,050 (95% credible interval = 894–1,239) bears using the integrated population model (IPM; see "***Population Size and Vital Rates***").

Food Monitoring

The distribution and availability of food sources, particularly high-calorie foods, is an important driver of population demographics of grizzly bears. Therefore, IGBST data collections include documenting indices of abundance for three high-calorie foods throughout the GYE: 1) Yellowstone cutthroat trout (*Oncorhynchus virginalis bouvieri*) spawning numbers; 2) bear use of army cutworm moths (*Euxoa auxiliaris*) sites; and 3) whitebark pine (*Pinus albicaulis*) cone production. As we noted in the 2017 Annual Report (van Manen et al. 2018), we are no longer conducting surveys to document availability of winter-kill carcasses of large ungulates. However, as meat from ungulates continues to be an important food resource for grizzly bears in the GYE

(Schwartz et al. 2014), we have added a new section to the report to assess ungulate consumption by grizzly bears in Yellowstone National Park (see section "***Grizzly Bear Consumption of Ungulates in Yellowstone National Park"***) and provide online references for herd statistics available through agency websites.

Besides IGBST surveys to index whitebark pine cone production, monitoring the health of whitebark pine in the ecosystem continued with the cooperation of the Greater Yellowstone Whitebark Pine Monitoring Working Group. We reference these monitoring efforts in Appendix B. The protocol has been modified to document the mortality rate in whitebark pine from all causes, including mountain pine beetle (*Dendroctonus ponderosae*).

Habitat Monitoring

In this report, we also detail findings from monitoring programs implemented since the 2007 delisting rule: 1) changes in secure habitat, open motorized access route density, and total motorized route density inside the designated Grizzly Bear Recovery Zone (hereafter GBRZ; also referred to as the Primary Conservation Area in the 2024 Conservation Strategy); 2) changes in number and capacity of developed sites inside the GBRZ; and 3) changes in number of commercial livestock allotments, permitted domestic sheep (*Ovis aries*) animal months inside the GBRZ, and livestock allotments with grizzly bear conflicts during the last five years (Appendix A).

History and Purpose of the IGBST

It was recognized as early as 1973 that a better understanding of the dynamics of grizzly bears in the GYE would best be accomplished by an independent research group responsible for collecting, managing, analyzing, and distributing scientific information. To meet this need, agencies developed a Memorandum of Understanding and formed the IGBST, a science consortium among the U.S. Geological Survey (USGS), National Park Service (NPS), U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), and the state wildlife agencies of Idaho, Montana, and Wyoming. The Eastern Shoshone Tribe of the Wind River Reservation, Wyoming, and the Northern Arapaho Tribe of the Wind River Reservation, Wyoming, formally joined the study team in 2009.

Quantitative data on grizzly bear abundance, distribution, survival, mortality, nuisance activity, and bear foods are critical to formulating management strategies and decisions. Moreover, this information is necessary to evaluate the recovery process. The IGBST coordinates data collection and analysis on an ecosystem scale, limits duplication of effort, and pools limited budgetary and personnel resources. Primary responsibilities of the IGBST are to: 1) conduct short- and long-term research projects addressing information needs for grizzly bear management; 2) monitor the grizzly bear population, including status and trend, numbers, reproduction, and mortality; 3) monitor grizzly bear habitats, foods, and impacts from humans; and 4) provide technical support to agencies and other groups responsible for the immediate and long-term management of grizzly bears in the GYE. Additional details are on the IGBST website: https://www.usgs.gov/science/interagency-grizzly-bear-study-team.

Previous and Recent Research

Since 1975, the IGBST has produced annual reports and numerous scientific publications summarizing the team's monitoring and research efforts within the GYE. Descriptions of the study area and sampling techniques are reported by Blanchard (1985), Mattson et al. (1991*a*), Haroldson et al. (1998), and Schwartz et al. (2006). Newly published studies reflect our investment into improvements of the monitoring program and continuing collaborations with academic institutions to address important research questions related to bear ecology and management in the GYE and beyond. The development and implementation of the IPM marks a new era in IGBST's demographic monitoring of the GYE grizzly bear population. A publication by Gould et al. (2024) highlighted the ability of the IPM to combine several data sources spanning 40 years into a unified statistical framework. The synergistic nature of the IPM means information is shared during the simultaneous estimation of multiple demographic metrics (e.g., litter size, number of reproducing females, age-specific survival),

resulting in more precise estimates that are also more consistent with one another. Observed temporal patterns also substantiate previous research by the IGBST, such as van Manen et al. (2016), who showed the slowing of population growth in the early 2000s was due to lower cub and yearling survival rates, and to a lesser degree reproduction, in areas with higher bear densities (i.e., density dependence). Those patterns also corroborate the prediction that population growth would eventually follow an oscillating pattern around a long-term mean (van Manen et al. 2016, Gould et al. 2024). Together, the evidence provided by the IPM, along with previous research, shows a population that has demographically recovered.

Regardless of the legal status of grizzly bears in the GYE, the IGBST will continue to monitor the population to identify areas of potential concern and to inform management objectives. The flexible and modular nature of the IPM framework means we can adapt and strengthen the model with the most up-to-date analytical techniques while maintaining a cohesive and comprehensive monitoring program. The IPM now serves as the foundation of the monitoring program listed in the demographic chapter of the 2024 Conservation Strategy, which was approved by the Interagency Grizzly Bear Committee (IGBC) and its Yellowstone Ecosystem Subcommittee (Yellowstone Ecosystem Subcommittee 2024).

As always, we continue to invest in collaborations with academic and government institutions to better understand grizzly bear ecology across the GYE and beyond. Several study team members collaborated on research that set out to identify the presence or absence of grizzly and polar bear (*Ursus maritimus*) cubs based on post-denning movement data from global positioning system (GPS) telemetry data of adult females (Andersen et al. 2025). For both species, documenting reproduction through den visits can be dangerous, and direct observations can be difficult either logistically or due to habitat structure. Remote detection provides another method of documenting reproduction that may lead to better estimates of reproductive success and cub survival. The study team also contributed to research aimed at understanding how brown bears globally may modify their activity patterns in relation to human activities and fluctuations in daily temperatures (Donatelli et al. 2025). In general, brown bears became more nocturnal in more human-modified landscapes and during times with higher ambient temperatures. Of the six populations that were studied, grizzly bears in the GYE were most flexible in their ability to shift their daily activity patterns. Meanwhile, brown bears in Europe, where human influences in bear habitats are generally greater than the GYE, were the least flexible, suggesting they may be near their behavioral and physiological limit to further modify their activity patterns. These findings enhance our understanding of the ability of brown bears to adapt to future changes in the ecosystems they inhabit.

Celebration and Thanks

Finally, we celebrate the accomplished career of Mark Haroldson, who retired in December 2024 from the USGS. Mark has been a pillar of the IGBST since 1984 with an unmatched dedication for the conservation of the GYE grizzly bear population. His knowledge and expertise, so freely given to those who have listened, was acquired through worn boots and saddle leather over decades of exploring the GYE. That coveted knowledge, and his curiosity for grizzly bears and the natural world, followed Mark into the office. His passion for research, and his uncompromising principles to let the data lead the difficult conversations, have helped generate unparalleled insight into grizzly bear ecology and inform management plans that help ensure the future of the GYE population. Mark's contributions to the IGBST and the grizzly bear population of the GYE will be felt for decades to come. Fortunately, Mark is now a Scientist Emeritus with the USGS, and we can still rely on his deep knowledge of grizzly bears and the GYE.


Mark Haroldson and his companion, Joe, Greater Yellowstone Ecosystem.
(*Photos courtesy of Interagency Grizzly Bear Study Team*)

Acknowledgments

This report is a combined effort of the partner agencies and individual members of the IGBST, and many individuals contributed directly or indirectly to its preparation. To that end, we have identified author(s). Additionally, we wish to thank the following individuals for their valuable contributions to data collection, analysis, and other phases of IGBST research. **Idaho Department of Fish and Game**: C. Bowlin, J. Brower, B. Cummings, C. Hendricks, R. Howe, J. Hussman, C. Johnson, T. Lewis, J. Locke, J. Melvin, M. Mumma, B. Panting, M. Pieron, R. Poole, A. Sorensen, T. Swearingen, S. Wesche; **Montana State University**: O. Dalling, A. Litt, E. Loggers; **Montana Fish, Wildlife and Parks**: M. Becker, S. Brozovich, C. Costello, J. Cunningham, D. Fagone, K. Frey, W. Hansen, M. Heaton, D. McHugh, M. Jacobsen, B. Lloyd, K. Orozco, R. Pickens, R. Pohle, J. Ramsey, J. Smith, D. Scott, S. Stewart, O. Thomi; **Yellowstone National Park**: K. Atkins, J. Bergstrand, K. Gunther, Z. Haroldson, M. King, E. Reinertson, K. Vetter, J. Wright, T. Wyman; **Grand Teton National Park**: G. Angelo, B. Apel, L. Apel, T. Brasington, C. Butler, M. Clark, R. Clark, R. Coscarelli, S. Dewey, L. Dreger, C. Faustman, C. Faustman, G. Gonsiewski, N. Gonsiewski, C. Hayden, T. Hayden, C. Hutson, L. Kirby, T. Kirby, A. Langford, T. Lapuk, J. Lieb, S. Liske, R. Mascia, T. Mascia, S. Morriss, S. Morriss, L. Muir, J. Potter, C. Price, A. Ryan, S. Ryan, J. Schwabedissen, J. Stephenson, B. Swift, P. Waite, A. Willemain, C. Willemain, J. Willemain, K. Wilmot, A. Zuckerman; **Pilots and Observers**: N. Cadwell, M. Packila; **Eastern Shoshone Tribe of the Wind River Reservation and Northern Arapaho Tribe of the Wind River Reservation**: Eastern Shoshone Business Council, Northern Arapaho Business Council, J. Friday, A. Lawson, B. Snyder, W. Wagon, G. Gonzales; **SpeedGoat Wildlife Solutions**: G. Grosloks, H. Martin, J. Nowak; **University of Montana**: P. Lukacs, S. Sells; **U.S. Forest Service**: S. Derusseau, J. Flower, E. Moyer, K. Murphy, M. Park, A. Pils, S. Pils, K. Skeen, D. Tyers; **U.S. Fish and Wildlife Service**: S. Becker, H. Cooley, B. Jimenez, J. Fortin-Noreus, P. Hnilicka, M. Mazur, W. Lane, R. Lyon; **U.S. Geological Survey**: C. Dickinson, M. Gould, M. Haroldson, B. Karabensh, K. Schafer, F. T. van Manen, C. Whitman, A. Corradini, A. Donatelli, S. Stephens, B. Whitman; **U.S. Department of Agriculture Wildlife Services:** L. Czapenski, J. Farr, K. Glazier, J. Hedelius, F. Helske, C. Hoover, A. Kammann, C. Knopp, G. McDougal, J. Rost, D. Tidwell; **Wyoming Game and Fish Department:** C. Atkinson, M. Aughton, B. Baker, M. Boyce, J. Clapp, C. Class, T. Crane, J. Crump, A. Courtemanch, B. DeBolt, J. Dellinger, L. Ellsbury, G. Gerharter, Z. Gregory, J. Hunter, B. Hovinga, T. Kelly, R. Kindermann, J. Kraft, B. Kroger, K. Lash, D. Lutz, K. Mills, T. Mong, P. Quick, N. Roberts, A. Roosa, K. Secrist, C. Stewart, D. Smith, J. Stephens, S. Stingley, D. Thompson. Without the

collection efforts, contributions, and dedication of all these people, the information contained within this report would not be available. Finally, we thank P.J. White (NPS, Yellowstone National Park, retired) and Mackenzie Park (USFS, Caribou-Targhee National Forest) for their constructive reviews of an earlier draft of this report as part of the USGS's Fundamental Science Practices.

Bear Monitoring and Population Trend

Marked Animals

(Matthew J. Gould, Chad Dickinson, and Bryn E. Karabensh, U.S. Geological Survey, Interagency Grizzly Bear Study Team; Cade Bowlin, Idaho Department of Fish and Game; and Justin G. Clapp, Wyoming Game and Fish Department)

During the 2024 field season, we captured 96 individual grizzly bears on 104 occasions from research and management capture efforts in the Greater Yellowstone Ecosystem (GYE; Table 1), including 29 females (22 adult), 66 males (45 adult) and 1 yearling bear of unknown sex (Table 1). The single bear of unknown sex was captured at a research trap site and released without handling. Two individual bears (#1126 and #1129) were captured in the Northern Continental Divide Ecosystem, transported, and released in the GYE as part of a genetic augmentation effort by the States of Montana, Wyoming, and Idaho.

Seventy (73%) of the 96 individual bears captured were not previously marked. The percent of previously unmarked individual grizzly bears captured annually has remained relatively constant during the period 1998–2024, averaging 63%, with no evidence ($F = 0.0495$, 1 degree of freedom, P [significance or probability value] = 0.826) of a change in trend (Fig. 1). This finding continues to support that recruitment through reproduction is occurring at a relatively constant rate in this closed population. We would expect the number of new bears encountered annually to decline if this were not the case. We conducted research trapping efforts for a total of 569 trap days (1 trap day = 1 trap set for 1 day). During research trapping operations, we had 50 captures of 44 individual grizzly bears for a trapping success rate of 1 grizzly capture every 11.4 trap days. All research captures occurred within the DMA. There were 54 management captures of 52 individual bears during 2024 (Tables 1 and 2), including 14 females (12 adults) and 38 males (27 adults). Twenty-one of the 54 management captures (9 females, 12 males) occurred outside the DMA. Ten individual bears (3 females, 7 males) were relocated because of conflict situations (Table 2). In total, there were 42 management captures that resulted in removals (11 females, 31 males; Table 1). Twenty-one (9 females, 12 males) of these removals occurred outside the DMA. We radio-monitored 90 individual grizzly bears during the 2024 field season, including 43 females, 35 of which were adults (Tables 2 and 3). Forty-four grizzly bears entered their winter dens wearing active transmitters. Since 1975, 1,132 individual grizzly bears have been radio-marked in the GYE.

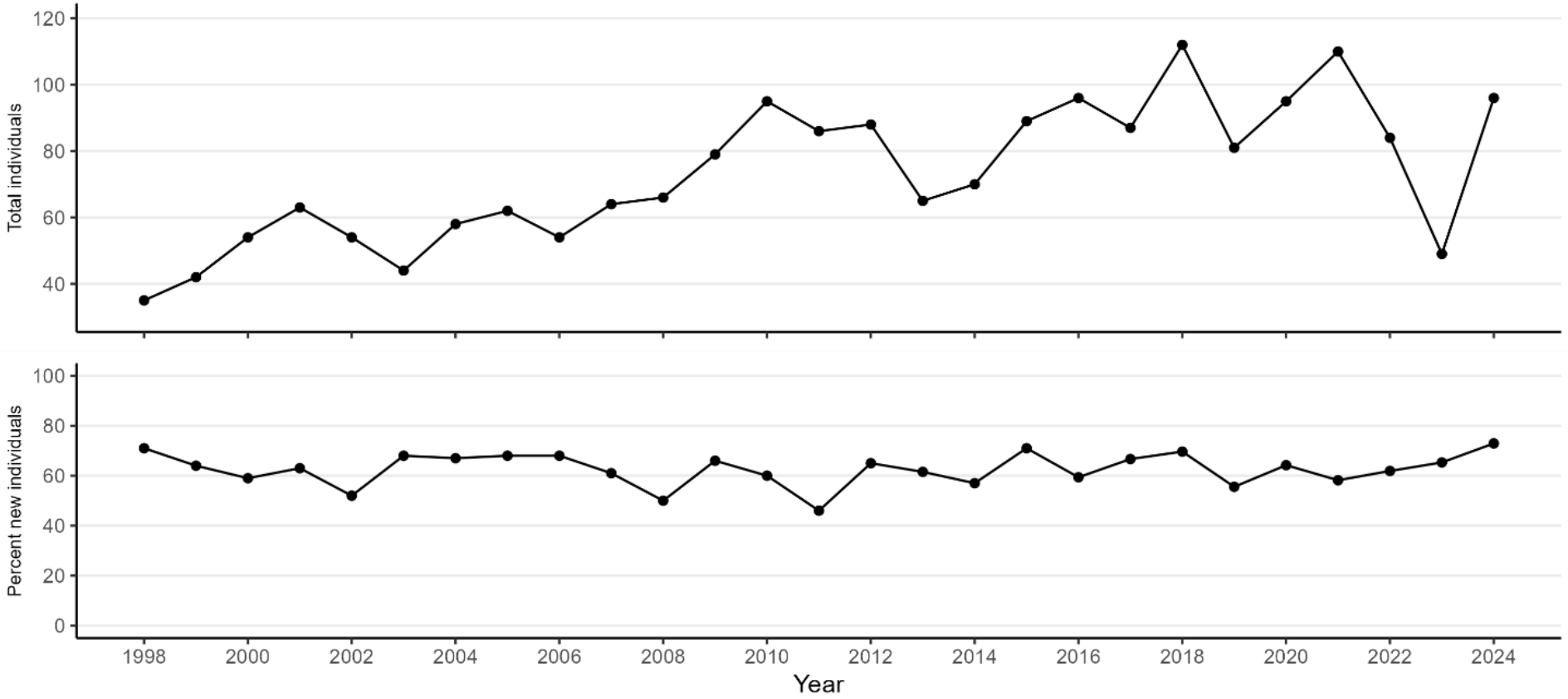

Fig. 1. Annual number of grizzly bears captured (top) and percent previously unmarked individuals (bottom) in the Greater Yellowstone Ecosystem, 1998–2024.

Table 1. Grizzly bears captured in the Greater Yellowstone Ecosystem, 2024.							
Bear	**Sex**	**Age**	**Date**	**General location[a]**	**Capture type**	**Release site[b]**	**Handler[c]**
Unm202401	Male	Subadult	4/15/2024	Redbank Creek, PR-WY	Management	Removed (202401)	WGFD
Unm202402	Male	Adult	4/25/2024	Gooseberry Creek, BLM-WY	Management	Removed (202402)	WGFD
Unm202403	Male	Adult	4/27/2024	South Fork Shoshone River, PR-WY	Management	Removed (202403)	WGFD
1059	Male	Adult	5/7/2024	South Fork Shoshone River, PR-WY	Management	Removed (202404)	WGFD
Unm202404	Male	Subadult	5/9/2024	Marquette Creek, PR-WY	Management	Removed (202405)	WGFD
1000	Male	Adult	5/17/2024	Little Horse Creek, SNF-WY	Research	On site	WGFD
1103 (was G240)	Male	Adult	5/19/2024	Middle Fork Long Creek, SNF-WY	Research	On site	WGFD
1104	Male	Subadult	5/20/2024	Oxbow Creek, YNP	Research	On site	IGBST
1105	Male	Subadult	5/22/2024	Frontier Creek, SNF-WY	Research	On site	WGFD
1106	Male	Adult	5/24/2024	North Fork Shoshone River, PR-WY	Management	Transported	WGFD
Unm202405	Female	Adult	5/24/2024	Oxbow Creek, YNP	Research	On site	IGBST
Unm202406	Unknown	Yearling	5/24/2024	Oxbow Creek, YNP	Research	On site	IGBST
1107	Female	Subadult	5/25/2024	East Fork Long Creek, SNF-WY	Research	On site	WGFD
1108	Male	Adult	5/27/2024	Little Horse Creek, SNF-WY	Research	On site	WGFD
1109	Male	Subadult	5/27/2024	Oxbow Creek, YNP	Research	On site	IGBST
1105	Male	Subadult	5/22/2024	Frontier Creek, SNF-WY	Research	On site	WGFD
G283	Male	Adult	5/30/2024	Frontier Creek, SNF-WY	Research	On site	WGFD
G284	Male	Adult	6/1/2024	Middle Fork Long Creek, SNF-WY	Research	On site	WGFD
G285	Male	Adult	6/3/2024	Middle Fork Long Creek, SNF-WY	Research	On site	WGFD
1104	Male	Subadult	6/4/2024	Elk Creek, YNP	Research	On site	IGBST
G286	Male	Subadult	6/4/2024	Frontier Creek, SNF-WY	Research	On site	WGFD
1104	Male	Subadult	6/5/2024	Oxbow Creek, YNP	Research	On site	IGBST
1110	Female	Adult	6/5/2024	Middle Fork Long Creek, SNF-WY	Research	On site	WGFD
1111	Male	Subadult	6/8/2024	Rock Creek, CGNF-MT	Management	Transported	MTFWP
1112	Male	Adult	6/9/2024	Little Horse Creek, SNF-WY	Research	On site	WGFD

Table 1. Grizzly bears captured in the Greater Yellowstone Ecosystem, 2024.							
Bear	**Sex**	**Age**	**Date**	**General location[a]**	**Capture type**	**Release site[b]**	**Handler[c]**
1113	Male	Adult	6/14/2024	Silver Lake, CTNF-ID	Research	On site	IDFG
Unm202407	Female	Adult	6/18/2024	Paradise Creek, ST-WY	Management	Removed (202409)	WGFD
1114	Female	Adult	6/19/2024	Donahue Creek, PR-MT	Research	On site	IGBST
1115	Male	Adult	6/19/2024	Silver Lake, CTNF-ID	Research	On site	IDFG
996	Female	Adult	6/24/2024	Paradise Creek, ST-WY	Management	Removed (202411)	WGFD
1116	Female	Subadult	6/25/2024	Silver Lake, CTNF-ID	Research	On site	IDFG
993	Male	Adult	6/29/2024	Little Horse Creek, SNF-WY	Management	Removed (202412)	WGFD
Unm202408	Male	Subadult	7/2/2024	Carter Creek, PR-WY	Management	Removed (202413)	WGFD
979	Female	Adult	7/7/2024	Gypsum Creek, BTNF-WY	Management	Removed (202415)	WGFD
G287	Male	Subadult	7/8/2024	Henry's Fork, CTNF-ID	Research	On site	IDFG
G288	Male	Adult	7/9/2024	Arnica Creek, YNP	Research	On site	IGBST
1117	Female	Yearling	7/10/2024	Dry Lake Creek, BTNF-WY	Research	On site	WGFD
G288	Male	Adult	7/11/2024	Arnica Creek, YNP	Research	On site	IGBST
1118	Female	Yearling	7/12/2024	Wagon Creek, BTNF-WY	Management	Transported	WGFD
1119	Female	Adult	7/12/2024	North Fork Spread Creek, BTNF-WY	Research	On site	WGFD
G289	Male	Yearling	7/13/2024	South Fork Spread Creek, BTNF-WY	Research	On site	WGFD
1120	Male	Adult	7/17/2024	Nort Fork Spread Creek, BTNF-WY	Research	On site	WGFD
Unm202409	Male	Adult	7/18/2024	Dry Creek, BLM-WY	Management	Removed (202417)	WGFD
769	Male	Adult	7/18/2024	Yellowstone River, PR-MT	Management	Removed (202418)	MTFWP
1121	Female	Yearling	7/19/2024	South Fork Spread Creek, BTNF-WY	Research	On site	WGFD
1122	Male	Adult	7/20/2024	Split Rock Creek, BTNF-WY	Research	On site	WGFD
1123	Female	Adult	7/20/2024	Dry Lake Creek, BTNF-WY	Research	On site	WGFD
1045	Male	Adult	7/23/2024	Granite Creek, CTNF-ID	Management	Removed (202421)	IDFG
702	Female	Adult	7/23/2024	South Fork Spread Creek, BTNF-WY	Research	On site	WGFD
1120	Male	Adult	7/23/2024	Nort Fork Spread Creek, BTNF-WY	Research	On site	WGFD

Table 1. Grizzly bears captured in the Greater Yellowstone Ecosystem, 2024.							
Bear	**Sex**	**Age**	**Date**	**General location[a]**	**Capture type**	**Release site[b]**	**Handler[c]**
1124	Female	Adult	7/27/2024	South Fork Spread Creek, BTNF-WY	Research	On site	WGFD
1040	Male	Adult	7/27/2024	Tepee Creek, BTNF-WY	Management	Removed (NA)	WGFD
1125	Male	Adult	7/28/2024	Nort Fork Spread Creek, BTNF-WY	Research	On site	WGFD
1126[d]	Female	Subadult	7/29/2024	Skyland Creek, FNF-MT	Research	Transported	MTFWP
1127	Male	Subadult	7/29/2024	South Fork Spread Creek, BTNF-WY	Research	On site	WGFD
1128	Male	Cub	7/30/2024	Black Rock Creek, BTNF-WY	Research	On site	WGFD
1129[d]	Male	Subadult	7/30/2024	Skyland Creek, FNF-MT	Research	Transported	MTFWP
1130	Male	Subadult	7/31/2024	Fish Creek, PR-WY	Management	Transported	WGFD
G724	Male	Adult	8/3/2024	Henry's Fork, CTNF-WY	Management	Removed (202423)	IDFG
Unm202410	Male	Adult	8/5/2024	Henry's Fork, CTNF-WY	Research	On site	IDFG
Unm202411	Male	Subadult	8/6/2024	Tepee Creek, BTNF-WY	Management	Removed (202424)	WGFD
G287	Male	Subadult	8/9/2024	Bear Creek, CTNF-ID	Research	On site	IDFG
Unm202412	Male	Subadult	8/10/2024	Grass Creek, SNF-WY	Management	Removed (202425)	WGFD
G290	Male	Subadult	8/12/2024	Upper Goose Lake, CTNF-ID	Research	On site	IDFG
Unm202413	Male	Adult	8/13/2024	Reef Creek, SNF-WY	Management	Removed (202426)	WGFD
1083	Male	Adult	8/13/2024	Toms Creek, PR-ID	Management	Transported	IDFG
1131	Male	Adult	8/15/2024	Curry Creek, PR-WY	Management	On site	WGFD
1047	Male	Adult	8/16/2024	Slab Creek, BLM-WY	Management	On site	WGFD
1132	Male	Adult	8/19/2024	Tepee Creek, BTNF-WY	Management	Transported	WGFD
1133	Female	Adult	8/20/2024	Kitten Creek, SNF-WY	Management	Transported	WGFD
1134	Female	Adult	8/21/2024	Eldridge Creek, CGNF-MT	Research	On site	IGBST
1135	Male	Subadult	8/21/2024	Volney Creek, PR-MT	Research	On site	MTFWP
Unm202414	Female	Adult	8/21/2024	West Fork Madison River, BDNF-MT	Management	Removed (202427)	WS
Unm202416	Male	Adult	8/21/2024	Big Creek, PR-MT	Management	Removed (202429)	WS
1136 (was G264)	Female	Adult	8/23/2024	Crooked Creek, CTNF-ID	Management	Transported	IDFG
Unm202415	Female	Adult	8/23/2024	Clarks Fork Yellowstone River, PR-WY	Management	Removed (202430)	WGFD
Unm202417	Male	Adult	8/24/2024	Deadman Creek, SNF-WY	Management	Removed (202431)	WGFD

Table 1. Grizzly bears captured in the Greater Yellowstone Ecosystem, 2024.							
Bear	**Sex**	**Age**	**Date**	**General location[a]**	**Capture type**	**Release site[b]**	**Handler[c]**
1041	Female	Adult	8/24/2024	Dago Creek, BTNF-WY	Management	Removed (202432)	WGFD
1101	Male	Subadult	8/26/2024	Aldrich Creek, PR-WY	Management	Removed (202433)	WGFD
G282	Male	Subadult	8/26/2024	Aldrich Creek, PR-WY	Management	Removed (202434)	WGFD
Unm202418	Female	Adult	8/29/2024	Clarks Fork Yellowstone River, PR-WY	Management	Removed (202435)	WGFD
1137	Male	Adult	9/4/2024	Firehole River, YNP	Research	On site	IGBST
1097	Female	Adult	9/6/2024	Clarks Fork Yellowstone River, PR-WY	Management	Removed (202441)	WGFD
1079	Male	Adult	9/10/2024	Henry's Fork, PR-ID	Management	Removed (202442)	IDFG
1083	Male	Adult	9/10/2024	Henry's Fork, PR-ID	Management	Removed (202443)	IDFG
468	Male	Adult	9/11/2024	Buffalo Fork, PR-WY	Management	Removed (202445)	WGFD
Unm202419	Male	Adult	9/15/2024	Snowshoe Creek, SNF-WY	Management	Removed (202448)	WGFD
695	Male	Adult	9/16/2024	Gibbon River, YNP	Research	On site	IGBST
Unm202420	Male	Adult	9/23/2024	Clarks Fork Yellowstone River, PR-WY	Management	Removed (202451)	WGFD
Unm202421	Male	Adult	9/23/2024	Clarks Fork Yellowstone River, PR-WY	Management	Removed (202452)	WGFD
1098	Female	Adult	9/24/2024	Stephens Creek, YNP	Research	On site	IGBST
1130	Male	Subadult	9/25/2024	Clarks Fork Yellowstone River, PR-WY	Management	Removed (202453)	WGFD
1138	Male	Subadult	9/28/2024	South Fork Shoshone River, PR-WY	Management	Transported	WGFD
Unm202422	Female	Adult	9/28/2024	Clarks Fork Yellowstone River, PR-WY	Management	Removed (202455)	WGFD
Unm202423	Male	Subadult	9/30/2024	Beauty Lake, SNF-WY	Management	Removed (202456)	WGFD
981	Female	Adult	10/2/2024	Gibbon River, YNP	Research	On site	IGBST
1099	Male	Adult	10/3/2024	Sage Creek, PR-WY	Management	Removed (202457)	WGFD
1139	Female	Subadult	10/11/2024	Gibbon River, YNP	Research	On site	IGBST
1140	Male	Adult	10/13/2024	Flat Mountain Arm, YNP	Research	On site	IGBST
496	Male	Adult	10/14/2024	Carter Creek, PR-WY	Management	Removed (202465)	WGFD
953	Male	Adult	10/15/2024	Flat Mountain Arm, YNP	Research	On site	IGBST
Unm202425	Male	Adult	10/23/2024	Gallatin River, PR-MT	Management	Removed (202470)	MTFWP

Table 1. Grizzly bears captured in the Greater Yellowstone Ecosystem, 2024.

Bear	Sex	Age	Date	General location[a]	Capture type	Release site[b]	Handler[c]
Unm202424	Female	Subadult	10/24/2024	Bennett Creek, PR-WY	Management	Removed (202469)	WGFD
1141	Male	Adult	10/25/2024	Bennett Creek, PR-WY	Management	Transported	WGFD
Unm202426	Male	Adult	11/2/2024	Greybull River, PR-WY	Management	Removed (202472)	WGFD
Unm202427	Female	Adult	11/18/2024	Greybull River, PR-WY	Management	Removed (202473)	WGFD

[a] BDNF = Beaverhead-Deerlodge National Forest, BLM = Bureau of Land Management, BTNF = Bridger-Teton National Forest, CTNF = Caribou-Targhee National Forest, CGNF = Custer Gallatin National Forest, FNF = Flathead National Forest, GTNP = Grand Teton National Park, SNF = Shoshone National Forest, YNP = Yellowstone National Park, WRIR = Wind River Reservation, PR = private.

[b] Numbers in parentheses are assigned mortality numbers.

[c] IDFG = Idaho Department of Fish and Game; IGBST = Interagency Grizzly Bear Study Team, U.S. Geological Survey; GTNP = Grand Teton National Park; MTFWP = Montana Fish, Wildlife and Parks; WS = Wildlife Services; WGFD = Wyoming Game and Fish Department; WRIR = Wind River Reservation, YNP = Yellowstone National Park.

[d] Individual captured in the Northern Continental Divide Ecosystem, transported, and released in the Greater Yellowstone Ecosystem as part of the augmentation effort by Idaho, Montana and Wyoming to support GYE genetic fitness in the absence of natural connectivity with other grizzly bear populations.

Table 2. Annual number of grizzly bears monitored, captured, and transported in the Greater Yellowstone Ecosystem, 1980–2024.

Year	Number monitored	Individuals trapped	Total captures		Transported
			Research	Management	
1980	34	28	32	0	0
1981	43	36	30	35	31
1982	46	30	27	25	17
1983	26	14	0	18	13
1984	35	33	20	22	16
1985	21	4	0	5	2
1986	29	36	19	31	19
1987	30	21	15	10	8
1988	46	36	23	21	15
1989	40	15	14	3	3
1990	35	15	4	13	9
1991	42	27	28	3	4

Table 2. Annual number of grizzly bears monitored, captured, and transported in the Greater Yellowstone Ecosystem, 1980–2024.					
Year	Number monitored	Individuals trapped	Total captures		Transported
			Research	Management	
1992	41	16	15	1	0
1993	43	21	13	8	6
1994	60	43	23	31	28
1995	71	39	26	28	22
1996	76	36	25	15	10
1997	70	24	20	8	6
1998	58	35	32	8	5
1999	65	42	31	16	13
2000	84	54	38	27	12
2001	82	63	41	32	15
2002	81	54	50	22	15
2003	80	44	40	14	11
2004	78	58	38	29	20
2005	91	63	47	27	20
2006	92	54	36	25	23
2007	86	65	54	19	8
2008	87	66	39	40	30
2009	97	79	63	34	25
2010	85	95	36	75	52
2011	92	86	61	46	24
2012	112	88	47	56	35
2013	88	65	58	30	20
2014	94	70	51	30	20
2015	101	89	34	72	41
2016	106	96	59	49	18
2017	99	87	62	37	15
2018	106	112	57	72	27
2019	98	81	59	39	16
2020	104	95	72	41	13
2021	120	110	51	59	19
2022	112	84	60	40	12
2023	84	48	16	34	10
2024	90	96	50	54	10

Table 3. Grizzly bears radiomonitored in the Greater Yellowstone Ecosystem, 2024.						
Bear	Sex	Age	Offspring	Monitored		Current status
				Out of den	Into den	
468	M	Adult		No	No	Removed
520	M	Adult		Yes	No	Cast[a]
566	M	Adult		Yes	No	Cast; dead
695	M	Adult		No	Yes	Active
688	M	Adult		Yes	No	Cast
702	F	Adult	1 yearling, lost	No	Yes	Active
706	F	Adult	2 cubs	No	Yes	Active
747	F	Adult	1 2-year-old, weaned	Yes	Yes	Active
883	F	Adult	2 2-year-olds, weaned	Yes	No	Dead
886	F	Adult	None	Yes	No	Dead
912	F	Adult	2 cubs	Yes	Yes	Active
948	F	Adult	1 yearling	Yes	Yes	Probable battery failure
953	M	Adult		No	Yes	Active
980	F	Adult	2 yearlings, 1 lost?	Yes	No	Cast
981	F	Adult	None	No	Yes	Active
999	F	Adult	2 yearlings	Yes	Yes	Active
1000	M	Adult		No	No	Cast
1025	F	Adult	3 yearlings, 1 lost?	Yes	Yes	Active
1035	F	Adult	None	Yes	No	Active
1044	F	Adult	2 cubs, 2 lost	Yes	No	Cast
1045	M	Adult		Yes	No	Cast; removed
1046	F	Adult	2 cubs, 1 lost	Yes	Yes	Active
1047	M	Adult		No	Yes	Active
1054	F	Adult	2 cubs	Yes	No	Cast
1060	M	Adult		Yes	No	Cast
1061	M	Adult		No	No	Probable battery failure
1062	F	Adult	None	Yes	Yes	Active
1063	F	Adult	3 cubs	Yes	No	Cast
1065	F	Adult	None	Yes	No	Cast
1068	M	Adult		Yes	No	Cast
1069	M	Subadult		Yes	No	Cast
1070	F	Adult	2 cubs, 2 lost	Yes	Yes	Active

Table 3. Grizzly bears radiomonitored in the Greater Yellowstone Ecosystem, 2024.						
Bear	Sex	Age	Offspring	Monitored		Current status
				Out of den	Into den	
1071	F	Adult	2 cubs, 2 lost	Yes	Yes	Active
1072	F	Adult	None	Yes	No	Probable battery failure
1074	M	Adult		Yes	No	Cast
1075	M	Adult		Yes	No	Probable battery failure
1076	F	Adult	1 cub	Yes	No	Cast
1077	M	Adult		Yes	No	Cast
1079	M	Adult		Yes	No	Cast
1083	M	Adult		No	No	Removed
1084	F	Adult	2 cubs	Yes	No	Probable battery failure
1087	M	Adult		Yes	No	Probable battery failure
1092	F	Adult	2 cubs, 2 lost	Yes	Yes	Active
1093	F	Adult	2 cubs	Yes	Yes	Active
1094	F	Adult	2 cubs	Yes	Yes	Active
1095	M	Adult		Yes	No	Cast
1097	F	Subadult	None	Yes	No	Cast; removed
1098	F	Adult		Yes	Yes	Active
1099	M	Adult		Yes	No	Removed
1100	M	Adult		Yes	Yes	Active
1101	M	Subadult		No	No	Cast; removed
1102	M	Adult		Yes	No	Probable battery failure
1103	M	Adult		No	No	Cast
1104	M	Subadult		No	No	Probable battery failure
1105	M	Subadult		No	No	Cast
1106	M	Adult		No	Yes	Active
1107	F	Subadult	None	No	Yes	Active
1108	M	Adult		No	No	Cast
1109	M	Subadult		No	No	Cast
1110	F	Adult	None	No	Yes	Active
1111	M	Subadult		No	No	Cast
1112	M	Adult		No	No	Cast
1113	M	Subadult		No	Yes	Active
1114	F	Adult	2 cubs	No	Yes	Active
1115	M	Adult		No	Yes	Active
1116	F	Subadult	None	No	Yes	Active

Table 3. Grizzly bears radiomonitored in the Greater Yellowstone Ecosystem, 2024.						
Bear	**Sex**	**Age**	**Offspring**	**Monitored**		**Current status**
				Out of den	**Into den**	
1117	F	Yearling	None	No	No	Cast
1118	F	Yearling	None	No	No	Cast
1119	F	Adult	None	No	Yes	Active
1120	M	Adult		No	No	Cast
1121	F	Yearling	None	No	Yes	Active
1122	M	Adult		No	No	Cast
1123	F	Adult	None	No	Yes	Active
1124	F	Adult	None	No	Yes	Active
1125	M	Subadult		No	Yes	Active
1126	F	Subadult	None	No	Yes	Active
1127	M	Subadult		No	Yes	Active
1128	M	Cub		No	Yes	Active
1129	M	Subadult		No	Yes	Active
1130	M	Subadult		No	No	Removed
1131	M	Adult		No	Yes	Active
1132	M	Adult		No	Yes	Active
1133	F	Adult	None	No	No	Dead
1134	F	Adult	None	No	Yes	Active
1135	M	Subadult		No	No	Cast
1136	F	Adult	None	No	Yes	Active
1137	M	Adult		No	Yes	Active
1139	F	Subadult	None	No	Yes	Active
1140	M	Adult		No	Yes	Active
1141	M	Adult		No	Yes	Active

[a] Includes all instances in which a radio collar was pre-programmed to drop off, the cotton spacer deteriorated, or the collar was removed by the animal

Estimating Number of Females with Cubs

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I. Estimating Population Size and Assessing Trend from Observations of Unique Females with Cubs

Background

Under the 2017 Revised Demographic Criteria for the GYE, which were amended to the Grizzly Bear Recovery Plan (USFWS 1993, 2017), the IGBST is tasked with annually estimating the number and trend of female grizzly bears with cubs (0–1 years old) in the GYE population and estimating the sizes of specific population segments to assess annual mortalities relative to population size. We present our 2024 findings for counts of unique females with cubs and the total population estimate derived from numbers of females with cubs observed within the DMA.

Methods

Historically, we used a technique developed by Knight et al. (1995) to estimate the number of unique females with cubs and tabulate sighting frequencies for each family. An important component of the original rule set was a distance criterion of > (greater than) 30 km to distinguish sightings as belonging to unique females with cubs. Findings from Schwartz et al. (2008), however, indicated the Knight et al. (1995) rule set underestimated the number of unique females with cubs and this underestimation bias increased with increasing population size. During 2021–2022, the IGBST completed a comprehensive reassessment, using extensive simulations to evaluate a distance criterion that resulted in relatively unbiased estimates for the number of females with cubs (IGBST 2021, van Manen et al. 2022). An important outcome of the study was that a 16-km distance criterion resulted in more accurate estimates and minimized the risk of overestimation. The IGBST started implementing this change in the rule set in 2021.

Using the number of unique females with cubs observed from aerial surveys conducted during June–August (see section "***Observation Flights***") and ground-based sightings, we obtain a nonparametric, bias-corrected estimate that accounts for individual sighting heterogeneity to estimate the total number of females with cubs in the population (denoted as $Chao2$; Chao 1989, Wilson and Collins 1992, Keating et al. 2002, Cherry et al. 2007). The raw $Chao2$ estimates are an important input to the newly implemented IPM (Gould et al. 2024).

2024 Sightings of Females with Cubs

We documented 206 verified sightings of females with cubs during 2024 in the GYE (Table 4). Of these 206 observations, more than half were obtained from aerial sources (58%, Table 4) in 2024. We differentiated 79 unique females with cubs from the 206 sightings using the Knight et al. (1995) rule set with the 16-km distance criterion. Twenty sightings (9.7%) of 7 unique females occurred outside the DMA (Fig. 2). Six of the seven females were only observed once outside the DMA. One of the females observed out of the DMA was also observed in the DMA, but only with the aid of telemetry as she was a collared female. Therefore, we identified 72 unique females with cubs inside the DMA. Fifty (24%) observations from an estimated 20 unique females with cubs based on 16-km distance criterion occurred within the boundary of Yellowstone National Park (YNP).

The total number of cubs observed during initial sightings of the 79 unique females with cubs was 151 and mean litter size was 1.91 (Table 5). There were 22 single cub litters, 44 litters of twins, 12 litters of triplets, no quadruplets, and the first documented quintuplet in the ecosystem (Table 5). Using only the initial sightings of all females with cubs observed within the DMA, there were a total of 128 cubs, with a mean litter size of 1.94.

2024 DMA *Chao2*

Excluding the 20 sightings (6 females) observed outside the DMA and sightings of 7 family groups based on telemetry only, which are not independent observations, we obtained 136 observations of 66 unique females

with cubs (Table 6) within the DMA. Using the sighting frequencies, our estimate of the number of unique females with cubs within the DMA (*Chao2*) was 84.45. We used this estimate as an input to the IPM (see "***Population Size and Vital Rates***").

Table 4. Method of observation for female grizzly bears with cubs sighted in the Greater Yellowstone Ecosystem, 2024.

Method of observation	Frequency	%	Cumulative %
Fixed wing aircraft–incidental	4	1.9	1.9
Fixed wing aircraft–observation flight	42	20.4	22.3
Fixed wing aircraft–telemetry flight	72	35	57.3
Fixed wing aircraft–ferry time	0	0	57.3
Helicopter–other researcher	1	0.5	57.8
Ground sighting	85	41.2	99
Trap	2	1	100
Total	206	100	

Table 5. Number of unique females with cubs ($\widehat{N}_{Obs}$), litter frequencies, total number of cubs, and average litter size at initial observation using the Knight et al. (1995) rule set based on the 16-km distance criterion for differentiating unique females with cubs, Greater Yellowstone Ecosystem, 2021–2024.

Year	$\widehat{N}_{Obs}$	Total no. of sightings	Litter size				Total no. of cubs	Mean litter size
			1 cub	2 cubs	3 cubs	4 cubs		
2021	73	203	23	36	14	0	137	1.88
2022	61	206	16	31	14	0	120	1.97
2023	64	194	9	36	19	0	138	2.05
2024	79	206	22	44	12	1[a]	151	1.91

[a] Female had 5 cubs

Table 6. Annual *Chao2* estimates for the numbers of female grizzly bears with cubs in the demographic monitoring area of the Greater Yellowstone Ecosystem, 2021–2024. The number of unique females observed ($\widehat{N}_{Obs}$) includes those located using radio telemetry; *m* is the number of unique females observed using random sightings only and *Chao2* gives the nonparametric, bias-corrected estimate per Chao (1989). Also included are the number of females with cubs sighted once (f_1) or twice (f_2) and the annual estimate of relative sample size (*n*/*Chao2*), where *n* is the total number of observations obtained without the aid of telemetry. Females with cubs sighted ≥3 times can be derived ($f_3+ = m–(f_1 + f_2)$).

Year	$\widehat{N}_{Obs}$	*m*	f_1	f_2	*Chao2*	*n*	*n*/*Chao2*
2021	71	63	30	20	84	130	1.55
2022	61	49	20	17	60	140	2.33
2023	64	53	26	15	73	129	1.77
2024	79	66	29	21	84	136	1.61

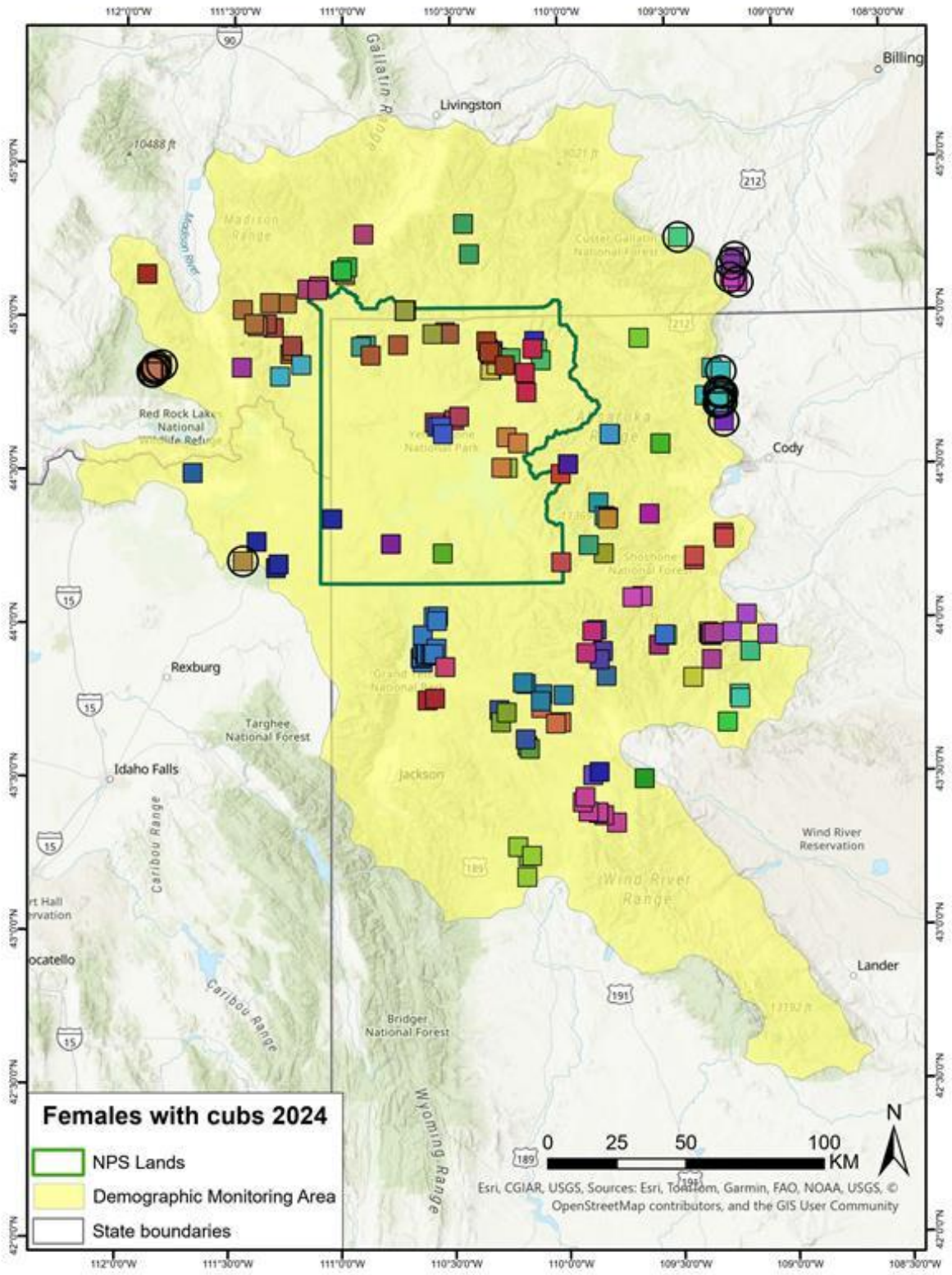

Fig. 2. Distribution of 206 sightings of 79 (indicated by colors) unique female grizzly bears with cubs observed based on the 16-km distance criterion in the Knight et al. (1995) rule set, Greater Yellowstone Ecosystem, 2024. Only sightings from females with cubs occurring within the demographic monitoring area (DMA) are used for population estimation. During 2024, 20 sightings (black circles around symbols) from 7 unique females with cubs occurred outside the DMA. Six of 7 of these females were only observed outside the DMA. One of the 7 females was observed both in and out of DMA, but with the aid of telemetry.

II. Mark-Resight Technique to Estimate Females with Cubs

Schwartz et al. (2008) demonstrated biases inherent in the method of estimating population size based on the Chao2 estimator (see previous section) using counts of unique females with cubs and the associated rule set of Knight et al. (1995). The IGBST invited partner agencies and quantitative ecologists to participate in three workshops held in 2011–2012 to consider alternative approaches. A product of these workshops was a recommendation to use systematic flight observation data collected since 1997. The mark-resight estimator yields an annual estimate of the number of females with cubs based on the presence of a radio-marked sample and two rounds of systematic observation flights per year per bear observation area (see "***Observation Flights***"), during which all bears observed are recorded and, following observation, checked for marks (i.e., radio collars) using telemetry. Pilots note whether family groups observed include cubs, yearlings, or 2-year-old offspring. Mark-resight designs for population estimation are commonly used for wildlife monitoring because they can provide a cost-efficient and reliable monitoring tool. However, inference from such designs is limited when data are sparse, either from a low number of marked animals, a low probability of detection, or both. In the GYE, annual mark-resight data collected for female grizzly bears with cubs suffer from both limitations. As an important outcome of the three workshops, Higgs et al. (2013) developed a technique to overcome difficulties due to data sparseness by assuming homogeneity in sighting probabilities over 16 years (1997–2012) of the biannual aerial surveys (see section "***Observation Flights***"). They modeled counts of marked and unmarked grizzly bears with cubs as multinomial random variables, using the capture frequencies of marked females with cubs for inference regarding the latent multinomial frequencies for unmarked females with cubs (Fig. 3).

One important assumption of the mark-resight technique is the geographic distribution of radio-marked female bears is generally representative of the geographic distribution and relative density of female bears in the population. Conclusions from workshop discussions were that this assumption is likely not violated within the GYE, with one exception. A subset of bears in the southeastern portion of the GYE annually spend 6 to 10 weeks in late summer (mid-July to late September) in alpine scree slopes feeding on army cutworm moths (Mattson et al. 1991*b*, Bjornlie and Haroldson 2011). These bears are highly visible and constitute a substantial proportion of bears seen during observation flights. However, capturing and marking these bears is difficult because the remote, high-elevation areas are snow-covered early in the capture season and access is limited due to high spring runoff. When access improves later in the season, most bears have already begun feeding on army cutworm moths and are difficult to capture. Thus, the proportion of radio-marked females with cubs among those feeding on these high-visibility sites is lower than in the remainder of the ecosystem. Applying mark-resight estimates to the entire ecosystem without considering these moth sites would result in overestimation bias. However, moth sites are now well defined, and the study team annually monitors these sites. Thus, the decision was made to exclude confirmed moth sites (defined as areas within 500 meters (m) of sites where multiple observations of bears feeding on moths occurred >1 year) from the mark-resight analyses. In place of this metric, counts of females with cubs only (marked and unmarked) from independent aerial census surveys of confirmed moth sites are added to the mark-resight estimate for a given year.

Higgs et al. (2013) performed simulations based on a known population of 50 females with cubs and resighting frequencies and proportions of bears sighted 0, 1, and 2 times from the observation flight data to determine accuracy and precision of the mark-resight technique. Accuracy was high, indicating this technique addressed the bias concerns associated with estimates based on the Chao2 estimator. However, the simulations also indicated precision was low. Peck (2016) reported on the poor ability of the mark-resight technique to detect declines of 1 and 2% in annual estimates of the number of females with cubs, but moderate effectiveness to detect a 5% annual decline. Although the IGBST concluded this technique was insufficient for effective monitoring of population trend, it does produce relatively unbiased estimates.

We conducted only one round of observation flights beginning in 2020 to reduce unnecessary risk to pilots and observers and to address budget constraints. The IPM reduces dependence on mark–resight estimates for quantifying the number of females with cubs because the model synthesizes information across multiple datasets and parameters. Although these mark–resight estimates are unbiased, they are imprecise due to sparse data. Because they are incorporated as data in the IPM, we continue to report these estimates (Tables 7–9, Fig. 3). Discontinuing the

second round of observation flights does not preclude the IGBST from evaluating additional or alternative techniques to estimate overall population abundance or the abundance of specific cohorts in the future.

Table 7. Data used in mark-resight analyses on female grizzly bears with cubs, Greater Yellowstone Ecosystem, 1998–2019, including number of radio-marked female grizzly bears available for sighting during observation flights (*m*), the number not sighted (Y_0), seen once (Y_1), seen twice (Y_2), and the number of unmarked females bears with cubs (*S*). Estimates exclude females with cubs observed <500 meters from army cutworm moth aggregation sites.

Year	*m*	Y_0	Y_1	Y_2	*S*
1998	4	2	2	0	7
1999	6	5	1	0	7
2000	7	7	0	0	11
2001	8	4	4	0	17[a]
2002	5	5	0	0	29[a]
2003	4	3	1	0	7
2004	4	2	2	0	20
2005	3	3	0	0	14
2006	7	7	0	0	23[a]
2007	5	3	2	0	23[b]
2008	5	3	1	1	19[a]
2009	6	6	0	0	14
2010	3	3	0	0	23[a]
2011	3	2	1	0	16
2012	5	3	2	0	12
2013	10	10	0	0	28
2014	5	4	1	0	12
2015	1	0	1	0	22
2016	2	1	1	0	19
2017	6	4	2	0	18
2018	7	6	1	0	19
2019	8	6	2	0	16

[a] Numbers decreased from 2013 data due to boundary changes of moth sites.
[b] Numbers increased from 20 to 23 due to boundary changes of moth sites.

Table 8. Results from mark-resight analyses of the number of female grizzly bears with cubs, Greater Yellowstone Ecosystem, 1998–2019. Data from all years were used to inform sightability, and previous years' posterior distributions were updated based on data from radio-marked females with cubs in 2017. Mean, median, and quantile values were derived from the posterior distributions of estimates of the number of female bears with cubs, excluding those observed <500 meters from army cutworm moth aggregation sites.

					Quantile	
Year	Sighted	Marked	Mean	Median	0.025	0.975
1998	7	4	29	27	12	57
1999	7	6	29	27	12	57
2000	11	7	46	44	22	83
2001	17	8	71	68	38	119
2002	29	5	121	117	72	192
2003	7	4	29	27	12	57
2004	20	4	83	80	47	138
2005	14	3	58	56	30	101
2006	23	7	96	92	55	156
2007	23	5	96	93	55	156
2008	19	5	79	76	44	132
2009	14	6	58	56	30	101
2010	23	3	96	93	55	155
2011	16	3	67	64	36	113
2012	12	5	50	48	25	88
2013	28	10	117	113	69	186
2014	12	5	50	48	25	88
2015	22	1	92	88	52	150
2016	19	2	79	76	44	132
2017	18	6	75	72	41	126
2018	19	7	81	78	45	137
2019	16	8	68	65	37	114

Table 9. Three-year moving averages for mark-resight estimates of the number of female grizzly bears with cubs, Greater Yellowstone Ecosystem, 1998–2019. Mean, median, and quantile values were derived from the posterior distributions of estimates of the number of female bears with cubs, excluding those observed <500 meters from army cutworm moth aggregation sites.

				Quantile	
Year	Mean	Median	Mode	0.025	0.975
1998	25	24	23	14	42
1999	35	34	31	20	56
2000	49	47	44	30	76
2001	79	77	75	51	120
2002	74	72	67	47	112
2003	78	76	70	50	118
2004	57	55	53	36	88
2005	79	77	71	51	120
2006	83	81	76	54	126
2007	90	88	81	59	136
2008	78	76	72	50	118
2009	78	76	72	50	117
2010	74	72	70	47	111
2011	71	69	68	45	108
2012	78	76	72	50	118
2013	72	70	65	46	110
2014	86	84	81	56	130
2015	74	72	68	47	112
2016	82	80	79	53	124
2017	80	77	73	52	123
2018	75	73	69	49	112
2019	Insufficient data for 3-year moving average				

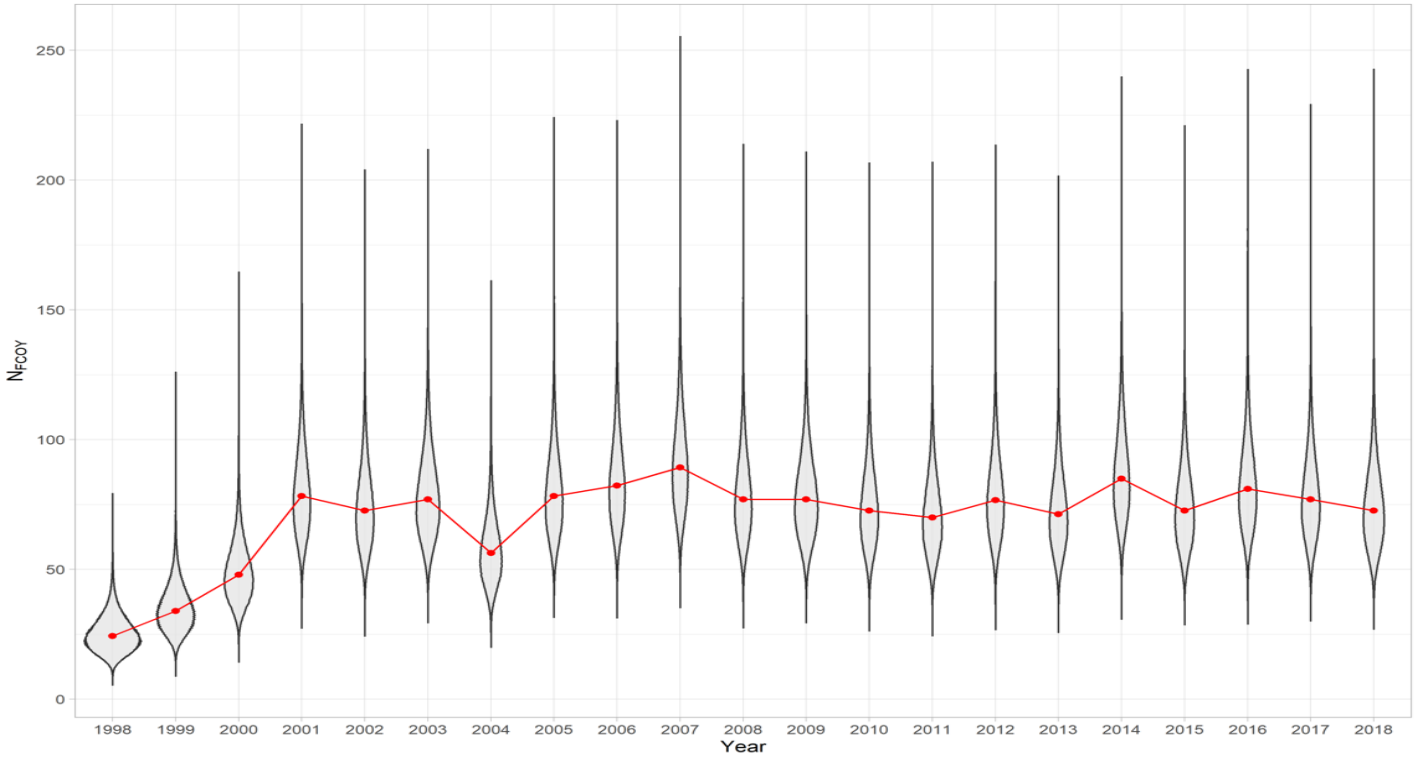

Fig. 3. Annual mark-resight estimates (3-year moving averages [red dots] and 95% inter-quartiles [gray area]) of the number of female grizzly bears with cubs (N_{FCOY}), Greater Yellowstone Ecosystem, 1998–2018. Estimates exclude females with cubs observed <500 meters from army cutworm moth aggregation sites.

Occupancy of Bear Management Units by Females with Young

(Bryn E. Karabensh and Mark A. Haroldson, U.S. Geological Survey, Interagency Grizzly Bear Study Team)

Dispersion of reproductive females throughout the ecosystem is assessed by verified observations of female grizzly bears with young (cubs, yearlings, 2-year-olds, or young of unknown age) by bear management unit (BMU). The requirements specified in the Demographic Recovery Criteria (USFWS 2007*b*) state that 16 of the 18 BMUs must be occupied by females with young on a running 6-year sum with no two adjacent BMUs unoccupied. All 18 BMUs had verified observations of female grizzly bears with young during 2024 and each year during the last 6-year (2019–2024) period (Table 10).

Table 10. Bear management units in the Greater Yellowstone Ecosystem occupied (X) by females with young (cubs, yearlings, 2-year-olds, or young of unknown age), as determined by verified reports, 2019–2024.

Bear management unit	2019	2020	2021	2022	2023	2024	Years occupied
1) Hilgard	X	X	X	X	X	X	6
2) Gallatin	X	X	X	X	X	X	6
3) Hellroaring/Bear	X	X	X	X	X	X	6
4) Boulder/Slough	X	X	X	X	X	X	6
5) Lamar	X	X	X	X	X	X	6
6) Crandall/Sunlight	X	X	X	X	X	X	6
7) Shoshone	X	X	X	X	X	X	6
8) Pelican/Clear	X	X	X	X	X	X	6
9) Washburn	X	X	X	X	X	X	6
10) Firehole/Hayden	X	X	X	X	X	X	6
11) Madison	X	X	X	X	X	X	6
12) Henry’s Lake	X	X	X	X	X	X	6
13) Plateau	X	X	X	X	X	X	6
14) Two Ocean/Lake	X	X	X	X	X	X	6
15) Thorofare	X	X	X	X	X	X	6
16) South Absaroka	X	X	X	X	X	X	6
17) Buffalo/Spread Creek	X	X	X	X	X	X	6
18) Bechler/Teton	X	X	X	X	X	X	6
Total	18	18	18	18	18	18	

Grizzly Bear Occupied Range in the Greater Yellowstone Ecosystem, 2010–2024

(Justin A. Dellinger, Wyoming Game and Fish Department; Bryn E. Karabensh and Mark A. Haroldson, U.S. Geological Survey, Interagency Grizzly Bear Study Team)

The GYE grizzly bear population had decreased to only a few hundred bears when it was listed as threatened under the Endangered Species Act in 1975. As the population increased in the intervening years, grizzly bears reoccupied areas of their former range, including areas unoccupied for over 100 years. Documenting range expansion is an important part of grizzly bear population monitoring, providing researchers, managers, and the public with spatial data on grizzly bear presence necessary to inform conservation and management.

From its inception, the IGBST has recorded confirmed locations of grizzly bears throughout the GYE as part of routine population monitoring. These locations have been used to create periodic estimates of occupied grizzly bear range since the early 1980s (Basile 1982, Blanchard 1992, Schwartz et al. 2002, Schwartz et al. 2006). Bjornlie et al. (2014) developed a technique that uses all confirmed grizzly bear locations, including sightings, captures, mortalities, conflicts, telemetry locations, and observations. Those locations are overlaid on a grid of 3-km cells to determine occupancy and the areas surrounding the centers of occupied cells are then interpolated to create a surface of occupied range (Bjornlie et al. 2014). Since the adoption of this method, biannual updates of grizzly bear occupied range have revealed steady range expansion. Additionally, a reanalysis of location data dating back to the 1970s provided estimates of historical grizzly bear range for comparison with current results.

Bjornlie et al. (2014) recommended location data be pooled over a 15–20-year period to provide an accurate representation of grizzly bear occupied range. We used a 15-year period of location data in a moving window analysis to provide annual estimates of occupied range. Thus, an annual estimate contains location data from that year and the previous 14 years (e.g., 2010–2024 for the reported year 2024). This report is an update of the occupied range analysis presented in the 2022 IGBST annual report (Dellinger et al. 2023).

Using this technique, analyses of grizzly bear locations from 1976 through 1990 produced an estimate of GYE grizzly bear occupied range almost entirely contained within the GBRZ established in the 1993 Grizzly Bear Recovery Plan (USFWS 1993). By 2000, occupied range had grown slightly to the south and east but was still mostly contained within the GBRZ (Fig. 4). However, in the 2000s, range expansion gained momentum, and larger increases were seen, particularly in mountainous terrain to the northwest and southeast of the GBRZ (Fig. 4). The addition of 2023–2024 location data resulted in a similar distribution to the previous iteration (Dellinger et al. 2023). Overall, there appears to be a stabilizing of grizzly bear occupied range, which may be due to the species filling out most of the suitable habitat within the GYE (Fig. 4). To provide spatial perspective, the southeastern extent of 2024 occupied range at the tip of the Wind River Range is substantially closer to the towns of Salt Lake City, Utah (294 km), and Fort Collins, Colorado (366 km), than to Bozeman, Montana (405 km) at the northern extent of grizzly bear range.

From 1990 through 2024, the area of occupied range has increased steadily at a rate of 3.7% per year from just over 23,000 km^2 in 1990 to 70,468 km^2 in 2020 (Figs. 4 and 5). The apparent stabilization in range from 2020 to 2024 (67,496 km^2) could be an indicator that grizzly bears are now occupying most of the ecologically and socially suitable areas in the GYE (Fig. 5). Grizzly bear occupied range now includes 97% of the DMA and has expanded 45 km beyond the DMA boundary to the east and west and by as much as 60 km in the Wyoming Range in the southwestern portion of the GYE. The 2024 data show that 28% of GYE grizzly bear range is now outside the DMA boundary (Fig. 5). As grizzly bears advance into new areas, they are encountering more human-dominated landscapes, many of which are private lands dominated by agricultural uses. By 1990, just over 600 km^2 of private lands were encompassed within grizzly bear occupied range, an area half the size of Grand Teton National Park (GTNP). By 2024, 10,768 km^2 of private lands occurred within occupied range, an area nearly 500 km^2 larger than YNP, GTNP, and John D. Rockefeller Parkway combined (Fig. 6). Grizzly bear expansion into private lands can result in an increased potential for human-bear conflicts.

There were only a few confirmed grizzly bear locations outside occupied range in 2023 and 2024. Two noteworthy locations farthest beyond occupied range included a 2024 verified location in the Wyoming Range approximately 23 km north of the town of Kemmerer, Wyoming, and 120 km south of the DMA boundary. This

site is the most southerly confirmed location of a grizzly bear in the GYE region since well before recovery efforts began. The second noteworthy location also occurred in 2024 and included a verified location in the Bighorn Mountains, approximately 130 km east of the DMA boundary, and represents the most easterly confirmed location of a grizzly bear in the GYE region since well before recovery efforts began. Additionally, genetics revealed a grizzly bear detected in 2021 in the Snowy Mountains of Montana was from the GYE. These locations add to other wide-ranging locations of bears from 2018 when grizzly bear tracks were confirmed near Ocean Lake, approximately 25 km northwest of Riverton, Wyoming, and a family group that was captured near the town of Byron, approximately 50 km northeast of Cody, Wyoming.

Verified locations of grizzly bears in places novel in recent history have become relatively common in many areas of the GYE and beyond. Confirmed locations from 2018 and 2022 west of Interstate 15 in the Pioneer Mountains and Big Hole valley near Wisdom, Montana, are located outside the Yellowstone Distinct Population Segment and likely are bears originating from either the GYE population or the Northern Continental Divide Ecosystem population in northwestern Montana. These outlying locations do not necessarily constitute occupied range but reveal the leading edges of grizzly bear expansion within and between ecosystems. The recovery of grizzly bears in the GYE is an important wildlife conservation success story, but this success presents formidable new challenges for wildlife managers and people living, working, and recreating in these areas, particularly in recently occupied areas where bear-resistant infrastructure to reduce access to anthropogenic foods often does not exist.

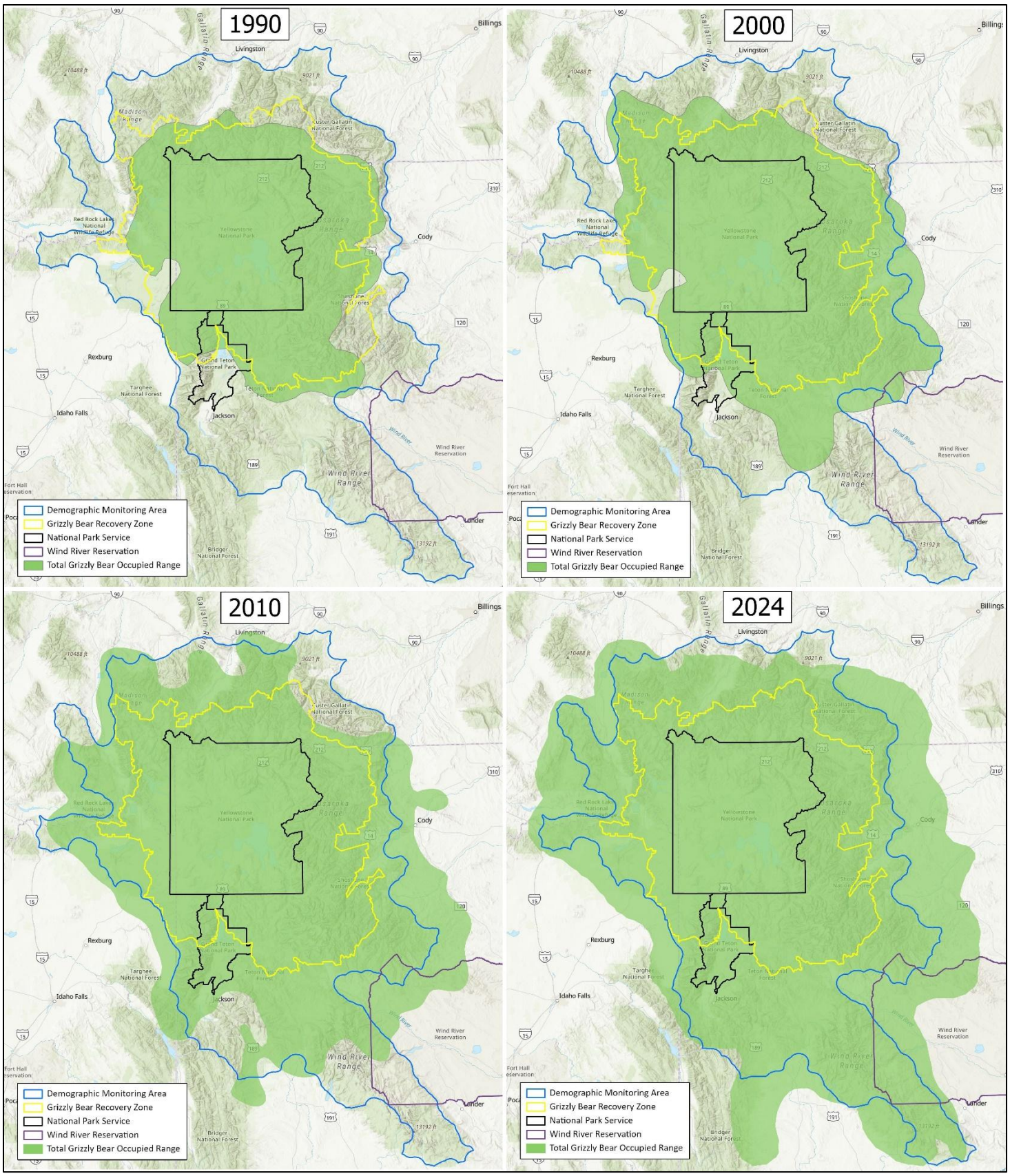

Fig. 4. Grizzly bear occupied range (green shaded area) in the Greater Yellowstone Ecosystem based on 15-year data windows ending in 1990, 2000, 2010, and 2024. Base Map Source: National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

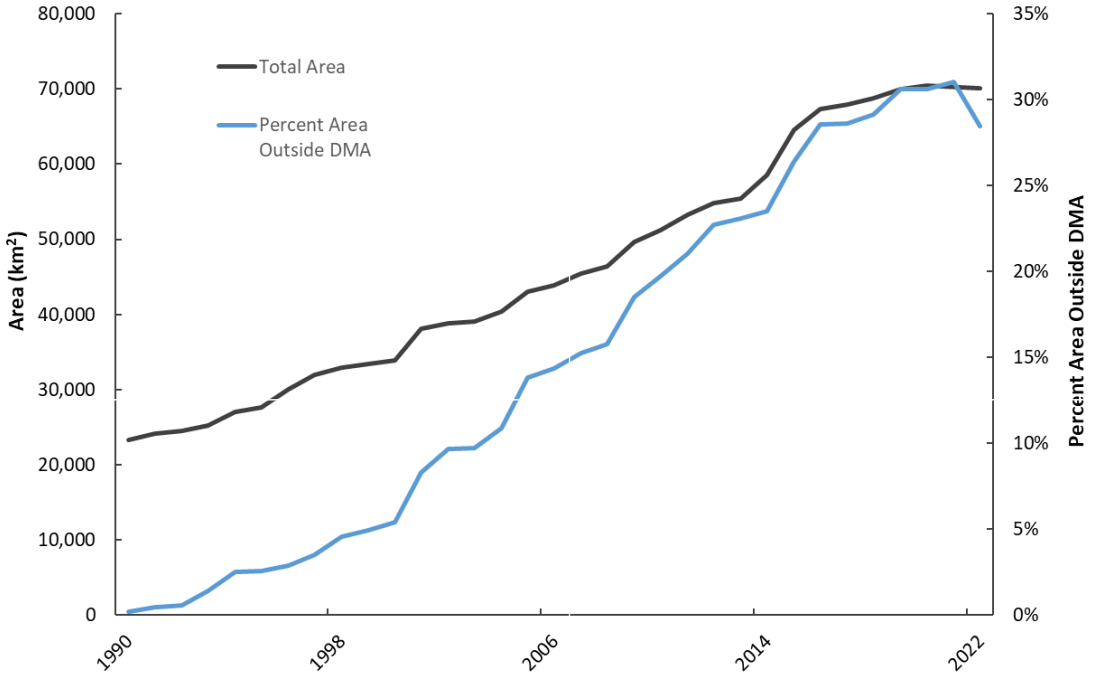

Fig. 5. Total area of grizzly bear occupied range and percent of occupied range outside the demographic monitoring area (DMA) in the Greater Yellowstone Ecosystem, 1990–2024.

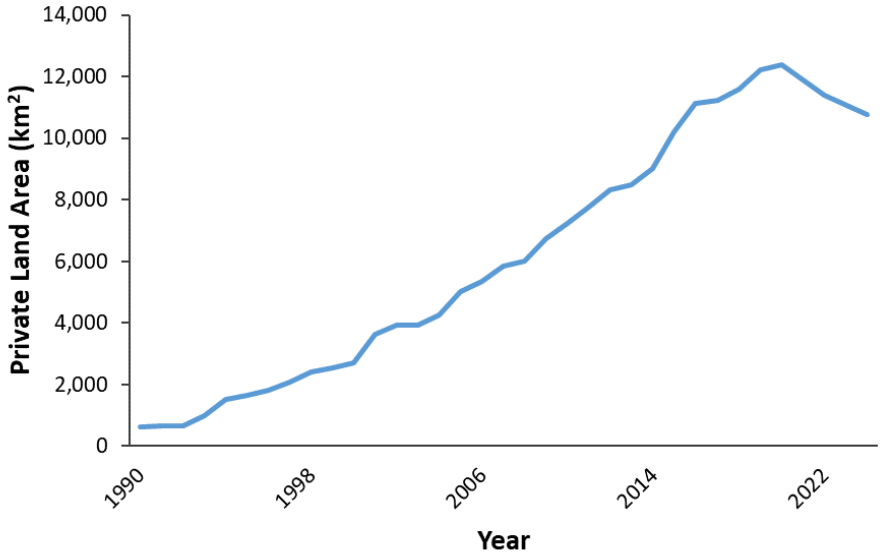

Fig. 6. Area of private land within grizzly bear occupied range in the Greater Yellowstone Ecosystem, 1990–2024.

Observation Flights

(Bryn E. Karabensh, U.S. Geological Survey, Interagency Grizzly Bear Study Team)

Fifty-four bear observation areas (Fig. 7) were established in 2014. In 2024, one round of observation flights was conducted: 36 areas were surveyed during this round over a time period (16 Jun–19 Aug) selected to optimize sightability. The total duration of observation flight time was 80 hours; average duration of individual flights was 2.2 hours (Table 11). Excluding dependent young, 327 bear sightings were recorded during observation flights. Of the 327 sightings, 9 were radio-marked bears (3 females with young, 4 females without young, and 2 males), 249 were solitary unmarked bears, and 69 were unmarked females with young (Table 11). Our observation rate was 4.1 bears per hour for all bears. A total of 116 young (71 cubs, 41 yearlings, and 4 2-year-olds) were observed (Table 12). Observation rates for females with dependent young were 0.90 females with young per hour and 0.52 females with cubs per hour (Table 11).

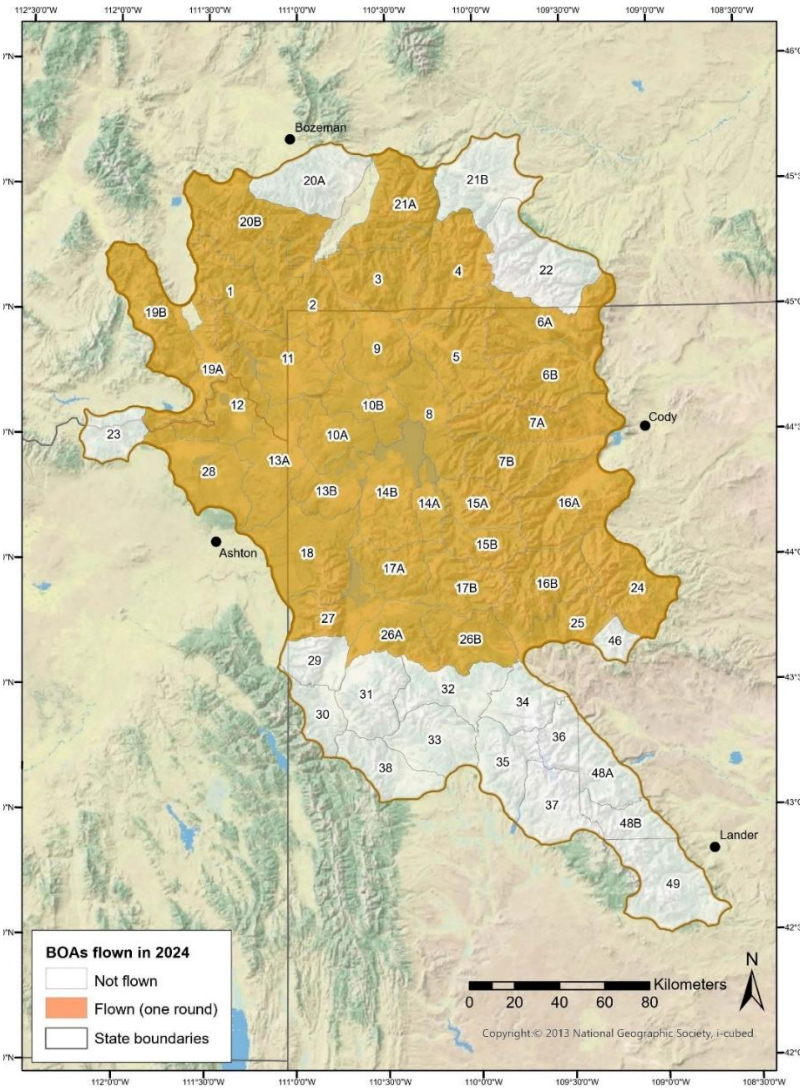

Fig. 7. Grizzly bear observation areas for aerial surveys, Greater Yellowstone Ecosystem, 2024. Areas in orange were surveyed in 2024, areas in white shading were not surveyed. Numbers represent the 54 bear observation areas (BOA), with several larger areas split into two subsections (A and B). Base map source: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community.

Table 11. Annual summary statistics for grizzly bear observation flights, Greater Yellowstone Ecosystem, 2009–2024. Starting in 2020, one round of observation flights was conducted.

Year[a]	Observation period	Total hours	Number of flights	Average hours/flight	Bears seen					Observation rate (bears/hour)		
					Marked		Unmarked		Total number of groups	All groups	With young	With cubs
					Lone	With young	Lone	With young				
2009	Round 1	90.3	47	1.9	1	0	85	21	107	1.2	---	---
	Round 2	93.6	47	2.0	2	0	157	34	193	2.1	---	---
	Total	183.9	94	2.0	3	0	242	55	300	1.6	0.3	0.2
2010	Round 1	101.1	48	2.1	0	2	93	22	117	1.2	---	---
	Round 2	93.3	46	2.0	0	0	161	41	202	2.2	---	---
	Total	194.4	94	2.1	0	2	254	63	319	1.6	0.3	0.2
2011	Round 1	88.9	47	1.9	2	1	153	31	187	2.1	---	---
	Round 2	71.0	35	2.0	4	0	109	23	136	1.9	---	---
	Total	159.8	82	1.9	6	1	262	54	323	2.0	0.3	0.2
2012	Round 1	95.4	48	2.0	4	2	178	35	219	2.3	---	---
	Round 2	73.7	35	2.1	2	1	117	30	150	2.0	---	---
	Total	169.1	83	2.0	6	3	295	65	369	2.2	0.4	0.2
2013	Round 1	97.0	48	2.0	2	1	152	44	199	2.1	---	---
	Round 2	72.8	35	2.1	4	1	171	48	224	3.1	---	---
	Total	169.8	83	2.1	6	2	323	92	423	2.5	0.6	0.4
2014	Round 1	104	52	2.0	2	2	170	47	221	2.1	---	---
	Round 2	88.6	43	2.1	3	1	188	60	252	2.8	---	---
	Total	192.6	95	2.0	5	3	358	107	473	2.5	0.6	0.3
2015	Round 1	104.0	52	2.0	4	1	126	34	165	1.6	---	---
	Round 2	88.6	44	2.0	1	2	142	41	186	2.1	---	---
	Total	192.7	96	2.0	5	3	268	75	351	1.8	0.4	0.2
2016	Round 1	106.8	53	2.0	5	3	133	36	177	1.7	---	---
	Round 2	86.5	42	2.1	1	2	95	32	130	1.5	---	---
	Total	193.3	95	2.0	6	8	228	68	307	1.6	0.4	0.2
2017[a]	Round 1	105.5	54	2.0	7	2	153	36	198	1.9	---	---
	Round 2	79.0	40	2.0	8	2	127	36	173	2.2	---	---
	Total	184.5	94	2.0	15	4	280	72	371	2.0	0.4	0.3
2018	Round 1	105.8	54	2.0	6	3	185	58	252	2.4	---	---
	Round 2	73.6	40	1.8	1	1	105	35	142	1.9	---	---
	Total	179.4	94	1.9	7	4	290	93	394	2.2	0.5	0.3

Table 11. Annual summary statistics for grizzly bear observation flights, Greater Yellowstone Ecosystem, 2009–2024. Starting in 2020, one round of observation flights was conducted.

Year[a]	Observation period	Total hours	Number of flights	Average hours/flight	Bears seen					Observation rate (bears/hour)		
					Marked		Unmarked		Total number of groups	All groups	With young	With cubs
					Lone	With young	Lone	With young				
2019	Round 1	107.8	54	2.0	7	4	183	56	251[b]	2.3	---	---
	Round 2	91.0	42	2.2	9	1	188	43	242[c]	2.7	---	---
	Total	198.8	96	2.1	16	5	371	99	493	2.5	0.5	0.2
2020	Total	78.5	36	2.2	7	2	222	72	303	3.9	0.9	0.5
2021	Total	69.9	33	2.1	8	4	214	71	297	4.3	1.1	0.6
2022	Total	75.0	36	2.1	12	2	240	71	299	4.0	0.79	0.43
2023	Total	78.4	36	2.2	5	1	258	59	317	4.0	0.75	0.37
2024	Total	80.2	36	2.2	6	3	249	69	327	4.1	0.90	0.52

[a] Dates of flights as Year (Round 1, Round 2): 2006 (5 Jun–9 Aug, 30 Jun–28 Aug); 2007 (24 May–2 Aug, 21 Jun–14 Aug); 2008 (12 Jun–26 Jul, 1 Jul–23 Aug); 2009 (26 May–17 Jul, 8 Jul–27 Aug); 2010 (8 Jun–22 Jul, 10 Jul–24 Aug); 2011 (15 Jun–17 Aug, 21 Jul–29 Aug); 2012 (29 May–30 Jul, 9 Jul–23 Aug); 2013 (6 Jun–25 Jul, 7 Jul–20 Aug); 2014 (10 Jun–25 Jul, 7 Jul–29 Aug); 2015 (1 Jun–21 Jul, 1 Jul–31 Aug); 2016 (2 Jun–24 Jul, 7 Jul–28 Aug); 2017 (1 Jun–31 Aug, 4 Jul–28 Aug); 2018 (12 Jun-13 Aug, 10 Jul-29 Aug); 2019 (4 Jun–6 Aug, 4 Jul–28 Aug); 2020 (10 Jun–16 Aug); 2021 (11 Jun–15 Aug); 2022 (26 Jun-23 Aug); 2023 (6 Jun-16 Aug); 2024 (16 Jun-19 Aug).

[b] Includes observation of 3 cubs of the year without adult female present.

[c] Includes observation of 2 cubs of the year without adult female present.

Table 12. Size and age composition of grizzly bear family groups seen during observation flights, Greater Yellowstone Ecosystem, 2009–2024. Starting in 2020, one round of observation flights was conducted.

Year[a]	Observation period	No. of females with cubs by litter size			No. of females with yearlings by litter size			No. of females with 2-year-olds or young of unknown age by litter size		
		1	2	3	1	2	3	1	2	3
2009	Round 1	0	6	4	2	3	1	3	1	0
	Round 2	6	11	1	3	7	1	4	1	1
	Total	6	17	5	5	10	2	7	1	1
2010	Round 1	2	7	2	2	6	1	4	0	0
	Round 2	10	10	7	5	4	3	1	4	3
	Total	12	17	9	7	10	4	5	4	3
2011	Round 1	4	8	3	3	6	1	2	2	3
	Round 2	2	8	4	2	2	1	1	3	0
	Total	6	16	7	5	8	2	3	5	3
2012	Round 1	5	19	1	2	3	4	0	2	1
	Round 2	5	9	0	4	6	2	1	3	1
	Total	10	28	1	6	9	6	1	5	2
2013	Round 1	8	20	4	1	5	0	3	4	0
	Round 2	11	21	3[c]	2	7	0	0	5	0
	Total	19	41	7[c]	3	12	0	3	9	0
2014	Round 1	8	17	3	6	14	0	1	0	0
	Round 2	1	15	8	11	18	3	2	2	1
	Total	9	32	11	17	32	3	3	2	1
2015	Round 1	6	18	15	2	20	6	0	2	0
	Round 2	9	22	12	2	24	6	2	0	4[d]
	Total	15	40	27	4	44	12	2	2	4[d]
2016	Round 1	3	16	2	5	8	1	2	2	0
	Round 2	8	11	6	2	4	1	1	1	0
	Total	11	27	8	7	12	2	3	3	0
2017	Round 1	6	14	3	4	7	2	0	2	0
	Round 2	5	20	2	5	3	0	1	1	1
	Total	11	34	5	9	10	2	1	3	1
2018	Round 1	7	24	10	5	7	2[b]	3	3	0
	Round 2	5	8	4	6	11	2	0	0	0
	Total	12	32	14	11	18	4	3	3	0
2019	Round 1	11	10	2[c]	9	16	5	6	0	1
	Round 2	2	14	3	8	14	2	0	1	0
	Total	13	24	5	17	30	7	6	1	1

Table 12. Size and age composition of grizzly bear family groups seen during observation flights, Greater Yellowstone Ecosystem, 2009–2024. Starting in 2020, one round of observation flights was conducted.										
Year[a]	Observation period	No. of females with cubs by litter size			No. of females with yearlings by litter size			No. of females with 2-year-olds or young of unknown age by litter size		
		1	2	3	1	2	3	1	2	3
2020	Total	10	29	1	12	18	2	0	2	0
2021	Total	10	21	10	9	21	3	1	0	0
2022	Total	11	18	3	8	16	2	0	1	0
2023	Total	5	11	5	7	12	2	2	1	0
2024	Total	18	19	5	15	10	2	2	1	0

[a] Dates of flights as Year (Round 1, Round 2): 2006 (5 Jun–9 Aug, 30 Jun–28 Aug); 2007 (24 May–2 Aug, 21 Jun–14 Aug); 2008 (12 Jun–26 Jul, 1 Jul–23 Aug); 2009 (26 May–17 Jul, 8 Jul–27 Aug); 2010 (8 Jun–22 Jul, 10 Jul–24 Aug); 2011 (15 Jun–17 Aug, 21 Jul–29 Aug); 2012 (29 May–30 Jul, 9 Jul–23 Aug); 2013 (6 Jun–25 Jul, 7 Jul–20 Aug); 2014 (10 Jun–25 Jul, 7 Jul–29 Aug); 2015 (1 Jun–21 Jul, 1 Jul–31 Aug); 2016 (2 Jun–24 Jul, 7 Jul–28 Aug); 2017 (1 Jun–31 Aug, 4 Jul–28 Aug); 2018 (12 Jun-13 Aug, 10 Jul-29 Aug); 2019 (4 Jun–6 Aug, 4 Jul–28 Aug); 2020 (10 Jun–16 Aug); 2021 (11 Jun–15 Aug); 2022 (26 Jun-23 Aug); 2023 (6 Jun-16 Aug); 2024 (16 Jun-19Aug).

[b] Includes 1 female with 4 yearlings.

[c] Includes 1 female with 4 cubs.

[d] Includes 1 female with 4 young of unknown age.

Telemetry Location Flights

(Bryn E. Karabensh, U.S. Geological Survey, Interagency Grizzly Bear Study Team)

We conduct telemetry flights to locate grizzly bears and, if possible, obtain visual confirmation of their status. For females, telemetry flights also allow us to document when they reproduce and the age and number of offspring. Changes in litter size over the active season provide important data for estimation of cub and yearling survival. Eighty-one telemetry location flights were conducted during 2024, resulting in 242 hours of search time (excluding ferry time to and from airports; Table 13). Flights were conducted at least once during all months, with 70% of telemetry flights from May–November. During telemetry flights, 768 locations of bears equipped with radio transmitters were collected, 239 (31%) of which included a visual sighting. One-hundred and forty-four sightings of unmarked adult bears were also obtained during telemetry flights, including 119 solitary bears, 18 females with cubs, 7 females with yearlings, and 1 pair of yearlings without an adult female present. No 2-year-old bears were observed during these flights. The rate of observation for all unmarked bears (i.e., bears without radio transmitters) during telemetry flights was 0.19 bears per hour, and 0.31 bears per hour for marked bears. The observation rate during telemetry flights for unmarked adult females with cubs was 0.02 females with cubs per hour.

To reduce flight time and costs associated with aerial telemetry and obtain higher-frequency data, we began deploying satellite GPS collars in 2012 using Argos (Collecte Localisation Satellites, Toulouse, France) and Iridium (Iridium Communications Inc., McLean, Virginia) platforms. These GPS collars are different from those that store GPS locations onboard, which we have deployed since 2000, by providing the ability to download GPS location data via satellites at will or on a fixed schedule. We deployed 28 Iridium GPS collars in 2024 and monitored an additional 22 GPS collars that were deployed in previous years. We obtained over 100,120 GPS locations from the 50 individual grizzly bears with satellite collars.

Table 13. Summary statistics for radio-telemetry flights to locate grizzly bears, Greater Yellowstone Ecosystem, 2024.												
				Radio-marked bears			Unmarked bears observed					
							Number of females				Observation rate (groups/hour)	
Month	Hours	Flights	Mean hours/flight	Locations	Observed	Observation rate (groups/hour)	Lone bears	With cubs	With yearlings	With young	All groups	Females with cubs
Jan	6.3	3	2.10	37	0	---	0	0	0	0	---	---
Feb	8.2	4	2.05	44	0	---	0	0	0	0	---	---
Mar	16.5	8	2.06	79	4	0.2	0	0	0	0	---	---
Apr	19.0	4	4.75	66	34	1.8	2	0	0	0	0.10	---
May	24.4	7	3.49	66	35	1.4	8	0	1	0	0.40	---
Jun	25.2	8	3.15	69	48	1.9	11	2	1	0	0.60	0.08
Jul	31.0	12	2.58	75	46	1.5	68	6	1	0	2.40	0.19
Aug	27.5	8	3.44	77	33	1.2	21	8	4	0	1.20	0.29
Sep	21.4	6	3.57	62	16	0.7	2	1	0	0	0.60	0.09
Oct	22.5	8	2.81	60	11	0.5	0	0	0	0	---	---
Nov	26.1	8	3.26	90	11	0.4	0	0	0	0	---	---
Dec	13.5	5	2.70	43	1	0.1	0	0	0	0	---	---
Total	241.6	81	2.98	768	239	0.99	119	18	8[a]	0	0.19	0.02

[a]No adult female present

Documented Grizzly Bear Mortalities

(Matthew J. Gould, Mark A. Haroldson, U.S. Geological Survey, Interagency Grizzly Bear Study Team; and Jeremiah Smith, Montana Fish, Wildlife and Parks)

Under the 2017 Revised Demographic Criteria for the GYE, which were amended to the Grizzly Bear Recovery Plan (USFWS 1993, 2017), the IGBST is tasked with documenting grizzly bear mortalities in the DMA and evaluating mortality levels (Demographic Recovery Criterion 3). We evaluate mortalities for population segments within the DMA by deriving known and probable mortalities for independent-age (≥2 years old) females and independent-age males and estimating unknown/unreported mortalities (Cherry et al. 2002). We used these data as input for the IPM to determine the total annual mortality rate for these segments as a percent of their respective population estimates. For dependent bears (<2 years old), we determine human-caused mortality but do not include estimates of unknown and unreported mortality. We report numbers of known and probable mortalities in the GYE and numbers by sex and age class inside and outside the DMA.

We use the definitions provided in Craighead et al. (1988) to classify grizzly bear mortalities in the GYE relative to the degree of certainty regarding each event. Cases in which a carcass is physically inspected or when a management removal occurs are classified as "known" mortalities. Instances are classified as "probable" where evidence strongly suggests a mortality has occurred, but no carcass is recovered. When evidence is circumstantial, with no prospect for additional information, a "possible" mortality is designated. Possible mortalities are not included in the assessment of percent annual mortalities. We continue to tabulate possible mortalities because they provide an additional source of location information for grizzly bears and possible causes of mortalities in the GYE.

2024 Mortality Results

We documented 73 known and probable mortalities in the GYE during 2024, of which 1 (Table 14, #202414) was estimated to have died prior to 2024. Of the 72 known and probable mortalities for bears that died during 2024, 14 (#202407, #202440, #202447, #202450, #202454, #202458, #202460, #202461, #202462, #202463, #202464, #202466, #202467, #202471) remain under investigation by USFWS and state law enforcement agencies. Specific information related to these mortalities cannot be provided (Table 14, Fig. 5). However, these 12 mortalities are included in the following summaries of all documented mortalities for bears that died during 2024.

Seventy of the 72 known and probable mortalities during 2024 were attributed to human causes. Among these 70 mortalities, 28 (40%) were due to management removals for livestock depredations, 15 (21%) were related to anthropogenic site conflicts, and 15 (21%) were the result of reported self-defense kills. Other human-caused mortalities included 7 (10%) accidental mortalities (3 drownings, 2 vehicle strikes, and 2 electrocutions), 3 (4%) illegal mortalities, 1 (1%) mistaken identification, and 1 (1%) humane removal of an injured and orphaned cub.

We documented 2 natural mortalities in 2024, one of which occurred during 2024 (#202406, Table 14). Evidence indicated both were killed by another bear. There were 9 probable mortalities of cubs from 5 different radio-marked females who lost 1 to 2 cubs each. We documented 4 possible mortalities during 2024, 3 of which remain under investigation (Table 14).

Of the 72 known and probable documented mortalities occurring in 2024, 44 (61%) occurred within the boundaries of the DMA and 28 (39%) occurred outside (Table 15, Fig. 8). During 2024, we documented 11 independent-age female and 26 independent-age male known or probable mortalities within the DMA (Tables 14 and 15). There were 6 known or probable human-caused mortalities of dependent young documented in the DMA during 2024 (Table 16). The human-caused mortality rate was 1.99% for dependent-age males and 2.65% for dependent-age females.

Specific information pertaining to closed mortality investigations since 2015 will be updated on the IGBST Mortality Lists (Gould et al. 2022) as they become available. We remind readers that some cases can remain open and under investigation for extended periods. The study team cooperates with federal and state law enforcement agencies and cannot release information that could compromise ongoing investigations.

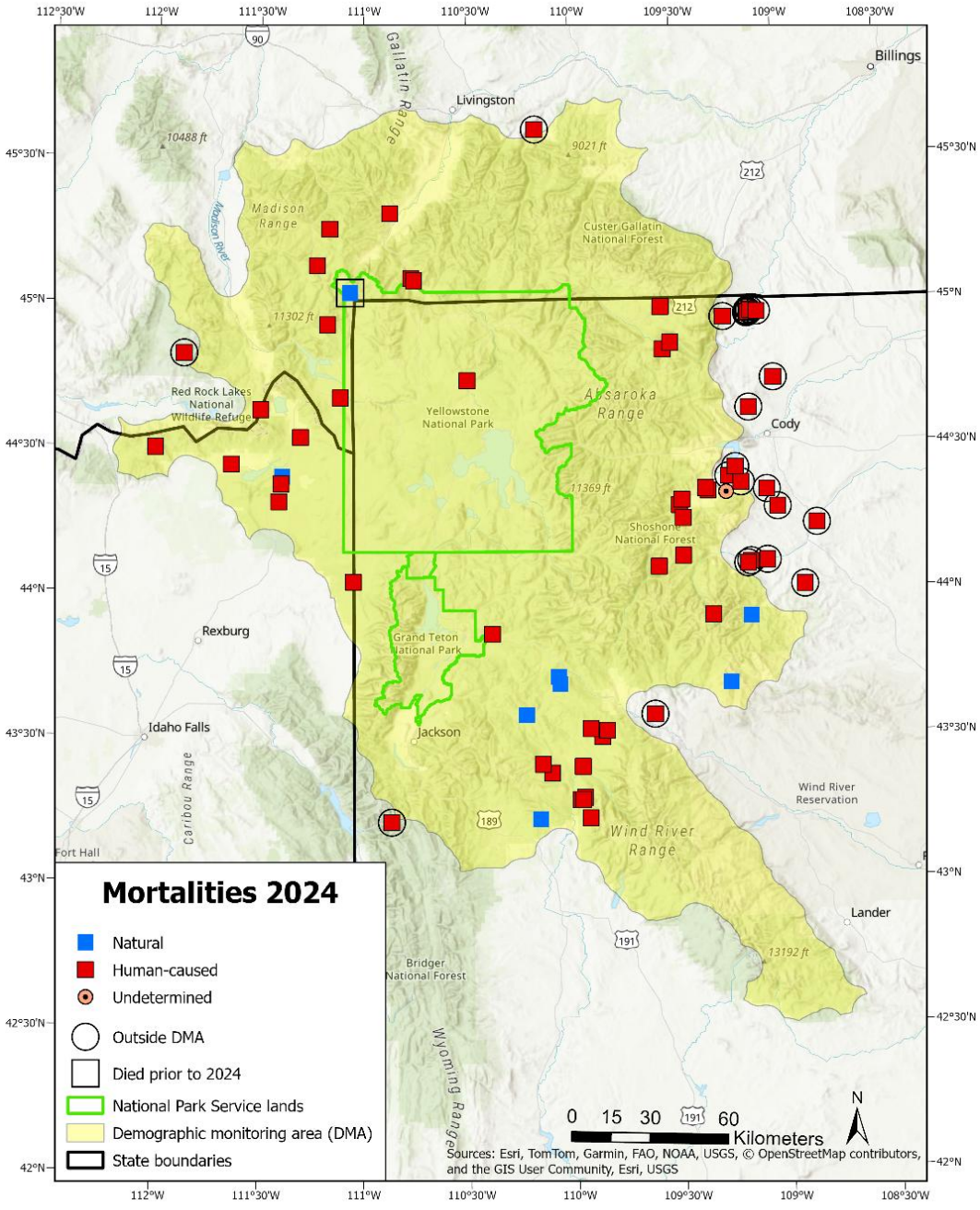

Fig. 8. Distribution of 73 known and probable grizzly bear mortalities documented in the Greater Yellowstone Ecosystem during 2024, including 1 mortality that occurred prior to 2024 (black square around symbol). Forty-four of the documented mortalities in 2024 were within the demographic monitoring area (DMA), of which 42 were attributed to human causes. Twenty-eight mortalities in 2024 were outside the DMA (black circles around symbols), all of which were attributed to human causes. Because of multiple bear mortalities at a specific location or separate mortalities occurring close to one another, not all 73 locations are visible on this map. Base map source: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStretMap contributors, and the GIS User Community, Esri, USGS.

Table. 14. Grizzly bear mortalities documented in the Greater Yellowstone Ecosystem, 2024.								
Unique #	**Bear[a]**	**Sex[b]**	**Age[c]**	**Date**	**Location[d]**	**Monitoring Area[e]**	**Certainty**	**Notes**
202401	Unm	M	Subadult	4/15/2024	Redbank Creek, PR-WY	Outside DMA	Known	Human cause; management capture and removal for cattle depredation.
202402	Unm	M	Adult	4/25/2024	Gooseberry Creek, BLM-WY	Outside DMA	Known	Human cause; management capture and removal for cattle depredation.
202403	Unm	M	Adult	4/27/2024	South Fork Shoshone River, PR-WY	Inside DMA	Known	Human cause; management capture and removal for cattle depredation.
202404	1059	M	Adult	5/7/2024	South Fork Shoshone River, PR-WY	Inside DMA	Known	Human cause; management capture and removal for cattle depredation. Bear was not collared at time of removal.
202405	Unm	M	Subadult	5/9/2024	Marquette Creek, PR-WY	Outside DMA	Known	Human cause; management capture and removal for cattle depredation.
202406	Unm	F	Yearling	5/20/2024	Henry's Fork, CTNF-ID	Inside DMA	Known	Natural; killed by another bear.
202407				2024	ID	Inside DMA	Known	Under investigation
202408	Unm	F	Cub	6/17/2024	Cottonwood Creek, PR-WY	Outside DMA	Known	Human cause; vehicle strike.
202409	Unm	F	Subadult	6/18/2024	Paradise Creek, ST-WY	Outside DMA	Known	Human cause; management capture and removal for cattle depredation and poor condition.
202410	Unm	F	Cub	6/21/2024	Madison River, CGNF-MT	Inside DMA	Known	Human cause; humane management removal of injured and orphaned cub. Leg was severely injured, necropsy showed right front leg shattered. No outside marks and no lead found.
202411	966	F	Adult	6/24/2024	Paradise Creek, ST-WY	Outside DMA	Known	Human cause; management capture and removal for cattle depredation. Bear was not collared at time of removal.
202412	993	M	Adult	6/29/2024	Little Horse Creek, PR-WY	Outside DMA	Known	Human cause; management capture and removal for cattle depredation. Bear was not collared at time of removal.

Table. 14. Grizzly bear mortalities documented in the Greater Yellowstone Ecosystem, 2024.								
Unique #	**Bear[a]**	**Sex[b]**	**Age[c]**	**Date**	**Location[d]**	**Monitoring Area[e]**	**Certainty**	**Notes**
202413	Unm	M	Subadult	7/2/2024	Carter Creek, PR-WY	Outside DMA	Known	Human cause; management capture and removal for cattle depredation.
202414	Unm	F	Adult	2020	Specimen Creek, YNP	Inside DMA	Known	Natural; evidence suggests killed by another bear.
202415	979	F	Adult	7/7/2024	Gypsum Creek, BTNF-WY	Inside DMA	Known	Human cause; management capture and removal for repeated depredation spanning multiple years. Bear was not collared at time of removal.
202416	Unm	M	Subadult	7/10/2024	Boulder River, PR-MT	Outside DMA	Known	Human cause; mistaken as black bear and shot during active pig depredation.
202417	Unm	M	Adult	7/18/2024	Dry Creek, BLM-WY	Outside DMA	Known	Human cause; management capture and removal for cattle depredation.
202418	769	M	Adult	7/18/2024	Yellowstone River, PR-MT	Inside DMA	Known	Human cause; management free-range removal for extreme habituation, food conditioning, property damage, and human safety. Bear was not collared at time of removal.
202419	Unm	M	Adult	7/16/2024	Cascade Creek, YNP	Inside DMA	Known	Human cause; electrocuted by high voltage active power cable while attempting to scavenge 2 electrocuted cow elk.
202420	Unm	M	Adult	7/16/2024	Cascade Creek, YNP	Inside DMA	Known	Human cause; electrocuted by high voltage active power cable while attempting to scavenge 2 electrocuted cow elk. Unknown if bear was marked or unmarked as the neck and head were burnt to ash.
202421	1045	M	Adult	7/23/2024	Granite Creek, CTNF-ID	Inside DMA	Known	Human cause; management capture and removal for cattle depredation. Bear was not collared at time of removal.
202422	1040	M	Adult	7/27/2024	Tepee Creek, BTNF-WY	Inside DMA	Known	Human cause; management capture and removal for cattle depredation. Bear was not collared at time of removal.
202423	G274	M	Adult	8/3/2024	Henry's Fork, CTNF-ID	Inside DMA	Known	Human cause; management capture and removal for cattle depredation.

Table. 14. Grizzly bear mortalities documented in the Greater Yellowstone Ecosystem, 2024.								
Unique #	**Bear[a]**	**Sex[b]**	**Age[c]**	**Date**	**Location[d]**	**Monitoring Area[e]**	**Certainty**	**Notes**
202424	Unm	M	Subadult	8/6/2024	Tepee Creek, BTNF-WY	Inside DMA	Known	Human cause; management capture and removal for cattle depredation.
202425	Unm	M	Subadult	8/9/2024	Grass Creek, SNF-WY	Inside DMA	Known	Human cause; management capture and removal for cattle depredation.
202426	Unm	M	Adult	8/13/2024	Reef Creek, SNF-WY	Inside DMA	Known	Human cause; management capture and removal for cattle depredation.
202427	Unm	F	Adult	8/21/2024	West Fork Madison River, BDNF-MT	Outside DMA	Known	Human cause; management free-range removal for chronic sheep depredation.
202428	Unm	F	Cub	8/21/2024	West Fork Madison River, BDNF-MT	Outside DMA	Probable	Human cause; 1st of 1 cub (mortality #202427, Unm202414) whose mother was a free-range removal for chronic sheep depredation.
202429	Unm	M	Adult	8/21/2024	Big Creek, PR-MT	Inside DMA	Known	Human cause; management capture and removal for cattle depredation.
202430	Unm	F	Subadult	8/23/2024	Clarks Fork of the Yellowstone River, ST-WY	Outside DMA	Known	Human cause; management capture and removal for frequenting agricultural areas, crop damage, and human safety concerns.
202431	Unm	M	Adult	8/24/2024	Deadman Creek, SNF-WY	Inside DMA	Known	Human cause; management capture and removal for cattle depredation.
202432	1041	F	Adult	8/24/2024	Dago Creek, BTNF-WY	Inside DMA	Known	Human cause; management capture and removal for cattle depredation. Bear was not collared at time of removal.
202433	1101	M	Subadult	8/26/2024	Aldrich Creek, SNF-WY	Inside DMA	Known	Human cause; management capture and removal for cattle depredation. Bear was not collared at time of removal.
202434	G282	M	Subadult	8/26/2024	Aldrich Creek, SNF-WY	Inside DMA	Known	Human cause; management capture and removal for cattle depredation.
202435	Unm	F	Subadult	8/27/2024	Clarks Fork of the Yellowstone River, PR-WY	Outside DMA	Known	Human cause; management capture and removal for frequenting agricultural areas and human safety concerns.

Table. 14. Grizzly bear mortalities documented in the Greater Yellowstone Ecosystem, 2024.								
Unique #	**Bear[a]**	**Sex[b]**	**Age[c]**	**Date**	**Location[d]**	**Monitoring Area[e]**	**Certainty**	**Notes**
202436	Unm	F	Adult	8/27/2024	Heart Mountain Canal, PR-WY	Outside DMA	Known	Human cause; unmarked adult female drowned in Heart Mountain Canal. Mother of mort#202437 and mortality #202438
202437	Unm	M	Cub	8/27/2024	Heart Mountain Canal, PR-WY	Outside DMA	Known	Human cause; 1st of 2 cubs (mother, mortality #202436) drowned in Heart Mountain Canal.
202438	Unm	M	Cub	8/27/2024	Heart Mountain Canal, PR-WY	Outside DMA	Known	Human cause; 2nd of 2 cubs (mother, mortality #202436) drowned in Heart Mountain Canal.
202439	566	M	Adult	9/1/2024	North Fork Duck Creek, CTNF-ID	Inside DMA	Known	Human cause; self-defense kill by two archery hunters during a surprise attack. Bear was not collared at time of death.
202440				2024	ID	Inside DMA	Known	Under investigation
202441	1097	F	Subadult	9/6/2024	Clarks Fork of the Yellowstone River, PR-WY	Outside DMA	Known	Human cause; management capture and removal for frequenting agricultural areas, crop damage, and human safety concerns. Failed previous relocation attempt in 2023. Bear was not collared at time of removal.
202442	1079	M	Adult	9/10/2024	Henry's Fork, CTNF-ID	Inside DMA	Known	Human cause; management capture and removal for cattle depredation. Bear was not collared at time of removal.
202443	1083	M	Adult	9/10/2024	Henry's Fork, CTNF-ID	Inside DMA	Known	Human cause; management capture and removal for cattle depredation. Bear was wearing an active radio collar.
202444	Unm	F	Adult	9/9/2024	Tepee Creek, CGNF-MT	Inside DMA	Known	Human cause; self-defense kill by two archery hunters during a surprise attack. Two yearlings present (mother, mortality #202446).
202445	468	M	Adult	9/11/2024	Buffalo Fork, PR-WY	Inside DMA	Known	Human cause; management capture and removal for breaking into anthropogenic structure and obtaining a food reward. Bear was in poor body condition and was wearing an active collar at time of removal.

Table. 14. Grizzly bear mortalities documented in the Greater Yellowstone Ecosystem, 2024.								
Unique #	**Bear[a]**	**Sex[b]**	**Age[c]**	**Date**	**Location[d]**	**Monitoring Area[e]**	**Certainty**	**Notes**
202446	Unm	M	Yearling	9/9/2024	Tepee Creek, CGNF-MT	Inside DMA	Probable	Human cause; 1st of 2 yearlings (mother, mortality #202444) self-defense kill by two archery hunters during a surprise attack.
202447				2024	WY	Inside DMA	Known	Under investigation
202448	Unm	M	Subadult	9/15/2024	Snowshoe Creek, SNF-WY	Inside DMA	Known	Human cause; management free-range removal for chronic cattle depredation and human safety.
202450				2024	WY	Inside DMA	Known	Under investigation
202451	Unm	M	Adult	9/23/2024	Clarks Fork of the Yellowstone River, PR-WY	Outside DMA	Known	Human cause; management capture and removal for crop damage and human safety concerns.
202452	Unm	M	Adult	9/23/2024	Clarks Fork of the Yellowstone River, PR-WY	Outside DMA	Known	Human cause; management capture and removal for crop damage and human safety concerns.
202453	1130	M	Subadult	9/25/2024	Clarks Fork of the Yellowstone River, PR-WY	Outside DMA	Known	Human cause; management capture and removal for crop damage and human safety concerns. Relocated earlier in the summer for similar behavior. Bear was wearing an active radio collar at time of removal.
202454				2024	WY	Inside DMA	Known	Under investigation
202455	Unm	F	Adult	9/28/2024	Clarks Fork of the Yellowstone River, PR-WY	Outside DMA	Known	Human cause; management capture and removal for crop damage and human safety concerns.
202456	Unm	M	Subadult	9/30/2024	Beauty Lake, SNF-WY	Inside DMA	Known	Human cause; management free-range removal for killing hiker's dog, aggressive behavior towards other dogs and horseback riders, and frequenting occupied camps. Implicated in tearing up a camp and receiving food rewards.
202457	1099	M	Adult	10/3/2024	Sage Creek, PR-WY	Outside DMA	Known	Human cause; management capture and removal for cattle depredation. Bear was wearing an active radio collar at time of removal.

Table. 14. Grizzly bear mortalities documented in the Greater Yellowstone Ecosystem, 2024.								
Unique #	**Bear[a]**	**Sex[b]**	**Age[c]**	**Date**	**Location[d]**	**Monitoring Area[e]**	**Certainty**	**Notes**
202458				2024	WY	Inside DMA	Known	Under investigation
202459	Unm	F	Adult	10/5/2024	First Creek, CGNF-MT	Inside DMA	Known	Human cause; self-defense kill by archery hunter. Bear found severely injured. Dispatched by agency personnel.
202460				2024	WY	Inside DMA	Known	Under investigation
202461				2024	WY	Inside DMA	Known	Under investigation
202462				2024	WY	Inside DMA	Known	Under investigation
202463				2024	WY	Inside DMA	Known	Under investigation
202464				2024	WY	Inside DMA	Known	Under investigation
202465	496	M	Adult	10/14/2024	Carter Creek, PR-WY	Outside DMA	Known	Human cause; management darting and removal for frequenting agricultural areas and obtaining livestock feed and silage. Bear was in extremely poor body condition and was not collared at time of removal.
202466				2024	WY	Inside DMA	Known	Under investigation
202467				2024	WY	Inside DMA	Known	Under investigation
202468	399	F	Adult	10/22/2024	Snake River, BTNF-WY	Outside DMA	Known	Human cause; vehicle strike. No indication yearling was struck. Bear was not collared at time of death.
202469	Unm	F	Subadult	10/24/2024	Bennett Creek, PR-WY	Outside DMA	Known	Human cause; management capture and removal for property damage and obtaining apples and duck feed.
202470	Unm	M	Subadult	10/23/2024	Gallatin River, PR-MT	Inside DMA	Known	Human cause; management capture and removal for property damage and obtaining anthropogenic foods.
202471				2024	ID	Inside DMA	Known	Under investigation
202472	Unm	M	Adult	11/2/2024	Greybull River, PR-WY	Outside DMA	Known	Human cause; management capture and removal for repeated conflicts involving livestock feed, property damage, aggression towards people, and frequenting developed areas.

Table. 14. Grizzly bear mortalities documented in the Greater Yellowstone Ecosystem, 2024.								
Unique #	**Bear[a]**	**Sex[b]**	**Age[c]**	**Date**	**Location[d]**	**Monitoring Area[e]**	**Certainty**	**Notes**
202473	Unm	F	Adult	11/18/2024	Greybull River, PR-WY	Outside DMA	Known	Human cause; management capture and removal for site conflict for obtaining livestock feed and feeding with cattle in feedlot.
202477	886	F	Adult	9/8/2024	Irma Lake, PR-WY	Inside DMA	Probable	Undetermined; evidence indicated a mortality, but no signs pointed to a cause. Bear was wearing an active radio collar.

[a] Number indicates bear number; Unm = unmarked bear; Unk = unknown if a marked or unmarked bear; Mkd = previously marked bear but identity unknown.

[b] Unk = unknown sex.

[c] Cub = <1 year old; yearling = 1–2 years old; subadult = 2–4 years old; adult = ≥5 years old; Unk = unknown age.

[d] BTNF = Bridger-Teton National Forest, BLM = Bureau of Land Management, CTNF = Caribou-Targhee National Forest, CGNF = Custer Gallatin National Forest, GTNP = Grand Teton National Park, SNF = Shoshone National Forest, YNP = Yellowstone National Park, PR = private.

[e] Location relative to demographic monitoring area.

[f] Nine probable mortalities of cubs from radio-marked females were recorded.

Table 15. Counts of documented known and probable grizzly bear mortalities that occurred in 2024 by mortality cause, sex, age class, and location relative to the demographic monitoring area (DMA), Greater Yellowstone Ecosystem.						
Area	**Mortality category**	**Dependent (<2 years old)**	**Independent (≥2 years old)**			**Total**
			Females	**Males**	**Unknown**	
Inside DMA	Natural	1	0	0	0	1
	Site Conflict	0	0	4	0	4
	Self-defense	5	7	3	0	15
	Illegal	0	1	1	0	2
	Mistaken ID	0	0	1	0	1
	Livestock	0	2	15	0	17
	Accidental	0	0	2	0	2
	Humane removal	1	0	0	0	1
	Unknown	0	1	0	0	1
	Total	7	11	26	0	44

Table 15. Counts of documented known and probable grizzly bear mortalities that occurred in 2024 by mortality cause, sex, age class, and location relative to the demographic monitoring area (DMA), Greater Yellowstone Ecosystem.

Area	Mortality category	Dependent (<2 years old)	Independent (≥2 years old)			Total
			Females	Males	Unknown	
Outside DMA	Natural	0	0	0	0	0
	Site Conflict	0	6	5	0	11
	Self-defense	0	0	0	0	0
	Illegal	0	0	1	0	1
	Mistaken ID	0	0	0	0	0
	Livestock	1	3	7	0	11
	Accidental	3	2	0	0	5
	Humane removal	0	0	0	0	0
	Unknown	0	0	0	0	0
	Total	4	11	13	0	28

Table 16. Mean reporting rate, reported mortalities, and mean estimated combined reported and unreported mortalities along with the 95% credible intervals for the former and latter estimates by population segment for grizzly bears in the demographic monitoring area, Greater Yellowstone Ecosystem, 2024. The estimated combined reported and unreported mortalities are used as inputs into the integrated population model as an additional source of population count data.

Population segment	Estimated reporting rate[a]	Reported mortalities	Estimated combined reported and unreported mortalities[b]
Independent females (≥2 years old)	0.44 (0.35–0.53)	7	17 (9–30)
Independent males (≥2 years old)	0.44 (0.35–0.53)	7	17 (9–30)

[a] Estimates based on Cherry et al. (2002) were developed from mortalities of radio-marked bears over the period 1983–2024, combining data from both sexes due to sample size limitations.

[b] Estimates based on Cherry et al. (2002) were derived from reported mortality counts during 2024 and an estimate of the reporting rate. The values were estimated through a Bayesian estimation process; not calculated by dividing reported mortalities by the estimated reporting rate.

Population Size and Vital Rates

(Matthew J. Gould, Frank T. van Manen, and Mark A. Haroldson, U.S. Geological Survey, Interagency Grizzly Bear Study Team; Justin G. Clapp, Justin A. Dellinger, Dan Thompson, Wyoming Game and Fish Department; and Cecily M. Costello, Montana Fish, Wildlife and Parks)

Background

Starting in 2017, the IGBST began investigating the merits of an IPM to estimate and monitor vital rates and population abundance of grizzly bears in the GYE. Traditionally, estimates of population size were derived by combining annual estimates of the number of unique females with cubs with estimates of the proportions of sex-age categories within the population, based on periodic estimates of demographic vital rates such as survival and fecundity from a sample of radio-marked individuals (IGBST 2012). Uncertainty associated with each component was difficult to propagate throughout the process, and confidence bounds for estimates of total population size were underestimated. Because there are separate estimation processes for each parameter, interruptions in data collection for any one process could affect the ability to estimate other parameters. Additionally, preparing data sets for estimating various demographic parameters was time and labor intensive, which is why we previously estimated and reported vital rates and population trends only periodically (i.e., 1983–2001 [Schwartz et al. 2006], 2002–2011 [IGBST 2012]).

The enhanced analytical capabilities of the IPM offer important advancements to our demographic monitoring program. Collection of rigorous, long-term data has always been a key strength of the IGBST, and analytical advances now allow us to fully integrate those robust data collections. Implementation of the IPM enables us to annually update vital rates and other demographic parameters relevant to Chapter 2 of the 2024 Conservation Strategy (Yellowstone Ecosystem Subcommittee 2024).

Integrated Population Model

With recent advances in analytics and data collections in the field of wildlife science, more unified approaches allow consolidation of independent sources of data and analyses into a single, joint analysis based on Bayesian statistical inference. In Bayesian approaches, available knowledge about parameters in a statistical model is updated with information from observed data. This union is realized in the IPM by simultaneously linking population-level count data with individual-based survival and reproductive data, through what is termed a "state-space model." A state-space model is composed of process and observation submodels, with the former describing the true state of the population over time and the latter linking temporal changes of the population with observation data. The process submodel is a population projection matrix model whereby annual abundance is a function of abundance and population survival and fecundity rates in the preceding year. The observation data (i.e., the population count data) are conditional on the ecological process and it is assumed that changes in the observation data (affected by some degree of observation error) track changes in population abundance. The addition of the population count data provides two benefits: 1) direct information on population abundance over time; and 2) indirect information on survival and productivity because these parameters inherently control population abundance. Because of limited demographic information provided by count data, additional information is needed to estimate survival and reproduction through analyses specific to each demographic parameter. By combining count, survival, and reproduction data into a single analysis, more information is available in the estimation of the parameters shared among the state-space, survival, and reproduction submodels.

Implementation of the IPM within IGBST's population monitoring program provides multiple benefits. First, because several parameters are linked across multiple submodels, there is more information available for the estimation process, resulting in what is termed "self-consistent estimates." This refers to the notion that within the IPM analytical framework, estimates from different data sources must reconcile with one another, which generally leads to greater precision and accuracy of estimates. The IPM framework improves our ability to annually update demographic parameters and assess and understand changes in population structure over time. Moreover, because of the inherent flexibility of an IPM, it can accommodate a variety of data collected over different time periods, including interruptions in efforts, and make better use of IGBST's extensive data

collections. This flexibility also allows us to modify monitoring protocols and harness future analytical and technological advancements (Gould et al. 2024).

The IPM for the GYE grizzly bear population was developed by researchers at the University of Montana and SpeedGoat Wildlife Solutions, Missoula, Montana, an independent research group, in conjunction with members of the IGBST. The IPM is composed of survival, reproduction, and state-space submodels, each incorporating data from the monitoring program. Telemetry and observation flight data inform a known-fate survival model for independent-age (≥2 years old) bears. Dependent-age (<2 years old) survival and litter size are latent (i.e., unobserved) parameters, whereas the number of cubs born is estimated based on estimated litter size and the number of adult females expected to give birth (Schwartz et al. 2006, Schwartz and White 2008, IGBST 2012). The latter parameter is based on data from annual ground observations and standardized aerial surveys to estimate the total number of females with cubs in the DMA, using the Chao2 estimator (Knight et al. 1995; Keating et al. 2002; Cherry et al. 2007; Schwartz et al. 2008; IGBST 2012, 2021, van Manen et al. 2022). Data from the aerial observation flights are also analyzed within a mark-resight framework as a second annual estimate of the total number of females with cubs (Higgs et al. 2013). With ancillary data on the annual probability of females transitioning among reproductive states (no offspring, cubs, yearlings, 2-year-old offspring), the total number of adult females can be estimated. Combined with estimates of survival for each population segment, abundance of all remaining cohorts is estimated to obtain annual estimates of total population abundance and population growth. Finally, known, probable, and estimated unknown or unreported mortality data (Cherry et al. 2002) collected since 1983 serve as additional population count data, providing information on the abundance of independent-age male and non-reproductive female population segments. We report estimates of vital rates for adults (≥3 years old), subadults (2 years old), yearlings (1 year old), and cubs (<1 year old), along with estimates of population size and growth rates during 1983–2024.

Vital Rates

Median survival rates (median [95% credible interval]) were highest for adult females (0.96 [0.94–0.97]) and adult males (0.95 [0.93–0.96]), followed by subadult females (0.94 [0.93–0.96]) and subadult males (0.93 [0.90–0.95]; Fig. 9). As expected, survival rates for dependent-age bears were lower than independent-age bears: survival for yearling males (0.66 [0.10–0.98]) was slightly higher than yearling females (0.56 [0.06–0.97]) with cub survival lower than yearling survival for both male and female cubs (0.50 [0.23–0.81]; the IPM assumes cub survival for both sexes is equal. Cohort-specific survival rates were similar to those reported by Schwartz et al. (2006) and IGBST (2012) and followed a similar pattern with higher survival rates as individuals reach prime age classes. The male to female sex ratio was functionally equal (i.e., 1.03:1.00). Median proportion of adult females with cubs was 0.29 (0.26–0.31) and median litter size was 2.29 (1.82–2.79) cubs per female (Table 17).

Population Size, Growth Rate, and Mortality Rates

Estimated total abundance at den emergence in 2024 was 1,050 (894–1,239) individual grizzly bears in the DMA (Figs. 10 and 11; Table 17). The median population growth rate from 2023 to 2024 was $\lambda = 1.030$ (0.938–1.119), a 3% growth from one year to the next (Table 17). Decadal growth rates were 2.3% during the 1980s, 6.4% in the 1990s, 3.0% in the 2000s, and 2.1% in the 2010s. Decadal growth rate for the first half of the 2020s was 2.9%. Estimated mortality rates for 2024 were higher for independent-age males (5.5%) compared with independent-age females (4.4%). We note these estimates of total mortality are obtained through the unified framework of the IPM and are not directly comparable to estimates of total mortality rates for years prior to implementation of the IPM. We now report IPM-based estimates of total mortality because these estimates must be self-consistent with other monitoring data that directly or indirectly inform these estimates, thus providing a more robust estimation of overall mortality.

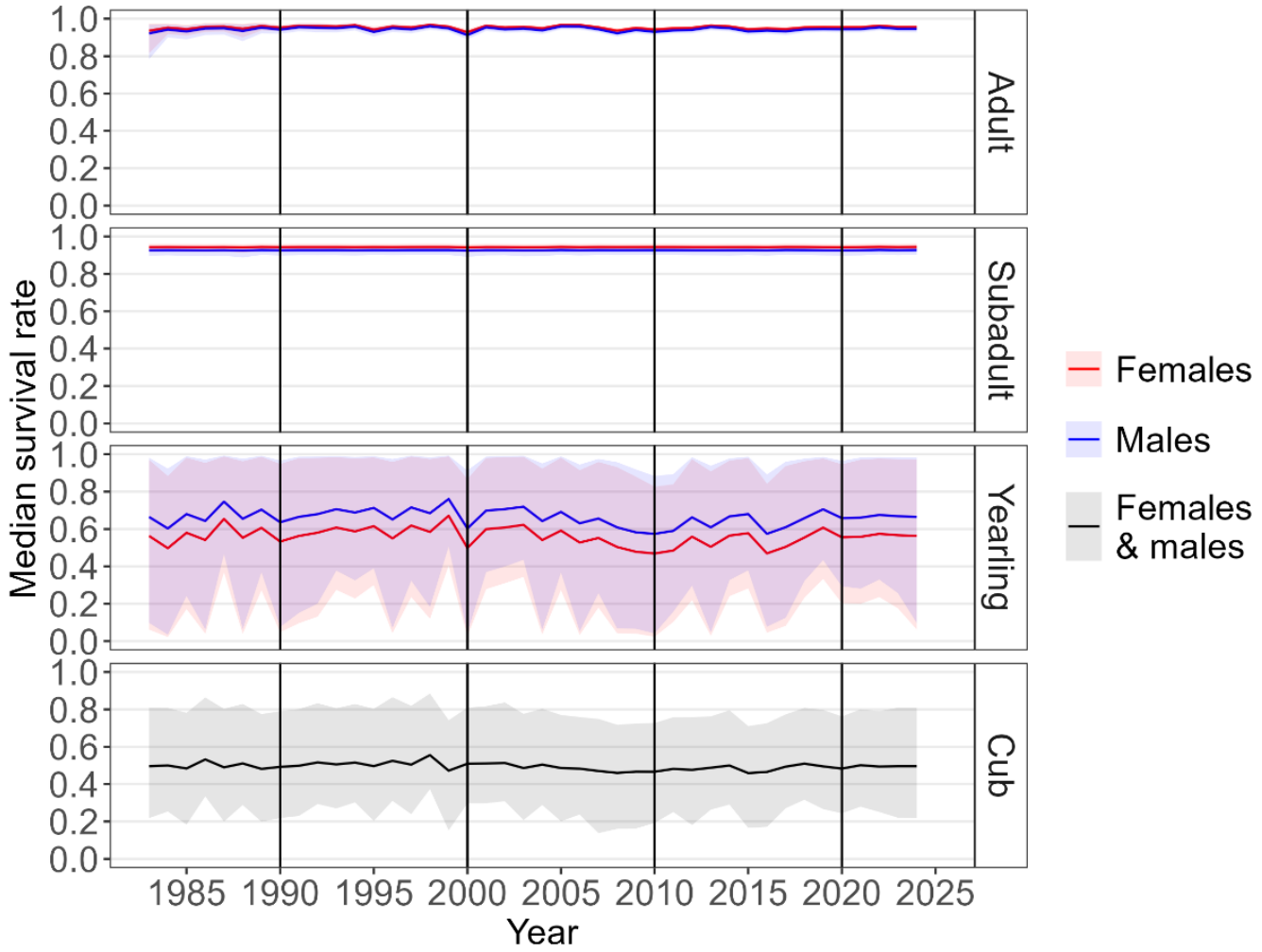

Fig. 9. Estimated median annual survival rates (solid lines) and their 95% credible intervals (shaded areas) for grizzly bears in the demographic monitoring area of the Greater Yellowstone Ecosystem, 1983–2024.

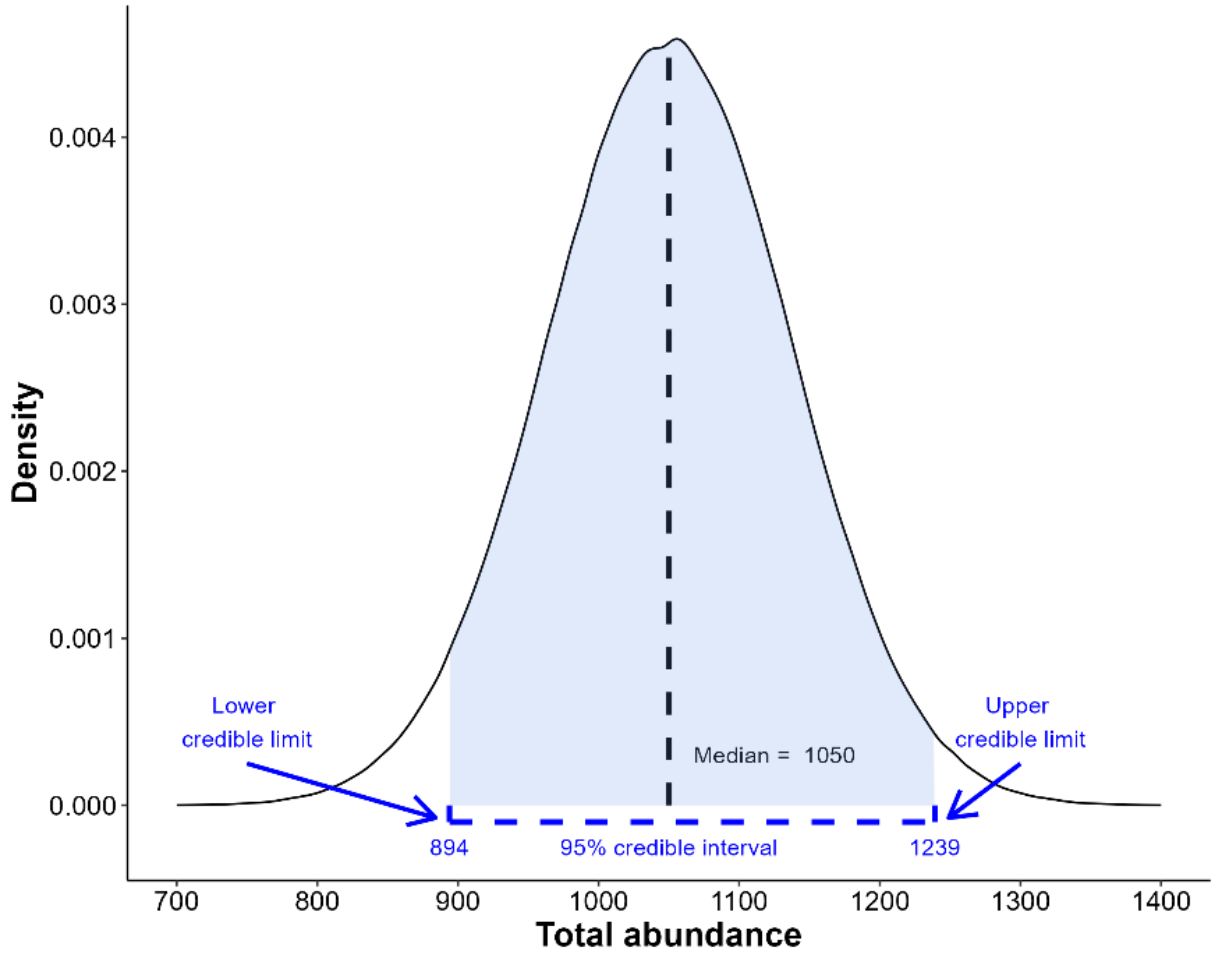

Fig. 10. Approximated posterior density plot of estimated abundance at den emergence for grizzly bears in the demographic monitoring area of the Greater Yellowstone Ecosystem, 2024. The plot visualizes the distribution of potential values for the estimated parameter. The area under the curve represents all possibilities with 'peaks' representing values with a higher probability of occurrence. The distribution can be characterized by the mean (average value), median (middle value), mode (most frequent value), or percentiles (range of values, e.g., 2.5 and 97.5 percentiles [i.e., the 95% credible interval]).

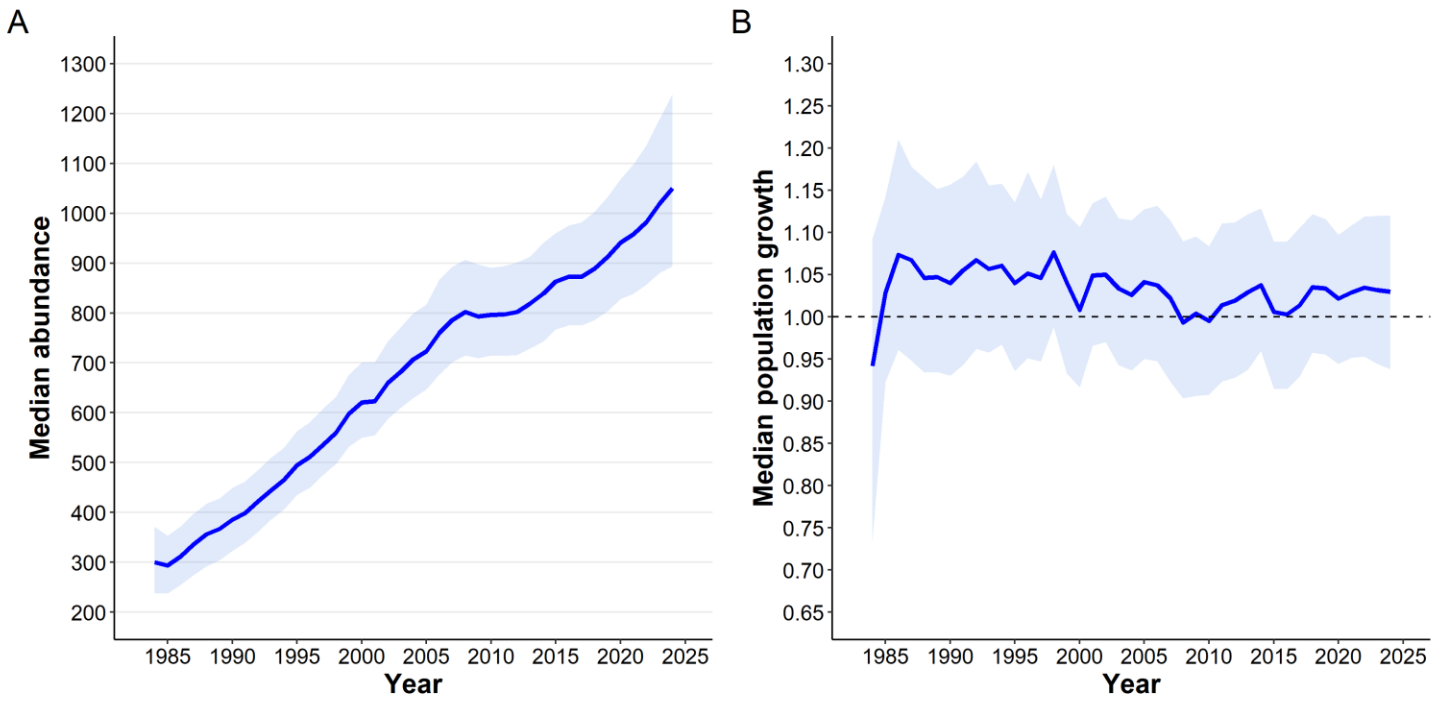

Fig. 11. A) Estimated median total population abundance (solid line) at den emergence and its 95% credible interval (shaded area), and B) estimated median population growth rate (solid line) and its 95% credible interval (shaded area) for grizzly bears in the demographic monitoring area of the Greater Yellowstone Ecosystem, 1983–2024. Median total population size in 2024 was estimated at 1,050 grizzly bears (95% credible interval = 894–1,239). Median population growth rate in 2024 was estimated at 1.030 (95% credible interval = 0.938–1.119). In panel B, the dashed line at 1.00 indicates no population growth.

Table 17. Estimated vital rates, population metrics, and mortality rates for grizzly bears in the Greater Yellowstone Ecosystem, 2024[a].		
Demographic parameter	**Median**	**95% credible interval**
Survival by population segment		
Cubs (assumed equal for females and males)	0.50	0.22–0.81
Yearling females	0.56	0.06–0.97
Yearling males	0.66	0.10–0.98
Subadult females	0.94	0.92–0.96
Subadult males	0.93	0.90–0.95
Adult females	0.96	0.94–0.97
Adult males	0.95	0.93–0.96
Reproduction		
Litter size	2.29	1.82–2.79
Proportion of females with cubs	0.29	0.26–0.31
Population size and growth rate		
Total abundance (2024)[b]	1,050	894–1,239
Independent (≥2 years old) female abundance	364	---
Independent (≥2 years old) male abundance	380	---
Dependent female abundance	151	---
Dependent male abundance	151	---
Population growth rate (lambda, 2023–2024)	1.030	0.938–1.119
Percent mortality		
Independent females	4.41	---
Independent males	5.53	---
Dependent females (human-caused only)[c]	2.65	---
Dependent males (human-caused only)[d]	1.99	---

[a] Estimates are specific to the reporting year 2024, based on data inputs for the period 1983–2024.

[b] The sum of segment medians differs from the median of the posterior distribution derived by summing segment estimates each iteration of the model fitting procedure.

[c] Includes three known mortalities where the unknown sex of the bear was randomly generated and assigned as female.

[d] Includes one known mortality where the unknown sex of the bear was randomly generated and assigned as male.

Monitoring of Grizzly Bear Foods

Grizzly Bear Consumption of Ungulates in Yellowstone National Park

(Kerry A. Gunther, Travis C. Wyman, and Eric G. Reinertson, Yellowstone National Park)

Ungulates are concentrated sources of calories and protein consumed by grizzly bears through scavenging and predation. Bears show preferential selection of ungulate meat over many other foods. Craighead et al. (1995) observed as many as 23 individual grizzly bears congregating at a single bison (*Bison bison*) carcass in Yellowstone National Park (YNP). State and federal management of bison, elk, and deer populations in the GYE for recreational hunting and addressing disease, property damage, crop damage, and other factors, could influence the number of ungulates on the landscape available to grizzly bears as food. To monitor broad-scale trends in grizzly bear consumption of ungulate meat, we record opportunistic sightings of grizzly bears throughout YNP. These sighting records include information on bear activity, including consumption of bison, moose (*Alces alces*), elk *(Cervus canadensis)*, mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), pronghorn (*Antilocapra americana*), bighorn sheep (*Ovis canadensis*), and mountain goat (*Oreamnos americanus*) carcasses.

In 2024, we recorded 1,125 opportunistic observations of grizzly bears, their tracks, and feeding signs in YNP. In 83 (7%) of these observations, grizzly bears fed on ungulate carcasses (Table 18). Grizzly bears were observed consuming ungulate carcasses from March through December (Fig. 12), with most use occurring in May (25%, $n = 21$). Bison (55%, $n = 46$) and elk (30%, $n = 25$) were the species of ungulate most often consumed by grizzly bears. In contrast, black bears (*Ursus americanus*) fed on ungulate carcasses in only 12 (1%) of 984 opportunistic observations (Table 18). Interference competition from grizzly bears and wolves (*Canis lupus*) likely inhibits black bear use of many ungulate carcasses.

The 83 observations of grizzly bears feeding on ungulates in 2024 was higher than the long-term average of 67 (± 34 standard deviation) observations recorded over the previous 49 years (1975–2023) (Fig. 13). The 7% proportion of the total number of opportunistic sightings where grizzly bears fed on ungulate carcasses in 2024 was slightly lower than the long-term average of 9% recorded from 1975–2023 (Fig. 14).

A grizzly bear scavenges an adult female bison carcass usurped from the 25-member Wapiti Lake wolf pack in Hayden Valley, Yellowstone National Park, in early December 2024.
(Photo courtesy of K. Cassidy, National Park Service)

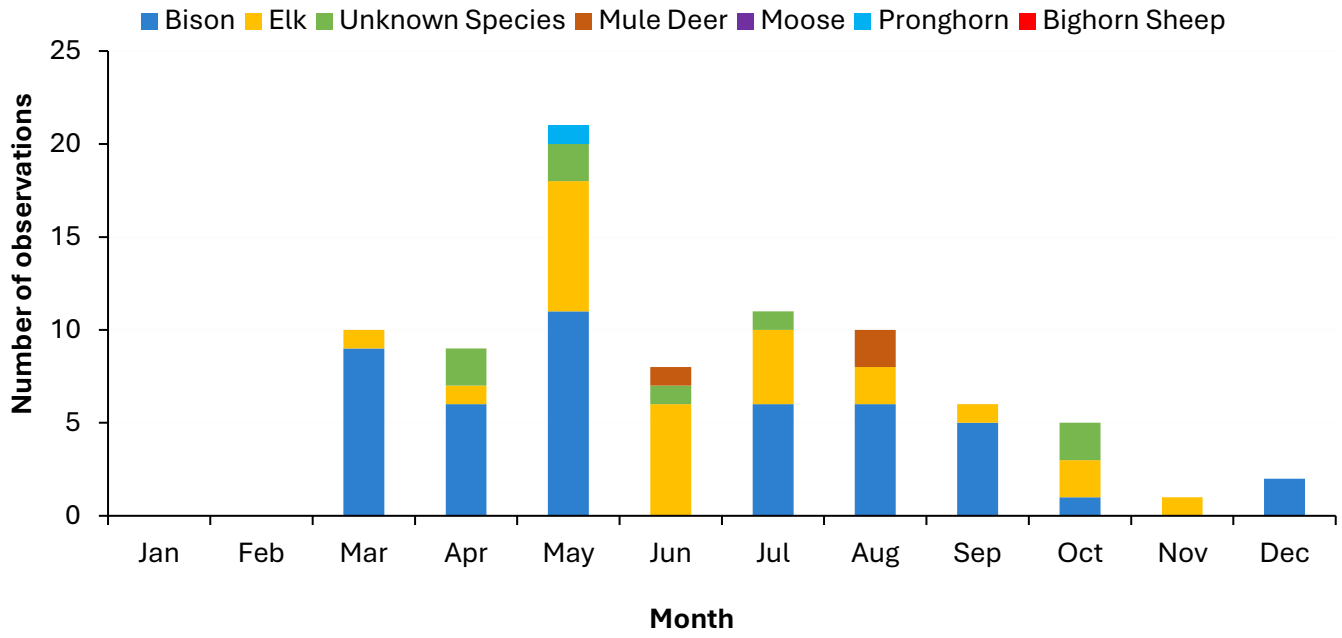

Fig. 12. Number of opportunistic observations of grizzly bears consuming ungulate meat by month in Yellowstone National Park, 2024.

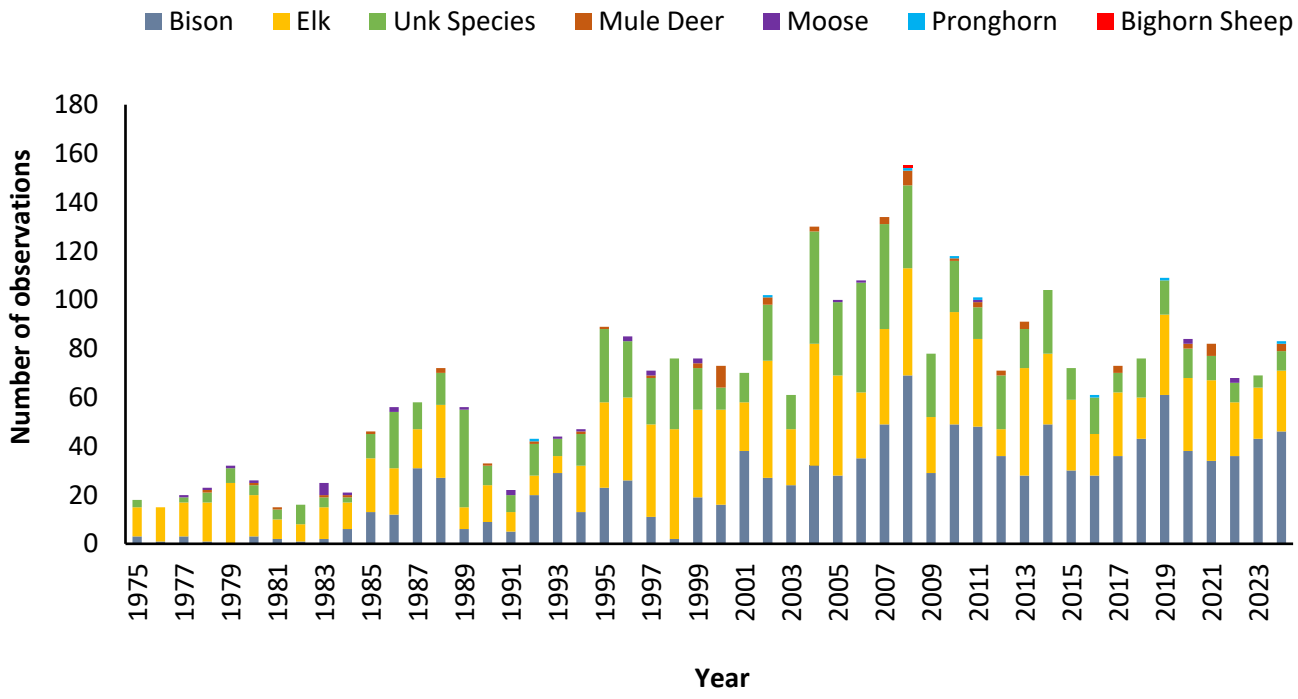

Fig. 13. Number of opportunistic observations of grizzly bears feeding on ungulate carcasses in Yellowstone National Park, 1975–2024.

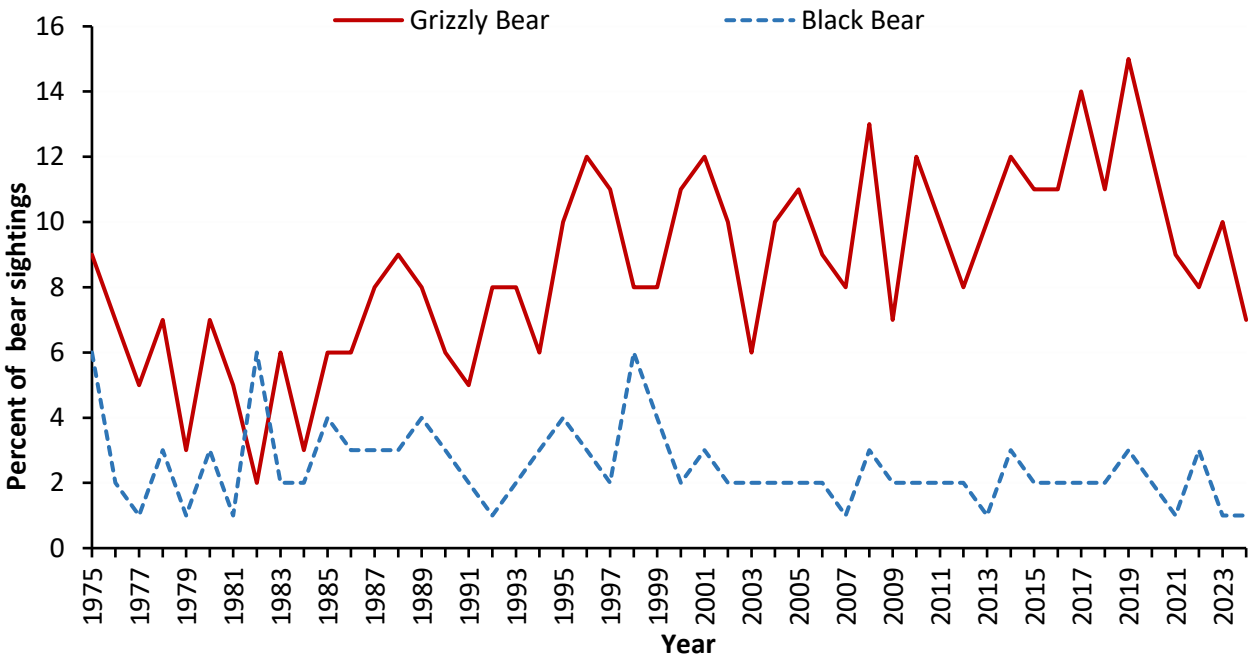

Fig. 14. Proportion of the total number of opportunistic observations of grizzly bears and American black bears where the observed bears were feeding on ungulate carcasses, Yellowstone National Park, 1975–2024.

Table 18. Number of opportunistic observations of grizzly bears and American black bears where the observed bear fed on ungulate carcasses, Yellowstone National Park, 2024.

Species of bear	Species of ungulate consumed									
	Bison	Elk	Moose	Mule Deer	White-tailed deer	Bighorn sheep	Mountain goat	Pronghorn	Unknown ungulate	Total
Grizzly	46	25	0	3	0	0	0	1	8	83
Black	2	7	0	3	0	0	0	0	0	12

Spawning Cutthroat Trout Availability and Use by Grizzly Bears in Yellowstone National Park

(Kerry A. Gunther, Eric G. Reinertson, Travis C. Wyman, Todd M. Koel, and Patricia E. Bigelow, Yellowstone National Park)

In spring and early summer, grizzly bears with home ranges in the Yellowstone Lake watershed prey on spawning native Yellowstone cutthroat trout (*Oncorhynchus virginalis bouvieri*) in tributary streams of the lake. Bears also occasionally prey on cutthroat trout in other areas of YNP, including Fan Creek (westslope cutthroat trout [*O. lewisi*], Yellowstone cutthroat trout, or westslope × Yellowstone cutthroat trout hybrids) in the northwest section of the park and the inlet creek to Trout Lake (Yellowstone cutthroat trout or Yellowstone cutthroat trout × rainbow trout *O. mykiss* hybrids) located in the northeast section of the park.

The Yellowstone cutthroat trout population in Yellowstone Lake was substantially reduced in the late-1990s and 2000s through predation by non-native lake trout (*Salvelinus namaycush*), whirling disease caused by an exotic parasite (*Myxobolus cerebralis*), and reduced juvenile recruitment due to drought conditions (Koel et al. 2005, 2006). The combined effect reduced Yellowstone cutthroat trout abundance by >90% in some spawning tributaries (Koel et al. 2006, 2019) and resulted in a noticeable decrease in bear fishing activity around the lake (Haroldson et al. 2005). Because of the Yellowstone cutthroat trout decline and associated trophic changes, and preferential use of this food source by some grizzly bears in the Yellowstone Lake watershed, monitoring of the Yellowstone cutthroat trout population is a component of the habitat monitoring program of the 2024 Yellowstone Grizzly Bear Conservation Strategy (Yellowstone Ecosystem Subcommittee 2016).

The Yellowstone cutthroat trout spawning population was historically monitored through counts at a fish trap located on Clear Creek (stream #1095) on the east shore of Yellowstone Lake. The Clear Creek fish weir and trap are no longer operational. A long-term netting assessment program conducted annually in August is now used to monitor lake-wide status and trends of the Yellowstone cutthroat trout population (Koel et al. 2020). Visual stream surveys of North Shore and West Thumb tributaries of the lake are used as indices of trout abundance and associated bear fishing activity. These surveys have been conducted annually since 1989 with many occurring on small creeks or streams that only have colloquial names (Fig. 15). In 2014, we began visual stream surveys along three Yellowstone Lake backcountry spawning streams (Flat Mountain Creek [stream #1155], stream #1138, and stream #1141) on the west shore of Yellowstone Lake. Methods used for visual spawning stream surveys are described in Gunther at al. (2022).

Yellowstone Lake

Front-country Visual Stream Surveys

Ice-off on Yellowstone Lake occurred on May 20, 2024. In North Shore streams, 200 spawning Yellowstone cutthroat trout were counted, including 150 in Bridge Creek (stream #1197), 39 in Hatchery Creek (stream #1201), 10 in North Incinerator Creek (stream #119701), and 1 in Lodge Creek (stream #1203) (Table 19). Additionally, two spawning cutthroat trout were observed in Hotel Creek (stream #1202) below the culvert. An approximate 1.2-meter drop from the small culvert to the creek bed, prevents fish from moving further upstream. These were the first spawning cutthroat observed in Hotel Creek in many years. No spawning cutthroat trout were observed in Wells Creek (stream #1198). A grizzly bear and a black bear were observed on Hatchery Creek. Grizzly bears and their tracks were observed on Bridge Creek. No bear activity was documented along Lodge, Incinerator, or Wells Creeks. No confirmed evidence of fishing (i.e., observations of bears fishing for trout, bear tracks associated with fish parts, or bear scats containing fish parts) were observed along any of the monitored North Shore streams in 2024.

In West Thumb streams, 424 spawning Yellowstone cutthroat trout were counted, including 371 in Little Thumb Creek (stream #1176), 44 in Sandy Creek (stream #1166), 7 in stream #1167, and 2 in Sewer Creek (stream #1164). Grizzly bear and black bear tracks were observed along Little Thumb Creek. Trail camera photos indicated that both a grizzly bear and a black bear were fishing in Little Thumb Creek on multiple occasions. Trail camera photos also indicated that coyotes, bald eagles, and golden eagles were fishing for

cutthroat trout in Little Thumb Creek. Additionally, gray wolves were documented scavenging cutthroat trout carcasses at Little Thumb Creek.

The number of spawning Yellowstone cutthroat trout counted in North Shore (Fig. 16) and West Thumb (Fig. 17) streams decreased substantially after 1989. Although the increased spawning activity observed in Little Thumb, Sandy, Bridge, and Hatchery Creeks in recent years is promising for Yellowstone cutthroat trout recovery, relatively few spawning trout have been observed in all other monitored North Shore and West Thumb tributary streams.

Backcountry Visual Stream Surveys

In 2024, we surveyed three backcountry tributary streams, including Flat Mountain Creek, stream #1138, and stream #1141. In these streams, we counted 20 spawning Yellowstone cutthroat trout, including 16 in stream #1141 and 4 in Flat Mountain Creek. No cutthroat trout were observed in stream #1138. We observed grizzly bear tracks along Flat Mountain Creek and streams #1138 and #1141. No black bears or any sign of them were observed along any of the backcountry creeks. Although no spawning fish were observed in stream #1138, bear scats containing fish parts were observed along the stream on both surveys suggesting that the stream likely had some spawners.

Trout Lake

We counted 123 spawning cutthroat trout in the Trout Lake inlet creek (stream #10331709) in 2024 (Fig. 18). No bears, bear tracks, or bear scats were observed along the Trout Lake inlet creek.

Outlook for Yellowstone Cutthroat Trout

The number of spawning Yellowstone cutthroat trout counted in all surveyed tributary streams of Yellowstone Lake reached an all-time low around 2004 (Figs. 16-18). A Native Fish Conservation Plan/Environmental Assessment was completed in 2010 (Koel et al. 2010*a*,*b*). The plan outlines an adaptive management program designed to protect the native Yellowstone cutthroat trout population through suppression of lake trout and other methods (Koel et al. 2020). As part of these management efforts, park fisheries biologists and private-sector (contracted) netters caught and removed 264,613 lake trout (260,654 in gillnets & 3,959 in trap nets) from Yellowstone Lake in 2024. Since lake trout suppression efforts began in 1994, more than 4.8 million lake trout have been removed from the lake through gillnetting and trap-netting. Population models indicate the removal program has slowed lake trout population growth and likely sent the population into decline beginning in 2012 (Syslo et al. 2020). Over the past decade, adult predatory lake trout age 6 years or older have been reduced by about 88%. Adult Yellowstone cutthroat trout now weigh twice what they did prior to the lake trout invasion, probably due to reduced competition, and juveniles are again recruiting into the Yellowstone cutthroat trout population (Koel et al. 2020). Spawning adult Yellowstone cutthroat trout are returning to some tributaries and bears are once again preying on them in a few streams. If the removal program results in a substantial long-term reduction in predatory lake trout, Yellowstone cutthroat trout may reestablish at higher numbers in Yellowstone Lake and its tributary streams. If the Yellowstone cutthroat trout restoration program is successful, this species may once again become an important diet item for grizzly bears and other terrestrial, aquatic, and avian predators in the Yellowstone Lake watershed (Bergum et al. 2017).

Table 19. Summary statistics for spawning Yellowstone cutthroat trout surveys, Yellowstone National Park, 2024.							
Stream	**Start of spawn**	**Last day of spawn**	**Duration of spawn (days)**	**Surveys during spawning period**	**Fish counted**	**Average fish/survey**	**Evidence of bear fishing[b]**
North Shore Streams							
Lodge Creek	5/26/2024	5/26/2024	1	1	1	1	No
Hatchery Creek	5/20/2024	6/02/2024	14	3	39	13	No
Incinerator Cr.	5/22/2024	60/5/2024	15	3	10	3.3	No
Wells Creek	No	Spawn					
Bridge Creek	5/20/2024	6/02/2024	14	3	150	50	No
West Thumb Streams							
Stream #1167	5/21/2024	5/21/2024	1	1	7	7	Yes
Sandy Creek	5/21/2024	6/04/2024	15	3	44	10.5	No
Sewer Creek	5/28/2024	5/28/2024	1	1	2	2	No
Little Thumb Creek	5/28/2024	6/17/2024	21	4	371	92.8	Yes
Total front-country[a]				19	624	32.8	2 of 8 streams
Backcountry Streams							
Flat Mountain Creek	5/27/2024	6/16/2024	20	2	4	2	No
Stream #1138	No Spawners Counted						Yes[c]
Stream #1141	5/27/2024	5/27/2024	1	1	16	16	Yes
Total backcountry				3	20	6	2 of 3 streams
Northern Range							
Trout Lake inlet	6/13/2024	6/26/2024	14	3	123	41	No

[a] Total for North Shore and West Thumb streams that had a spawn.

[b] Includes direct observations of bears fishing, trail camera evidence of bears fishing, fish parts with associated bear tracks, or bear scats containing fish parts.

[c] Although no spawning cutthroat trout were observed during the surveys, 2 bear fish scats with associated grizzly bear tracks were observed on the first survey and 2 additional bear fish scats were observed on the second survey.

Fig. 15. Locations of Yellowstone Lake cutthroat trout spawning streams surveyed in 2024. Base map: Geographic Society, i-cubed, Washington, D.C.

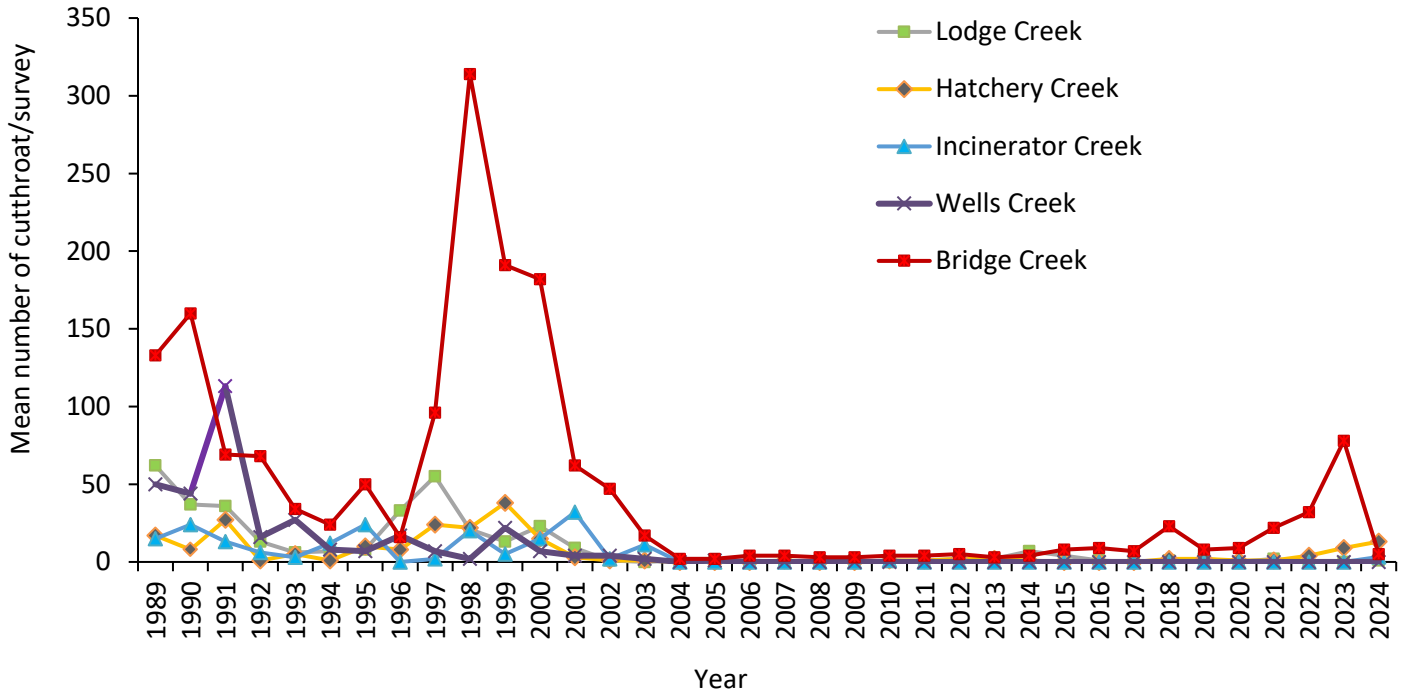

Fig. 16. Mean number of spawning Yellowstone cutthroat trout observed during weekly visual surveys of five North Shore spawning stream tributaries to Yellowstone Lake, Yellowstone National Park, 1989–2024.

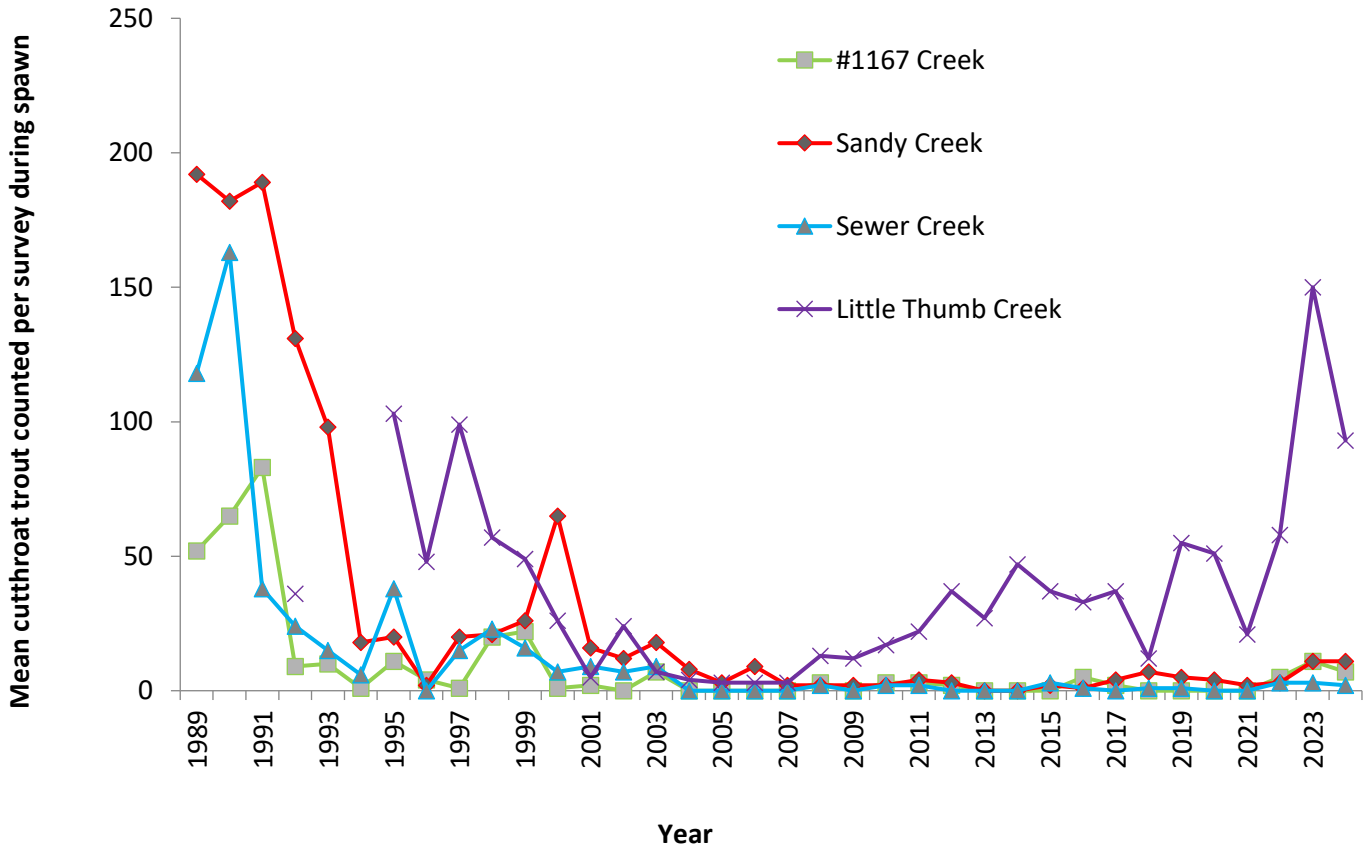

Fig. 17. Mean number of spawning Yellowstone cutthroat trout observed during weekly visual surveys of four West Thumb spawning stream tributaries to Yellowstone Lake, Yellowstone National Park, 1989–2024.

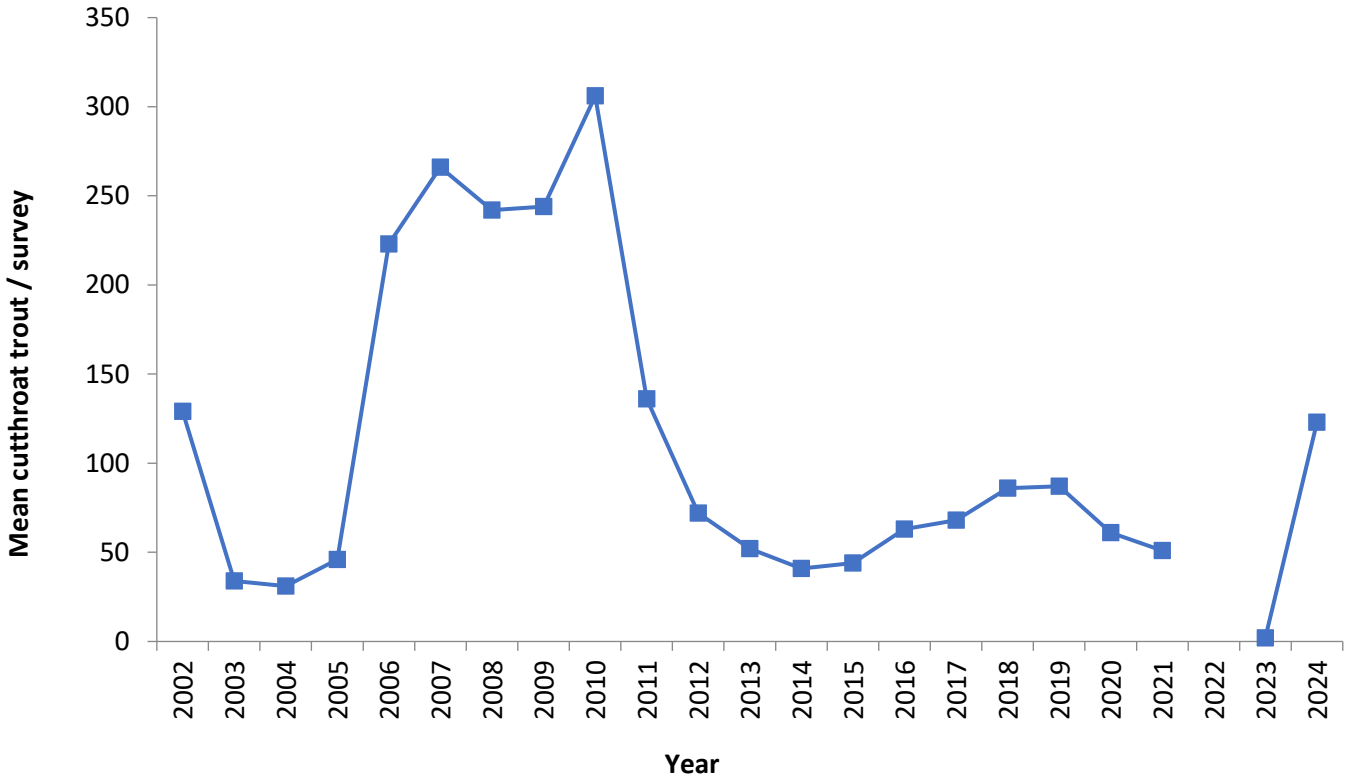

Fig. 18. Mean number of spawning Yellowstone cutthroat trout (including cutthroat × rainbow trout hybrids) observed during weekly visual surveys of the Trout Lake inlet creek, Yellowstone National Park, 1999–2024. Stream surveys were not conducted on the Trout Lake inlet creek in 2022 because the Tower to Northeast Entrance Road was washed out by a flood on June 13; the road did not reopen until November.

Grizzly Bear Use of Army Cutworm Moth Aggregation Sites

(Justin A. Dellinger, Wyoming Game and Fish Department; and Mark A. Haroldson, Interagency Grizzly Bear Study Team, U.S. Geological Survey)

Army cutworm moths (*Euxoa auxiliaris*; moths) were first recognized as an important food source for grizzly bears in the GYE during the mid-1980s (Mattson et al. 1991*b*, French et al. 1994). Early observations indicated that moths, and subsequently bears, showed site fidelity. These sites are generally high-alpine areas dominated by talus and scree adjacent to areas with abundant alpine flowers. We recognize that insects other than moths may be present and consumed by bears (e.g., ladybird beetles [Coccinellidae family]) as well, but within the GYE, observations indicate army cutworm moths are the primary insect food source (grizzly bears also forage on alpine vegetation at these sites).

Since the discovery of bears feeding at moth aggregation sites, numerous bears have been observed at or near these sites. Observability is high because of lack of tree cover and the number of bears using the sites. However, complete tabulation of grizzly presence at moth sites is extremely difficult. Only a few sites have been investigated by ground reconnaissance, and the boundaries of sites are not clearly known. In addition, it is likely the size and location of aggregation sites fluctuate from year to year with moth abundance and variation in environmental factors such as snow cover.

Our knowledge of these sites has increased over time, as have techniques for monitoring their use by grizzly bears. We developed a technique in 2000 that delineates sites by buffering only the locations of bears observed actively feeding at moth aggregation sites by 500 m; this distance was used to account for errors in aerial locations. The borders of the overlapping buffers at individual moth sites are dissolved to produce a single polygon for each site. These sites are identified as "confirmed" sites. Because these polygons are only created around feeding locations, the resulting site conforms to the topography of the mountain or ridge top where bears feed and does not include large areas of non-talus habitat that are not suitable for moths. Records from the grizzly bear location database from July 1 through September 30 of each year are then overlaid on these polygons and enumerated. "Possible" moth aggregation sites are identified as previously confirmed sites, sites with only one observation of an actively feeding bear, or sites with multiple observations of bears in a single year. These sites are then monitored in subsequent years for additional observations of actively feeding bears, and if substantiated, are added to the confirmed sites list. When the status of a site is changed to confirmed, analysis is done on all data back to 1986 to determine the historical use of that site. Therefore, the number of bears using moth aggregation sites in past years may change as new sites are added, and data from this annual report may not match those of past reports. New observations of grizzly bears actively feeding in previously undocumented areas will be added as possible sites and monitored for future use. In addition, as new observations of actively feeding bears are added along the periphery of existing sites, the polygons defining these sites increase in size and, thus, more overlaid locations fall within the site. This retrospective analysis brings us closer each year to the "true" number of bears using moth aggregation sites in past years.

As with 2023, only one round of grizzly bear observation flights was flown in 2024. Thus, the number of hours flown over moth aggregation sites was again reduced compared to pre-2020 flight totals. Most observation flights (71%) were conducted with a secondary observer in addition to the pilot. Analysis of grizzly bear use of moth aggregation sites in 2024 from observation flights resulted in 162 observations of actively feeding grizzly bears on previously identified, confirmed sites. We recorded another 159 observations of grizzly bears present at confirmed sites, for a total of 321 observations of grizzly bears on moth sites. We detected a new possible site and merged two previously existing confirmed sites. Thus, although there were no new confirmed sites added from our 2024 efforts, assessment of the data now indicates the number of sites is 35 confirmed and 20 possible. Note that associated tables and figures have been upgraded to reflect these changes.

Overall, the number of grizzly bear locations on moth aggregation sites in 2024 (n = 397) was an increase from 2023 and is a new record high (Table 20). This number includes all grizzly bear locations from aerial observation flights, telemetry flights, and observations made during flights for other species. The number of grizzly bears documented on sites and the percentage of confirmed sites with documented use by grizzly bears varies from year to year and may be an indicator that moth numbers are greater in some years than others (Fig. 19). We have no information as to the number of moths migrating to the GYE, but we did see an obvious

decline in the number of confirmed moth sites used by bears in 1993 because snow cover persisted on most of the sites throughout the moth season (Fig. 19, Table 20). In all other years, the percentage of moth aggregation sites used by grizzly bears varied between 47% and 83% (Fig. 19). Regardless, it is important to note that the relationship between annual moth abundance on moth sites and annual grizzly bear counts remains unknown, primarily because little to no data are available on moth abundance at these sites.

However, when we control for the amount of observation effort by including only bears observed during regularly conducted observation flights (see "***Observation Flights***"), the number of bears observed at insect aggregation sites per hour of flights has shown an overall increasing trend since these flights began in 1997 (Fig. 20). Whereas the number of bears observed per hour in 2024 was slightly above the average for the previous 10 years, the number of hours flown was 10% lower than years in which two rounds of flights were conducted. Thus, like in 2023, the number of observations per hour flown was higher in 2024 than in previous years when two rounds of flights were conducted (Fig. 20).

Table 20. Summary statistics for grizzly bear use of confirmed army cutworm moth aggregation sites, Greater Yellowstone Ecosystem, 1986–2024.

Year	Confirmed aggregation sites[a]	Sites used[b]	Aerial telemetry locations	Ground or aerial observations
1986	4	2	7	5
1987	5	3	3	17
1988	5	3	11	28
1989	9	7	9	41
1990	14	11	9	77
1991	16	13	13	169
1992	18	12	6	108
1993	19	3	1	2
1994	19	9	1	32
1995	21	12	7	40
1996	23	15	21	68
1997	24	16	17	84
1998	27	22	9	185
1999	27	14	26	156
2000	27	13	49	97
2001	28	18	23	128
2002	30	21	33	256
2003	30	20	9	163
2004	30	16	2	134
2005	32	19	16	198
2006	32	17	15	147
2007	32	19	19	162
2008	32	23	16	181
2009	34	23	12	170
2010	34	18	3	136
2011	35	22	10	165
2012	35	24	20	253
2013	35	23	27	297
2014	35	24	11	343
2015	35	21	13	211
2016	35	20	11	208
2017	36	22	20	280

Table 20. Summary statistics for grizzly bear use of confirmed army cutworm moth aggregation sites, Greater Yellowstone Ecosystem, 1986–2024.

Year	Confirmed aggregation sites[a]	Sites used[b]	Aerial telemetry locations	Ground or aerial observations
2018	36	20	18	267
2019	36	30	20	336
2020	36	27	19	325
2021	36	23	30	327
2022	36	24	84	230
2023	36	21	51	303
2024	35	23	72	325
Total			743	6,654

[a] The year of discovery was considered the first year a telemetry location or aerial observation was documented at a site. Sites were considered confirmed after additional locations or observations in a subsequent year and every year thereafter regardless of whether or not additional locations were documented.
[b] An aggregation site was considered used if ≥1 location or grizzly bear observation was documented within the site during July–September of that year.

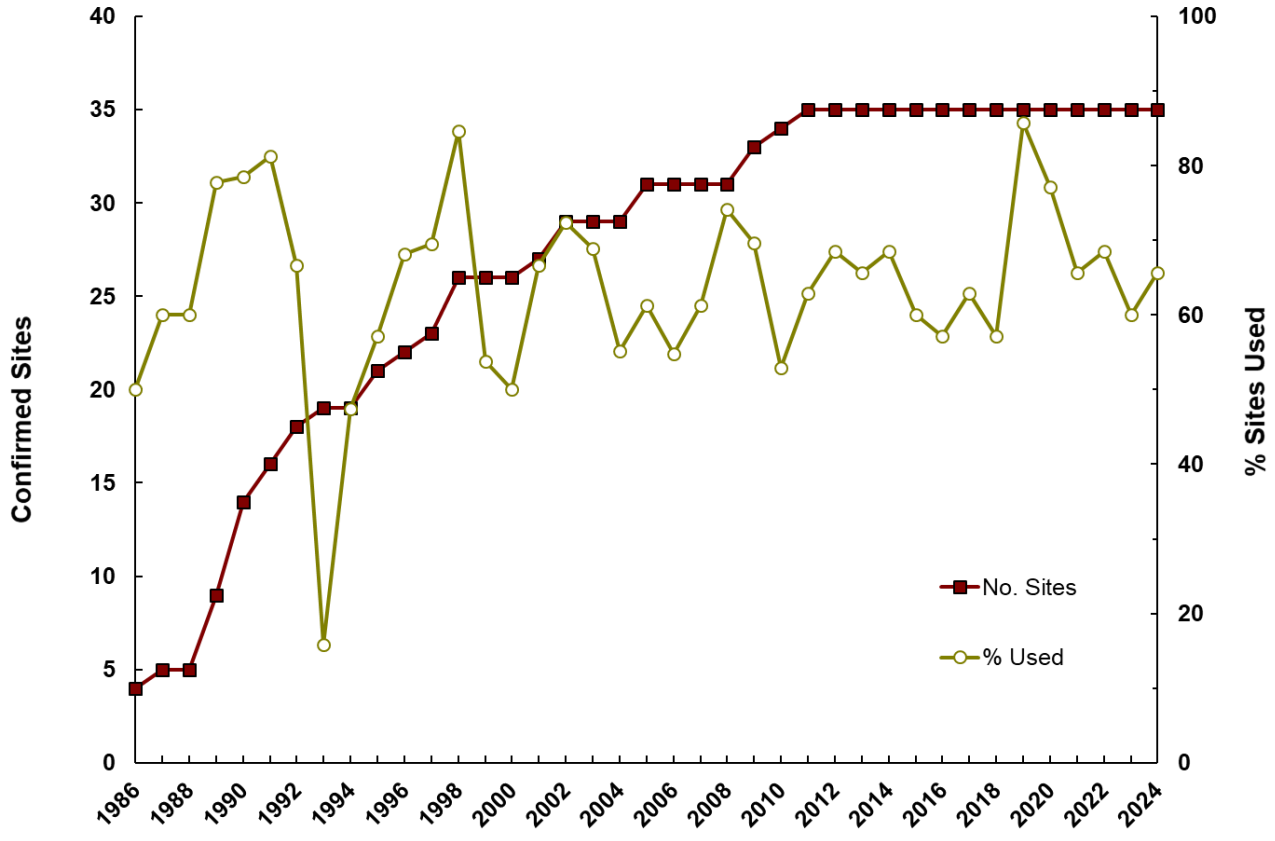

Fig. 19. Annual number of confirmed insect aggregation sites and percent of those sites at which telemetry relocations of marked bears or visual observations of unmarked bears were recorded, Greater Yellowstone Ecosystem, 1986–2024.

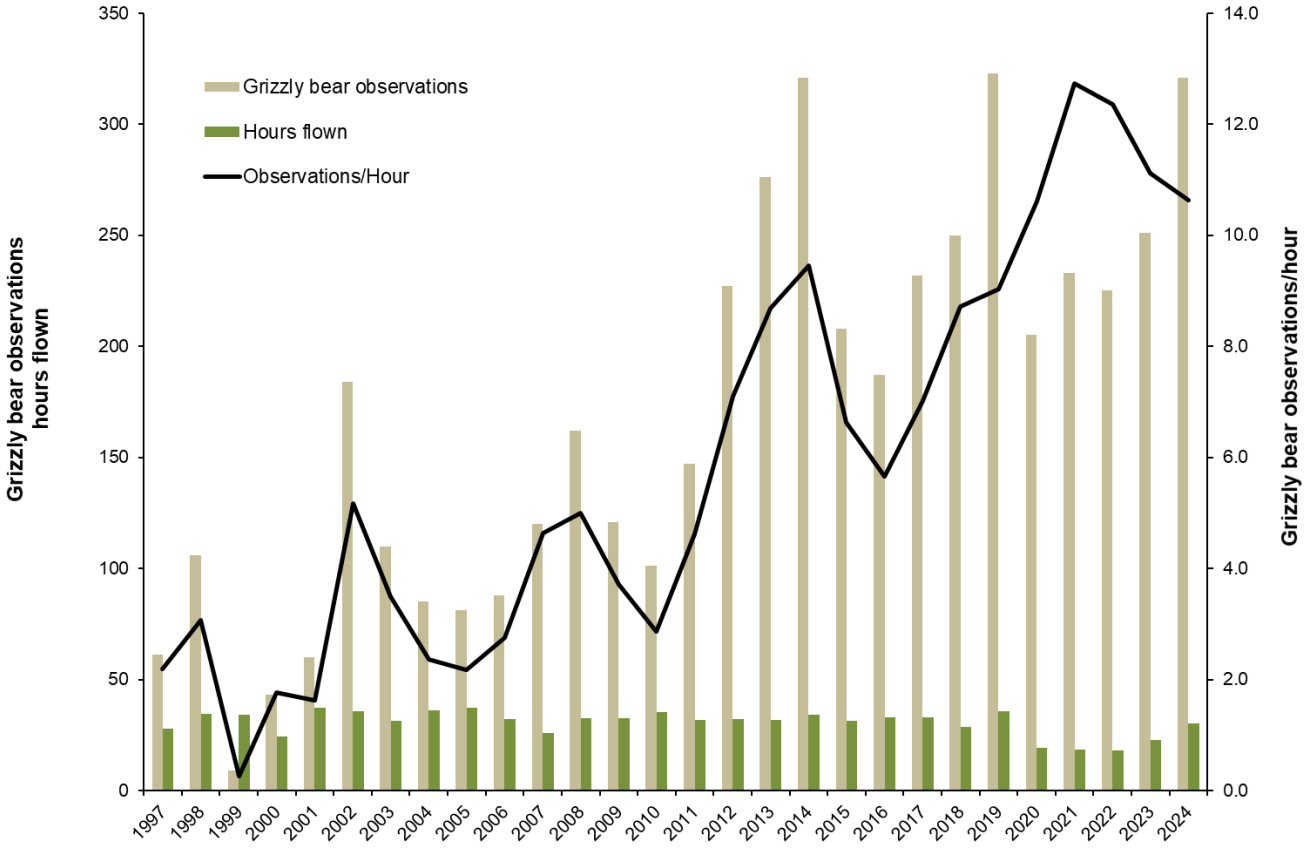

Fig. 20. Number of grizzly bears observed (tan bars) on insect aggregation sites during observation flights only, survey hours (green bars) for these bear management units (BMU), and grizzly bear observations per survey hour (black line) during observation flights of BMUs containing all known insect aggregation sites, Greater Yellowstone Ecosystem, 1997–2024.

Whitebark Pine Cone Production

(Bryn E. Karabensh and Mark A. Haroldson, U.S. Geological Survey, Interagency Grizzly Bear Study Team)

Whitebark pine (*Pinus albicaulis*) nuts provide a high-calorie food source for grizzly bears during late summer and fall. Whitebark pine trees have experienced substantial mortality throughout the GYE since the early 2000s, primarily due to mountain pine beetle (*Dendroctonus ponderosae*), blister rust (*Cronartium ribicola*), and fire. Whitebark pine surveys were conducted on 21 established transects and results indicated above average cone production for 2024 (Fig. 21). Cone production was comparable in northern transects to southern transects (Fig. 21, Table 21). Overall, the mean number of cones per tree was 24 (Table 22), whereas the long-term average for the period 1980–2024 was 17 cones per tree (Fig. 22).

Occasional tree mortality caused by mountain pine beetle may still occur in stands that contain the cone production transects. During 2024, we observed no additional beetle-caused mortality among individual trees surveyed since 2002. However, we did observe two additional mortalities from unknown causes. Total mortality on transect trees since 2002 is now 79% (150/190) with 100% (19/19) of transects containing beetle-killed trees. Cumulative mortality among the original 190 trees has been minimal for most of the last decade (Fig. 23). Similar to findings reported by the Greater Yellowstone Whitebark Pine Monitoring Working Group, these data support the interpretation that the mountain pine beetle outbreak that started around 2000 has run its course. However, data collected since 2019 provide evidence of increased pine beetle activity and associated tree mortality in portions of the ecosystem (Bockino et al. 2023).

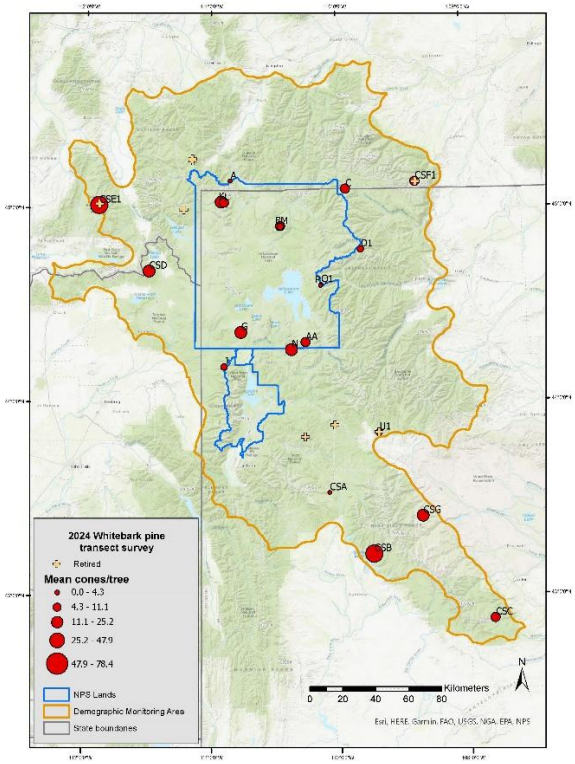

Fig. 21. Locations and mean number of cones per tree for 21 whitebark pine cone production transects, Greater Yellowstone Ecosystem, 2024. Labels reflect transect identifiers (see Table 22). Base map source: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, ©OpenStreetMap contributors, and the GIS User Community.

Table 21. Results of whitebark pine cone production surveys, Greater Yellowstone Ecosystem, 2024.				
Transect	**Cones**	**Trees**	**Mean cones/tree**	**Standard deviation**
A	17	4	4.3	5.4
B	236	10	23.6	8.8
C	210	10	21.0	13.5
D1	71	10	7.1	6.2
G	334	10	33.4	32.2
J	77	10	7.7	10.4
K	228	7	32.6	6.0
L	125	6	20.8	13.7
M	111	10	11.1	7.7
N	479	10	47.9	43.1
P	14	10	1.4	1.3
Q1	22	10	2.2	2.9
U1	100	10	10	10
AA	252	10	25.2	15.1
CSA	10	10	1.0	1.6
CSB	596	10	59.6	42.8
CSC	204	10	20.4	24.7
CSD	293	10	29.3	20.1
CSE1[b]	784	10	78.4	45.6
CSF1[a]	246	10	24.6	16.8
CSG	201	10	30.8	20.0

[a] Retired transect CSF replaced with CSF1 in 2020.
[b] Retired transect CSE replaced with CSE1 in 2023.

Table 22. Summary statistics for whitebark pine cone production surveys, Greater Yellowstone Ecosystem, 2024.										
Total			**Trees**				**Transect**			
Cones	**Trees**	**Transects**	**Mean cones**	**Standard deviation**	**Min**	**Max**	**Mean cones**	**Standard deviation**	**Min**	**Max**
4,717	197	21	23.9	28.7	0	169	219.5	194.3	10	784

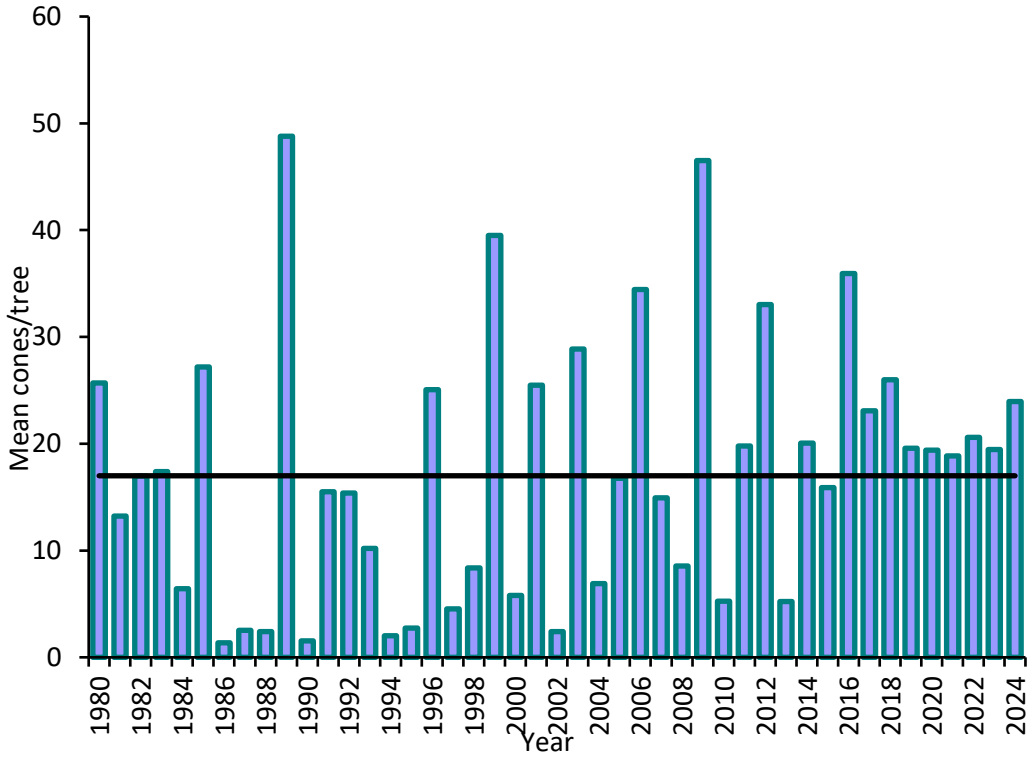

Fig. 22. Annual mean number of cones per tree observed along whitebark pine cone production transects, Greater Yellowstone Ecosystem, 1980–2024. The overall average for the time period (17 cones per tree) is shown as a solid black line.

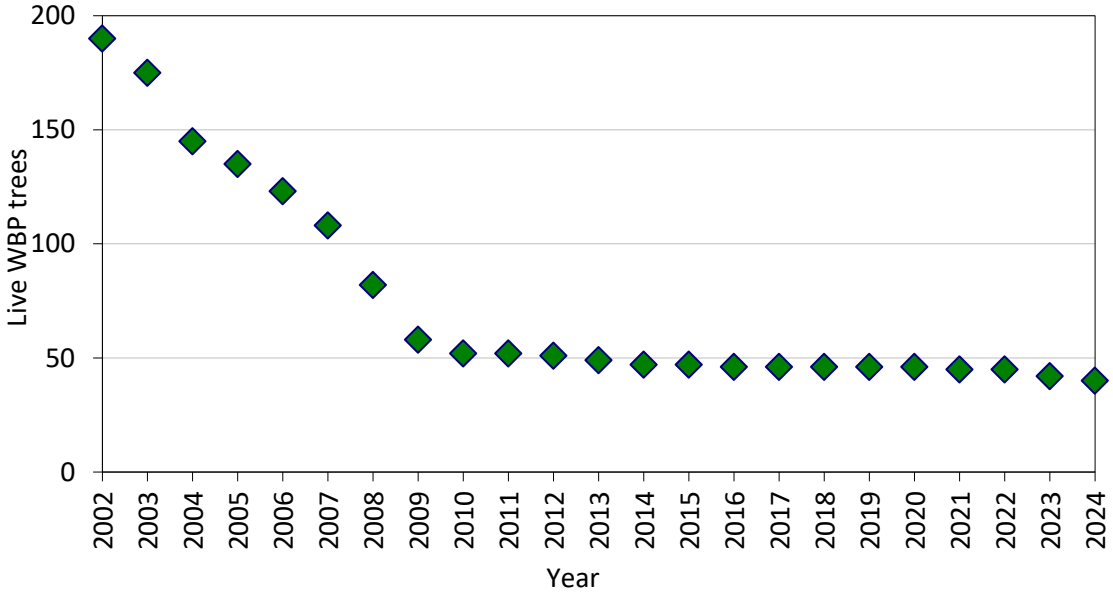

Fig. 23. Number of live whitebark pine (WBP) trees on cone production transects among 190 individual trees monitored since 2002, Greater Yellowstone Ecosystem, 2002–2024.

Ungulate Herd Statistics

(Dan J. Thompson, Wyoming Game and Fish Department; Cade Bowlin, Idaho Department of Fish and Game; Jeremiah Smith, Montana Fish, Wildlife and Parks; Kerry A. Gunther, National Park Service; and Katharine R. Wilmot, National Park Service)

We provide the following agency web links for readers as a resource to obtain statistics and data regarding the status, distribution, and harvest of ungulate herds within the GYE:

Idaho Department of Fish and Game:
https://idfg.idaho.gov/ifwis/huntplanner/stats/?season=general&game=elk&yr=2023

Montana Fish, Wildlife and Parks:
https://fwp.mt.gov/binaries/content/assets/fwp/conservation/elk/2023-montana-elk-counts.pdf

(under Elk Population Status for HD 313)
https://fwp.mt.gov/conservation/wildlife-management/elk

Wyoming Game and Fish Department:
https://wgfd.wyo.gov/hunting-trapping/harvest-reports-surveys

https://wgfd.wyo.gov/media/29195/download?inline

Grand Teton National Park
https://www.nps.gov/grte/learn/nature/vital-signs.htm

Yellowstone National Park
Bison: https://www.nps.gov/yell/learn/management/bison-management.htm

Recreation Monitoring

Grand Teton National Park Recreation Use

(Justin K. Schwabedissen and Katharine R. Wilmot, Grand Teton National Park)

Grand Teton National Park (GTNP) encompasses 125,710 hectares of occupied grizzly bear habitat in the GYE. Most of the land in the park is undeveloped. Over half of the park (52%) is designated as recommended wilderness and managed as wilderness lands in accordance with NPS policy. In addition, 33% of GTNP is included within the GBRZ established by the USFWS.

GTNP manages visitors and bears across three broad zones: developed areas, road corridors, and backcountry. Developed areas are generally managed for people to the exclusion of bears to reduce the risk of human-bear conflicts. Although bears are allowed to transit through developed areas, lingering is not tolerated. Within roadway corridors, bears are allowed access to roadside habitats for foraging and other natural behaviors. When safe to do so, visitors are allowed an opportunity to view bears within roadway corridors at a minimum 100-yard viewing distance. In the backcountry zone, bears are generally given priority in recreation management decisions where bear and human activities are not compatible. Park staff proactively implement seasonal recreational use restrictions and temporary closures for known high-use bear areas. Backcountry camping in the park requires a permit and is managed using a quota system.

In 2024, 5,156,987 total visits occurred in GTNP, including recreational, commercial (e.g., Jackson Hole Airport), and incidental (e.g., traveling through the park on U.S. Highway 89/191 but not recreating) use. Recreational visits totaled 3,628,222, which is the second highest year on record (Table 23). Most visitation occurred in the summer. However, as visitor use patterns continue to change in GTNP, the timing of recreational visits throughout the year is also evolving. In recent years, months of peak visitation have shifted later to July, August, and September.

Using trail counters at key summer destinations, GTNP has documented an estimated 34% increase in trail use over the last ten years. However, GTNP recorded a decreasing number of backcountry user nights (38,830) in 2024, which marked a 7% decrease from 2023. In addition to recreational interest within the park's backcountry, front-country camping also remains popular. There were 355,079 overnight stays in front-country campgrounds in 2024, the sixth highest year on record. Long- and short-term trends of recreational visitation and backcountry user nights are shown in Table 24 and Fig. 24. Because of slight revisions in data from previous years, visitor use numbers in this report may differ from earlier reports. The data included here are consistent with the latest, publicly available information found at: https://irma.nps.gov/STATS/Reports/Park/GRTE.

Table 23. Ten highest years for recreational visits to Grand Teton National Park, 1979–2024.		
Rank	**Year[a]**	**Recreational visits**
1	2021	3,885,230
2	2024	3,628,222
3	2018	3,491,151
4	2023	3,417,106
5	2019	3,405,614
6	2017	3,317,000
7	2020	3,289,638
8	2016	3,270,076
9	2015	3,149,921
10	2022	2,806,223

[a] Grand Teton National Park did not differentiate between recreational and non-recreational visits until 1979.

Table 24. Average annual recreational visits and backcountry user nights by decade in Grand Teton National Park, 1950–2019.		
Decade	**Average annual recreational visits[a]**	**Average annual backcountry user nights**
1950s	1,102,518	Data not available
1960s	2,326,580	Data not available
1970s	2,689,306	Data not available
1980s	1,728,218	22,614
1990s	2,362,833	28,592
2000s	2,497,899	27,515
2010s	3,007,602	33,400

[a] Grand Teton National Park did not differentiate between recreational and non-recreational visitation until 1979. In 1983 and 1992, the park updated methods for counting visitation. These updates may be the cause of certain large fluctuations in visitation numbers between years. Therefore, park-wide visitation data are not strictly comparable between years of different counting methods.

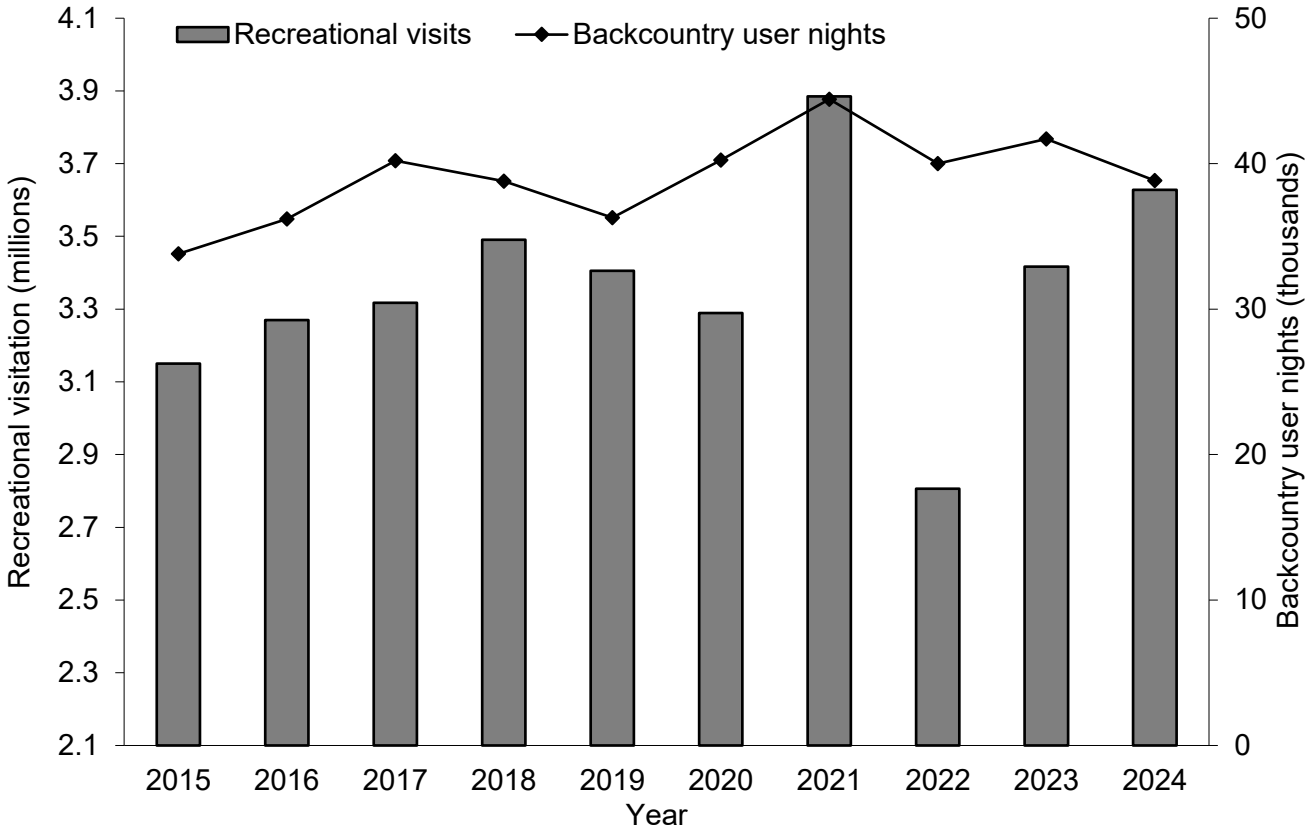

Fig. 24. Trends in recreational visitation and backcountry user nights in Grand Teton National Park, 2015–2024.

Yellowstone National Park Recreational Use

(Kerry A. Gunther, Yellowstone National Park)

Yellowstone National Park (YNP) encompasses 899,139 ha in the core of occupied grizzly bear habitat in the GYE. Most (~99%) of YNP is relatively pristine, undeveloped land; 92% of the park has been recommended for wilderness designation and, by NPS policy, is managed so as not to preclude that designation in the future (NPS 1974, 2006). Only ~1% of the park's natural landscape has been substantially altered through construction of roads, buildings, and developments. YNP is located entirely within the boundaries of the GBRZ in the GYE (USFWS 1993). Therefore, the habitat protections implemented through the 2024 Conservation Strategy for Grizzly Bears in the GYE apply to all lands within the park (Yellowstone Ecosystem Subcommittee 2024).

The NPS is mandated to preserve the cultural and natural resources of YNP unharmed for the benefit and enjoyment of future generations. This mandate requires protecting the ecological integrity of the park and providing recreational experiences for visitors on a landscape shared with grizzly bears. Visitor activities are carefully regulated to ensure minimal impacts to free-ranging grizzly bears and their habitat. Visitors and bears in the park are managed in three broad zones: developed areas, road corridors, and backcountry/proposed wilderness. Each zone has different strategies for managing the human-bear interface (Table 25). Human activities are prioritized in developed areas, road corridors are managed for use by both visitors and bears, and bears are generally given priority in backcountry areas. Bear-proof garbage cans and dumpsters are provided in all front-country areas (developed areas, road corridors, and vehicle-accessible campgrounds).

Recommended wilderness status protects 92% of the grizzly bear habitats in YNP from construction of roads and developments. To further reduce disturbances to bears in important backcountry habitat and prevent their displacement from high-quality food resources, YNP has also designated 16 Bear Management Areas encompassing 188,032 ha (21% of the park) of the highest-quality bear habitats within the park. Recreational activity is limited within Bear Management Areas through a variety of seasonal trail, campsite, and area closures, no off-trail travel requirements, and prohibitions of backcountry travel during nocturnal and crepuscular time periods implemented during periods when bear activity is concentrated on specific high-quality foods in predictable locations. Backcountry recreation related disturbance of bears is further reduced by implementing a designated backcountry campsite system in the park. The designated backcountry campsite system limits the number of people and parties that can camp in the backcountry each night, thereby reducing the frequency of human-bear encounters. In addition, by making overnight recreational activity more predictable to bears, the designated backcountry campsite system reduces the potential for confrontations at campsites. The danger of bear-human confrontations and bear-inflicted human injuries decreases when grizzly bears know where to expect people (Herrero 2002). Bear-resistant food storage devices (food hanging poles or bear-proof food storage lockers) are provided at every designated backcountry campsite making bear-resistant food storage easy and convenient, thereby reducing the frequency that bears obtain human foods, cause conflicts in campsites, and need to be killed in subsequent management actions.

Total visitation to the park in 2024 was 5,989,787 visits (https://irma.nps.gov/STATS/Reports/Park/YELL), including recreational and non-recreational use. Recreational visits in 2024 totaled 4,744,353 (Table 26). Most of the park's recreational visitation in 2024 occurred during the 6-month period from May through October, the same period all sex and age classes of grizzly bears are out of their winter dens and active on the landscape. In 2024, there were 4,496,133 recreational visits (95%) during those peak months, an average of 24,569 recreational visits per day. Park visitors spent 536,215 overnight stays in roadside campgrounds, and 37,257 overnight stays in remote backcountry campsites and dispersed camping zones in the park.

Average annual recreational visitation has increased from 7,378 visits per year during the late 1890s to 4,240,564 visits per year during 2020–2024 (Table 27, Fig. 25). Temporary closures of the park and park campgrounds during the 2020 COVID pandemic year and the spring flood of 2022 resulted in fewer park visits and overnight stays in roadside campgrounds during those years (Table 27, Fig. 26). Although total park recreational visitation has increased steadily over time, the average number of overnight stays in backcountry areas, the most important bear habitats in the park, has been relatively stable, ranging from 38,525 to 45,615

overnight stays per year per decade (Table 27, Fig. 27). The number of overnight stays in the backcountry is limited by the number and capacity of designated backcountry campsites in the park.

Table 25. Management zone, proportion of park within the management zone, and management prescription for the visitor-bear interface in Yellowstone National Park.

Management zone	Area	Management prescription
Developments	2,212 ha (5,467 acres) (<1% of park)	• Managed for people to the exclusion of bears • Bears conditioned to human foods are removed (euthanized or sent to zoos) • Visitors are given priority when visitor and bear activities are not compatible
Road corridors	654 ha (1,617 acres) (<1% of park)	• Managed for transportation, bear viewing, and bear use of roadside habitats • Bears are tolerated in roadside habitats for foraging and other natural behaviors • Habituation of bears to people is expected • Bears conditioned to human foods are removed
Wilderness and undeveloped lands	886,552 ha (2,190,718 acres) (~99% of park)	• Managed primarily for bears and other wildlife • Overnight visitation is capped by a limited number of designated backcountry campsites and campsite capacity limits • Most recreational day use is <5 km (3 miles) from roads • Implementation of seasonal recreational closures and restrictions for high use bear areas • Bears are generally given priority in recreation management decisions where bear and human activities are not compatible • Bears conditioned to human foods are removed

Table 26. Ten highest years for recreational visits to Yellowstone National Park, 1872–2024.

Rank	Year	Visitation
1	2021	4,860,537
2	2024	4,744,353
3	2023	4,501,382
4	2016	4,257,177
5	2017	4,116,525
6	2018	4,114,999
7	2015	4,097,710
8	2019	4,020,287
9	2020	3,806,306
10	2010	3,640,184

Table 27. Average annual recreational visitation, auto campground overnight stays, and backcountry campsite overnight stays by decade, Yellowstone National Park, 1895–2024.			
Decade	**Average annual number of recreational visits**	**Developed campground average annual overnight stays**	**Backcountry campsite average annual overnight stays**
1890s	7,378[a]	Data not available	Data not available
1900s	17,110	Data not available	Data not available
1910s	31,746	Data not available	Data not available
1920s	157,676	Data not available	Data not available
1930s	300,564	82,331[b]	Data not available
1940s	552,227	139,659[c]	Data not available
1950s	1,355,559	331,360	Data not available
1960s	1,955,373	681,303[d]	Data not available
1970s	2,240,698	686,594[e]	45,615[f]
1980s	2,344,485	656,093	39,280
1990s	3,012,653	647,083	43,605
2000s	2,968,037	624,450	40,362
2010s	3,779,045	720,875[g]	41,637
2020–2024	4,240,564	498,207[h]	38,525

[a] Data from 1895–1899. During 1872–1894, visitation was estimated to be not fewer than 1,000 and no more than 5,000 each year.

[b] Data from 1930–1934.

[c] Average does not include data from 1940 and 1942.

[d] Data from 1960–1964.

[e] Data from 1975–1979.

[f] Backcountry campsite use data available for 1972–1979.

[g] The Fishing Bridge Recreational Vehicle Campground was closed in 2019 for remodeling.

[h] The Norris Campground was closed during 2020–2024. The Fishing Bridge Recreational Vehicle Campground was closed in 2020 and 2021 for remodeling. The Tower Fall Campground was closed from 2020 - 2024 due to a road reconstruction project. The Pebble Creek Campground was closed during 2022–2024 due to flood damage. The Slough Creek, Mammoth, and Indian Creek Campgrounds were closed in 2022 due to flood damage to the campgrounds or associated utility infrastructure.

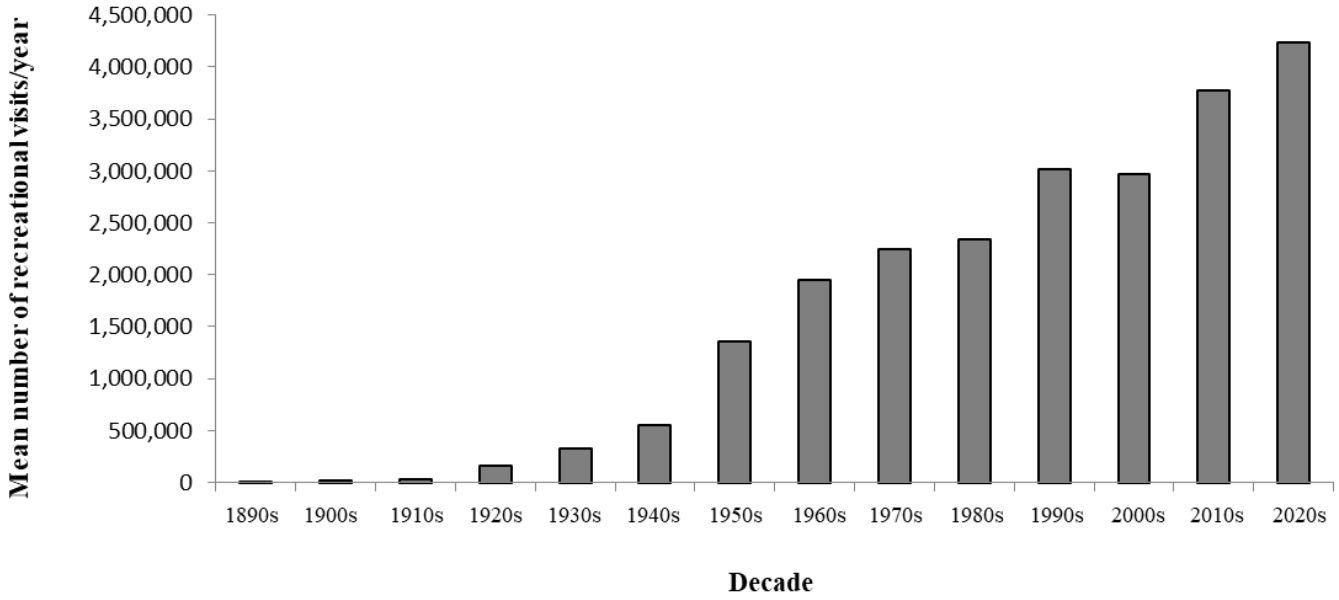

Fig. 25. Average annual number of recreational visits per year by decade, Yellowstone National Park, 1895–2024.

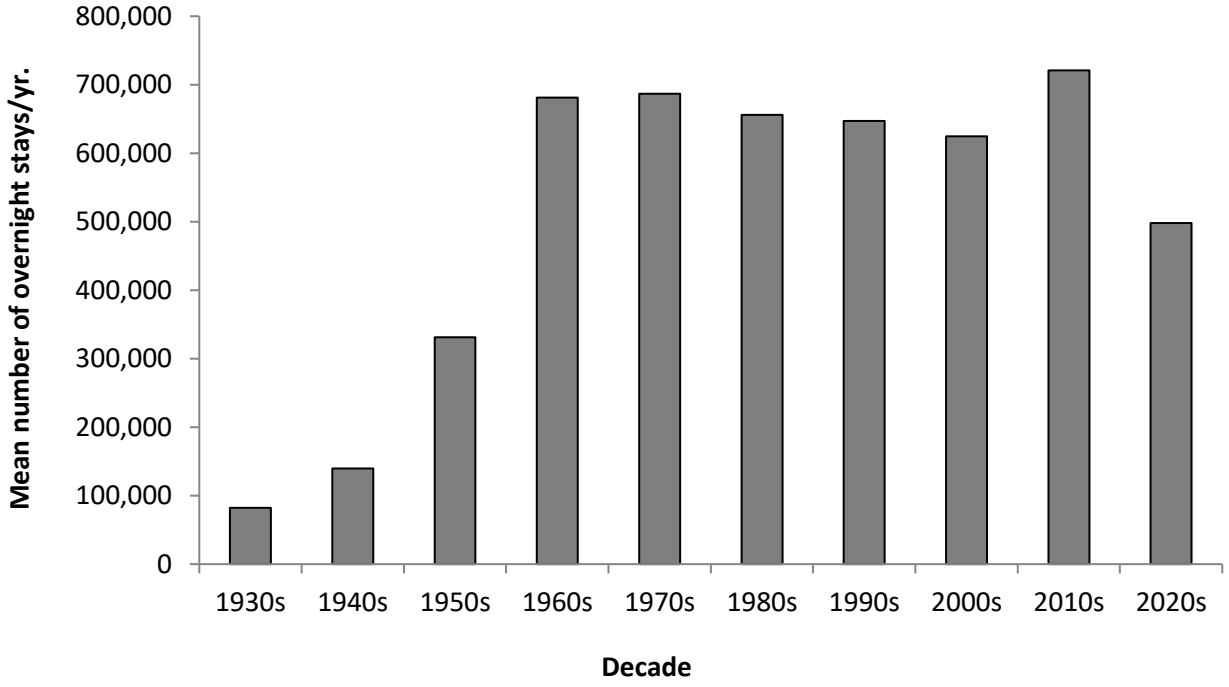

Fig. 26. Average annual number of overnight stays in roadside campgrounds per year by decade, Yellowstone National Park, 1930–2024.

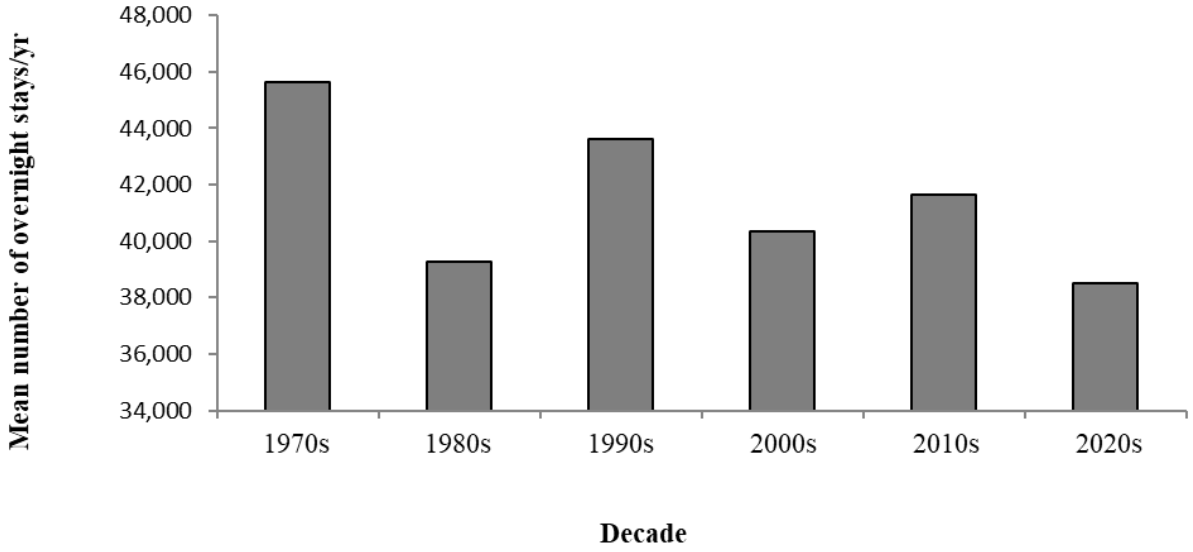

Fig. 27. Average annual number of overnight stays in backcountry campsites and dispersed camping zones per year by decade, Yellowstone National Park, 1972–2024.

Human-Grizzly Bear Conflicts in the Greater Yellowstone Ecosystem

Human-Grizzly Bear Conflicts in Grand Teton National Park and the John D. Rockefeller, Jr. Memorial Parkway

(Justin K. Schwabedissen and Katharine R. Wilmot, Grand Teton National Park)

Park staff recorded two human-grizzly bear conflicts in Grand Teton National Park (GTNP) and the John D. Rockefeller, Jr. Memorial Parkway (JDR) in 2024. In May, a visitor hiking off-trail surprised at least two grizzly bears, possibly a female with at least one yearling cub. The larger bear reacted defensively and mauled the visitor, inflicting non-life-threatening injuries. The second conflict incident involved a grizzly bear entering an occupied lakeshore campsite and damaging camping and paddling equipment. After both incidents, park staff instituted temporary area closures and increased monitoring of the respective areas. No direct action against the bears involved was deemed necessary.

With visitor-use patterns continuing to evolve in GTNP, management of the human-bear interface requires considerable effort to maintain a low level of conflicts. To help facilitate safe interactions between visitors and wildlife, GTNP fielded the Wildlife Brigade to provide dedicated personnel to manage the human-bear interface. In 2024, the team was composed of one permanent bear biologist, two seasonal wildlife management rangers, 32 volunteers, and two interns. The Wildlife Brigade managed a minimum of 512 bear jams (224 grizzly bear, 254 black bear, and 34 occasions where a bear of unknown species had departed prior to staff arrival), which resulted when non-food-conditioned, habituated bears frequented roadway corridors drawing crowds of wildlife watchers. Most grizzly bear jams occurred in late spring and early summer with a second peak during the fall. In accordance with the park's hazing policy, grizzly bears were hazed out of developed areas on seven occasions and off roadways 20 times.

The Wildlife Brigade, in addition to law enforcement rangers, interpretative staff, and supplementary volunteer teams, patrolled campgrounds, picnic areas, and other front country areas for unsecured attractants and to educate visitors about food storage requirements. Additionally, the Wildlife Brigade staffed a bear education trailer at a popular roadside turnout, educating thousands of visitors on bear ecology, safety in bear country, and proper use of bear spray. In total, Wildlife Brigade volunteers contributed over 12,000 hours toward bear conservation efforts within the park in 2024. Complementing these efforts, interpretative staff provided bear safety information and bear spray demonstrations at park visitor centers.

GTNP continued its partnership with the Grand Teton National Park Foundation to cost-share expenses associated with the purchase of bear-resistant food storage lockers (i.e., bear boxes). This collaboration has allowed the park to install 1,093 modern bear boxes in campgrounds and other front country sites since 2008. Once final installations are completed in Jenny Lake Campground in 2025, a modern bear box will be available in every campsite in every front country campground in GTNP and the JDR.

Human-Grizzly Bear Conflicts in Yellowstone National Park

(Kerry A. Gunther, Travis C. Wyman, and Eric G. Reinertson, Yellowstone National Park)

Management Strategy

Yellowstone National Park's management strategy for reducing human-grizzly bear conflicts and human causes of grizzly bear mortality places substantial emphasis on prevention of conflicts rather than post-conflict management (e.g., capture and relocation) of bears. Relocation of conflict bears was a common management practice in the park for the first 25 years after grizzly bears were listed as a federally threatened species in 1975. Although success rates were low (Cole 1971, Brannon 1987, Craighead et al. 1995, Blanchard and Knight 1995), relocations deferred removals of some adult females long enough for completion of additional reproductive cycles, thereby contributing to population recovery and range expansion. However, because of its demonstrated low long-term efficacy, relocation was deemphasized as a management tool in the late 1990s when grizzly bears in the national park began showing signs of biological recovery and density-dependent effects on demographics (Schwartz et al. 2006, van Manen et al. 2016).

Grizzly bears have strong fidelity to their established home ranges where they know their standing in the local social hierarchy and are familiar with the locations and seasonal availability of the food resources (Craighead et al. 1995). Grizzly bears also have a remarkable homing ability (Cole 1972, Craighead and Craighead 1972, Miller and Ballard 1982). Therefore, relocation as a management tool works best when conflict bears are moved long distances into high-quality habitats in areas with low risk for repeat conflicts (Brannon 1987, Blanchard and Knight 1995, Stenhouse et al. 2022). Choosing release sites with low densities of other bears to reduce density-dependent social intolerance and associated displacement and mortality may also improve relocation success rates (Davis 1949, Cole 1972, Rogers 1986, Riley et al. 1994). Yellowstone National Park is not geographically large enough to relocate grizzly bears far enough so that they do not return to the original conflict site (Cole 1972, Craighead and Craighead 1972) or have opportunity for further conflicts in the relocation area. Relocation distances of >100 km for males and >75 km for females, are needed to keep return rates <50% (Blanchard and Knight 1995). Those distances are not attainable within the park for grizzly bears captured at most of the park's developed areas and campgrounds, the sites where most conflicts occur. The farthest point from a road a conflict bear can be released in the park is 35 km; the farthest point from a development or campground a bear can be released is 41 km. Portions of the park also have among the highest densities of bears in the GYE (Gunther and Haroldson 2020) and the park receives millions of human recreational visits annually (*see Yellowstone National Park Recreational Use*), making it a poor candidate for relocation success.

Monitoring the fate of relocated bears on a long-term basis confirms very low success rates in the park. From 1975 to 2024, 36 grizzly bears involved in conflicts inside the park were captured and relocated to other areas of the park (Table 28). Of these bears, 26 (72%) were known to cause further conflicts after relocation. During the same period, an additional 95 grizzly bears involved in conflicts outside of the park were captured by state agencies and accepted for relocation into the park (Table 29). More than half (n = 51, 54%) of these bears were known to cause further conflicts after relocation. Of the 131 grizzly bears involved in conflicts and relocated within or into the park, we know the final fate of 67. Of these, 57 (85%) were removed (killed or sent to a zoo facility) in management actions (n = 47) or killed by the public in defense of life or property incidents (n = 10). Other causes of mortality for relocated bears included illegal killings (n = 6), being killed by a black bear hunter (n = 1) and being struck and killed by a vehicle (n = 1). Only 2 (3%) of the 67 bears with known fates that were relocated for causing conflicts died of natural causes; most (97%, n = 65) of the bears relocated for causing conflicts died from human causes after relocation.

The park's current strategy to reduce conflicts and human causes of mortality is an aggressive, proactive program focused on conflict prevention. This strategy is accomplished by: 1) providing park visitors with information on how to hike, camp, recreate, and store anthropogenic bear attractants in a manner that reduces the chances of human-bear conflicts; 2) implementing bear-resistant human food and garbage storage requirements through the Code of Federal Regulations and Superintendents Compendium; 3) providing park visitors with bear-proof infrastructure (e.g., bear-resistant garbage cans, dumpsters, and food storage devices) so food and garbage storage regulations are easy and convenient to comply with; 4) rigorously enforcing food and

garbage storage regulations through bear-attractant security patrols in front-country developed sites, roadside campgrounds, and backcountry campsites; and 5) fostering, through removal of human food-conditioned bears rather than relocation, a population of bears in the park that generally do not seek anthropogenic attractants or test bear-proof infrastructure.

Occasionally, park visitors fail to store food or garbage appropriately, park staff fail to detect or correct improperly stored anthropogenic attractants, or grizzly bears simply outsmart park visitors and national park staff or defeat food storage infrastructure and obtain human food rewards. In incidents where bears specifically seek out anthropogenic attractants or behave aggressively toward people, injure people, or damage property in their attempts to gain access to human foods (offensive aggression), the bears are generally killed, even if it is their first offense. However, in relatively benign incidents where bears inadvertently happen upon unsecured food, the bears are generally left to roam free on the landscape and management actions other than removal are taken. No action is taken against bears that injure people in defensive reactions to surprise encounters occurring in backcountry areas (defensive aggression). Although killing bears conditioned to human foods after just one aggressive conflict with people may seem severe, on a long-term basis this management strategy results in considerably fewer bear-human conflicts overall, and equally important, considerably fewer bears being killed in management actions to address conflicts. This management strategy promotes and favors occupation of available habitat by bears that do not seek anthropogenic foods. In contrast, tolerance and overprotection of human food-conditioned bears can promulgate a population where conflict behaviors become so pervasive as to result in the development of a tradition or culture of conflict behaviors in a large segment of the bear population. Bears that supplement natural foods with anthropogenic food sources can attain larger body sizes, better body condition, faster maturation, earlier age of first reproduction, shorter inter-birth interval, and better cub nutrition, likely giving human food-conditioned bears a competitive advantage over non-food-conditioned bears. Over the long term, that competitive advantage could result in bears that cause conflicts replacing non-conflict bears in the population.

Bears exhibit social learning behavior (Gilbert 1999, Mazur and Seher 2008, Morehouse et al. 2016). Human food-conditioned bear foraging behavior is often transmitted through social learning from mother bears to cubs, and from their grown female offspring to their cubs and future cubs (Cole 1976, Gilbert 1999, Mazur and Seher 2008). Cubs learn foods by watching their mothers and sharing their mother's food during the 1.5–3.5 years spent under her care (Meagher and Fowler 1989, Gilbert 1999). Park managers attempt to break the chain of learned conflict behavior passed from mothers to offspring and grown adult female offspring to future offspring (Cole 1976, Meagher and Fowler 1989). Breaking the sequence of learned conflict behaviors is important so that behaviors, such as damaging property or injuring people to obtain anthropogenic foods, do not persist across multiple generations of matriarchal lineages in a large segment of the bear population (Mazur and Seher 2008). Once a conflict bear has been removed, the next bear to reoccupy that habitat, area, or general range may be an immigrating subadult that exhibits wild behaviors rather than human food-conditioned conflict behaviors (Cole 1976, Meagher and Fowler 1989). If the next bear to occupy the area exhibits conflict behaviors, it is also removed. With a foundation of bear-proof infrastructure, effective educational efforts, and enforcement of food and garbage storage regulations, eventually the area will be re-occupied by a dispersing subadult exhibiting wild behaviors. By consistently implementing this strategy over the long term, a population of bears once dominated by a culture of conflict behaviors, such as bears in YNP during the 1930s–1960s (Cole 1971, 1976, Meagher and Phillips 1983, Schullery 1992, Wondrak Biel 2006), can be converted to and maintained as a population composed of individuals exhibiting primarily wild behaviors (Cole 1976), such as bears in the park from the 1980s to the present (Meagher and Phillips 1983, Gunther 1994, Garshelis et al. 2017, Gunther et al. 2018). The removal of bears conditioned to human foods and exhibiting conflict behaviors allows young bears not conditioned to human foods to recruit into and progressively replace conflict bears in the local population (Cole 1976, Meagher and Fowler 1989). Occasional removals of food-conditioned bears will still sometimes be necessary, as the opportunistic behavior of bears can periodically reestablish conflict behaviors in some bears (Mazur and Seher 2008).

The described management strategy has been highly successful at reducing grizzly bear-human conflicts and management removals of grizzly bears on national park lands where bear-proof infrastructure is provided and there is rigorous enforcement of food and garbage storage regulations (Meagher and Phillips 1983, Gunther 1994, Garshelis et al. 2017, Gunther et al. 2018, Schwabedissen and Wilmot 2024). Limiting management

removals of bears to sustainable rates and operating under the park's aggressive bear management strategy requires substantial investment of resources into conflict prevention. To efficiently and effectively allocate resources for implementing management actions designed to prevent grizzly bear-human conflicts, baseline information regarding the types, causes, locations, and recent trends of human-bear conflicts can support park managers. All reported human-grizzly bear conflicts are recorded annually, and conflicts are grouped into broad categories using standard definitions (Table 30).

Management Actions

In 2024, park staff dedicated considerable management effort toward preventing human-grizzly bear conflicts from occurring (Table 31). In response to grizzly bear activity in visitor-use areas, park staff posted bear warning signs at 13 locations and implemented temporary trail or area closures at 24 locations. To prevent grizzly bears from being attracted into visitor-use areas by animal carcasses, park staff removed 94 large mammal carcasses from developments, roadside campgrounds, road corridors, trails, backcountry campsites, and other visitor-use areas. Animal carcasses removed from visitor-use areas included 31 bison, 29 elk, 26 mule deer, 3 pronghorn, 2 grizzly bears, 1 black bear, 1 coyote, and 1 beaver (*Castor canadensis*). To discourage grizzly bears from entering areas of concentrated visitor use, park staff hazed grizzly bears out of human use areas 101 times. Staff hazed grizzly bears out of primary road corridors 74 times, park developments 24 times, picnic areas 2 times, and away from a boardwalk trail one time. Additionally, as part of the park's strategy for preventing bears from obtaining human foods, 73 bear-proof food storage lockers (30 cubic feet; ft^3) were purchased with donations raised by Yellowstone Forever and installed in roadside campgrounds (n = 64), contractor camps (n = 7), and backcountry campsites (n = 2). With the installation of 64 food storage lockers in public campgrounds, 1,570 (82%) of the park's 1,914 roadside public campground campsites now have bear-proof food storage lockers. Ten of the parks 11 campgrounds (Pebble Creek, Slough Creek, Tower Fall, Mammoth, Indian Creek, Norris, Canyon, Bridge Bay, Madison, and Lewis Lake), have food storage lockers in every campsite. As part of the program, some food storage lockers have also been installed in the Grant Village (21% of sites) campground. It is the park's goal to provide visitors with bear-proof food storage lockers in every roadside campsite in the park. All 300 designated backcountry campsites in YNP currently have a food storage device (food hanging poles in 259 campsites and bear-proof food storage lockers in 41 campsites). When camping in non-designated sites in dispersed camping zones, backcountry campers are required to use IGBC-approved, hard-sided, food storage canisters or rig their own food-hanging device.

Management of Roadside Bear Viewing

The habituation of some bears to people combined with the presence of large areas of non-forested habitat with good visibility in YNP has created exceptional bear viewing opportunities, resulting in substantial growth of bear viewing as a local industry in park gateway communities. Bear viewing is now one of the primary activities of visitors to the park (Taylor et al. 2014, Richardson et al. 2015) and contributes millions of dollars to the economies of gateway communities annually (Richardson et al. 2014).

Park staff spent many hours managing visitors at roadside bear-viewing opportunities in 2024. Staff and visitors reported 499 roadside traffic jams caused by visitors stopping to view human-habituated (but not human food-conditioned) grizzly bears along park roads. Thousands of visitors viewed bears at these traffic jams. Park staff responded to 352 (71%) of the grizzly bear jams and spent 1,431 personnel hours managing habituated grizzly bears, the traffic associated with the bear jams, and the visitors that stopped to view and photograph habituated grizzly bears along roads. On average, park personnel spent 4.1 staff-hours managing each grizzly bear-jam.

The objectives of managing visitors at roadside bear-viewing opportunities include: 1) preventing visitors from feeding bears foraging for natural foods in roadside meadows; 2) keeping visitor behavior as predictable as possible to bears; 3) keeping visitors at least 100 yards from bears; and 4) preventing visitors from approaching, encircling, or following roadside bears.

Human-Bear Conflicts

There were five human-grizzly bear conflicts reported in YNP in 2024 (Table 32). During the late afternoon on June 6, a park visitor reported seeing a grizzly bear pulling garbage out of an over-filled bear-

proof dumpster in the Gibbon Falls Picnic Area. Maintenance staff emptied the dumpster and Bear Management staff put up a trail camera to monitor the picnic area. The bear did not return to the picnic area, and no other action was taken.

Sometime during the early morning hours of June 8, a grizzly bear (based on tracks) entered the Yellowstone Park Trail Crew work campsite at the old Nez Perce Cabin and chewed a hole through the side of what was thought to be a bear-proof cooler (the same company had some IGBC certified coolers that looked similar, however, this model was not on the approved list). The bear obtained an estimated 20 pounds of the trail crew's food that it pulled through the hole it chewed through the side of the cooler (the cooler was padlocked shut). A trail camera was set up to monitor the area, and bear-proof food storage lockers will be installed at the trail-crew campsite in the spring of 2025. Additionally, the trail crew will replace all their coolers with IGBC-approved models. The bear did not return to the site and no further action was taken.

On July 13 at 4:55 a.m., adult male grizzly bear #769 tore through the screen, broke out the glass, and climbed through the kitchen window at the Chittenden Employee House in Mammoth. Once in the kitchen, the bear tore off a kitchen cabinet door and consumed rolled oats and granola bars from the cabinet. When a person inside the house imitated the sound of a barking dog, the bear climbed back out the window. Seeing the bear climb out the window, Xanterra concessions security guards yelled and clapped their hands, and the bear fled north out of Mammoth. Bear Management staff set traps and snares for the bear, however grizzly bear #769 did not return to Mammoth and was not captured in the park. Prior to this incident, grizzly bear #769 had attempted to break into several private residences outside of the park and gotten several food rewards at residents and businesses in Gardiner, Montana. After fleeing Mammoth, grizzly bear #769 caused further conflicts over the next few weeks outside of the park in the town of Gardiner, Montana, and was later lethally removed by staff from Montana Fish, Wildlife, and Parks.

On July 14 at approximately 5:30 a.m, an adult female grizzly bear with three yearlings ripped open a bag of trash left out in campsite B-42 of the Canyon Campground. The garbage appeared to be primarily food wrappers and packaging from freeze-dried meals; however, the bear likely consumed some food residue and scraps. The bears were hazed out of the Canyon development and Bear Management staff monitored the campground throughout the evening of July 15; however, the bear did not return. No further action was taken.

On September 21, Search and Rescue Teams looking for a lost solo hiker found the man's tent, pack, food, and other camping gear at backcountry campsite site #6D8. Based on a cell phone call, the hiker had summited Eagle Peak in a snowstorm and was never heard from again. A grizzly bear (based on hair samples) entered the man's campsite, which had been left unattended for days, and damaged the tent, sleeping pad, and backpack which had been left on the ground. The bear consumed gummy bears, granola bars, and snack food that was in a backpack left on the ground.

Many factors, including the availability of natural bear foods, grizzly bear population numbers, and park visitation, influence the annual number of bear-human conflicts occurring in YNP. The annual number of conflicts in the park has decreased substantially after efforts to prevent bears from obtaining anthropogenic foods were implemented in the late 1960s and early 1970s (Fig. 28, Meagher and Phillips 1983, Gunther 1994, Garshelis et al. 2017).

Grizzly Bear Mortality

There were two known grizzly bear mortalities in the YNP-portion of the GYE in 2024. On the evening of July 20, Northwestern Energy employees discovered two dead adult male grizzly bears electrocuted by a downed powerline northwest of the Canyon Horse Concession corrals. The powerline came off of the support pole during a windstorm. Two elk were electrocuted after walking into the powerline, which was hanging about 2 feet off the ground. The two grizzly bears likely entered the area to scavenge the elk carcasses and were also electrocuted. There were no grizzly bears removed (killed or sent to zoo facilities) in management actions in 2024.

Trends in causes of grizzly bear mortality inside YNP have changed considerably over time. From the late 1950s through the 1970s, most grizzly bear mortality in the park was from human causes (Fig. 29), primarily management removals of bears involved in human-bear conflicts (Craighead et al. 1988). Over the last 4+ decades (1980–2024), mortalities have decreased considerably in the park and most mortality has been

from natural causes, primarily complications of old age and intra- and inter-specific strife and predation involving other grizzly bears and wolves.

Table 28. Long-term fate of 36 unique grizzly bears involved in bear-human conflicts inside of Yellowstone National Park that were captured and relocated to remote areas of the park, 1975–2024.

Fate	Number
Caused further conflicts after relocation, later removed in management action	13
Caused further conflicts after relocation, later killed in defense of life or property incident outside of park	3
Caused further conflicts after relocation, later killed illegally	2
Caused further conflicts after relocation, later killed by black bear hunter (mistaken identification) outside of park	1
Caused further conflicts after relocation, later struck and killed by a vehicle outside of park	1
Caused further conflicts after relocation, final fate unknown	6
No known conflicts after relocation, final fate unknown	10
No known conflicts after relocation, died of natural causes	0
Total	36

Table 29. Long-term fate of 95 unique grizzly bears involved in bear-human conflicts outside of Yellowstone National Park that were captured and accepted for relocation into the park, 1975–2024.

Fate	Number
Caused further conflicts after relocation, later removed in management action	34
Caused further conflicts after relocation, later killed in defense of life or property incident outside of park	7
Caused further conflicts after relocation, later killed illegally outside of park	2
No known conflicts after relocation, later killed illegally outside of park	2
Killed by black bear hunter (mistaken identification)	0
Struck and killed by vehicle	0
Caused further conflicts after relocation, final fate unknown	8
No known conflicts after relocation, final fate unknown	40
No known conflicts after relocation, died of natural causes	2
Total	95

Table 30. Definition of terms used in human-bear conflict management in Yellowstone National Park.	
Term	**Definition**
Human-bear conflict	Incidents where bears injured or killed people, damaged property, obtained human foods, garbage, or other anthropogenic attractants, or injured or killed livestock or pets.
Property damage–without food reward	Incidents where bears damaged property, including vehicles, buildings, tents, and camping equipment, etc., but did not obtain human-food rewards.
Anthropogenic food reward	Incidents where grizzly bears obtained human-related foods, including garbage, groceries, grease, pet foods, livestock feed or other edible human-related attractants.
Human injury	Incidents where bears injured one or more people, including minor scratches, bites, and contusions.
Human fatality	Incidents where bears killed people intentionally or unintentionally in offensive encounters or during defensive reactions to encounters.
Livestock depredation	Incidents where bears killed or injured domestic horses, mules, burros, donkeys, or llamas.

Table 31. Number of management actions taken to reduce the potential for human-grizzly bear conflicts in Yellowstone National Park, 2024.	
Management action	**Number of incidents**
Bear warnings posted	13
Temporary area closures implemented	24
Wildlife carcass removal from visitor-use areas	94
Bear-jam management	352
Management hazing	101
Attempted capture–unsuccessful	1
Captured, marked, and released on site	0
Captured and relocated	0
Captured and removed (euthanized or live placement in zoo)	0
Captured for humane reasons	0
Total management actions	585

Table 32. Number of incidents of human-grizzly bear conflict reported in Yellowstone National Park, 2024.	
Conflict type	**Number of conflicts**
Property damage–without food reward	0
Anthropogenic food reward	5
Human injury	0
Human fatality	0
Livestock depredation[a]	0
Total conflict incidents	5
Captured, marked, and released on site	0

[a] There are no cattle or sheep grazing allotments inside of Yellowstone National Park. Horses, mules, and llamas used as riding or pack stock are the only domestic livestock in the park that can potentially be killed by grizzly bears. Forty commercial outfitters have contracts to provide stock day rides and overnight pack trips in the park. Stock animals (horses, mules, llamas) spend from 3,800 – 8,400 nights annually, on overnight pack trips in backcountry areas of the park.

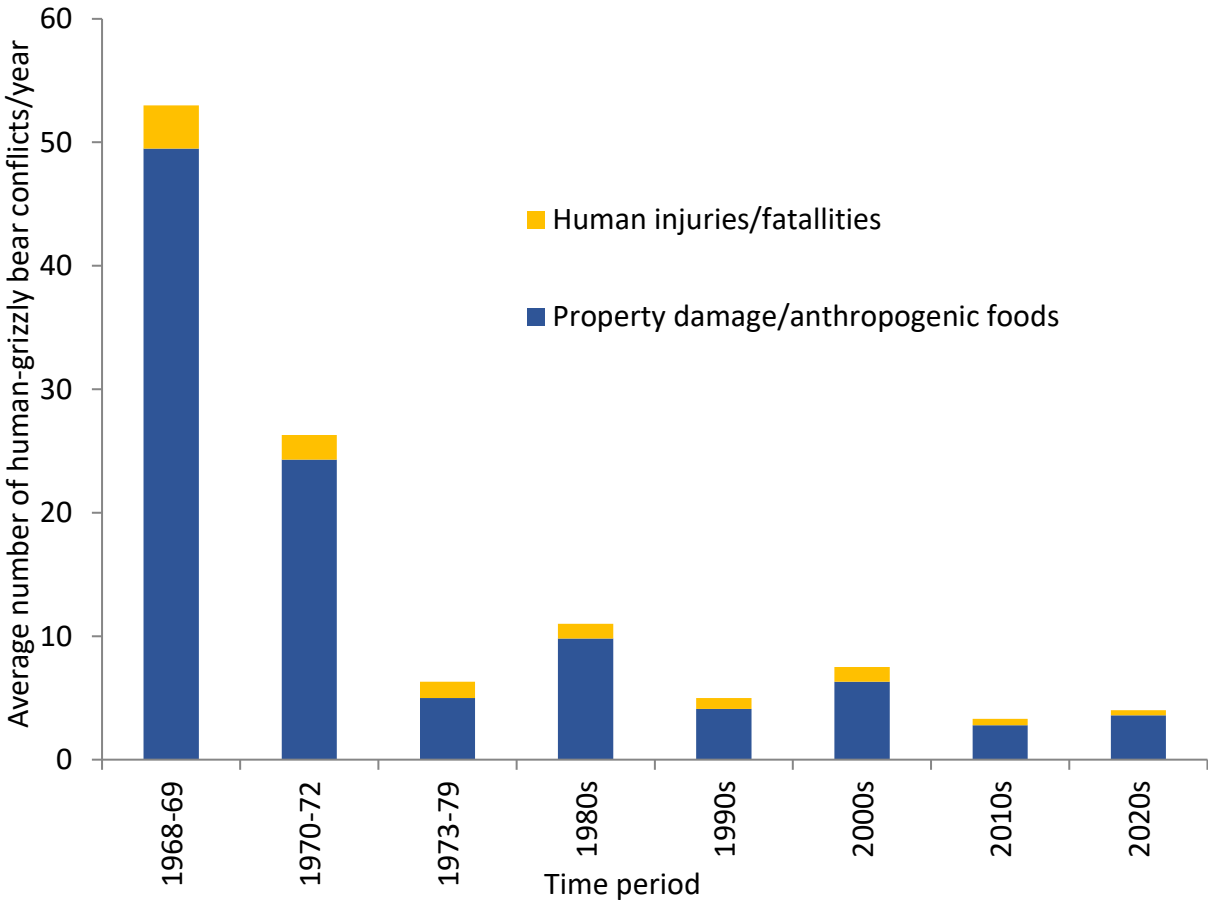

Fig. 28. Average number of human-grizzly bear conflicts per year by time-period, Yellowstone National Park, 1968–2024.

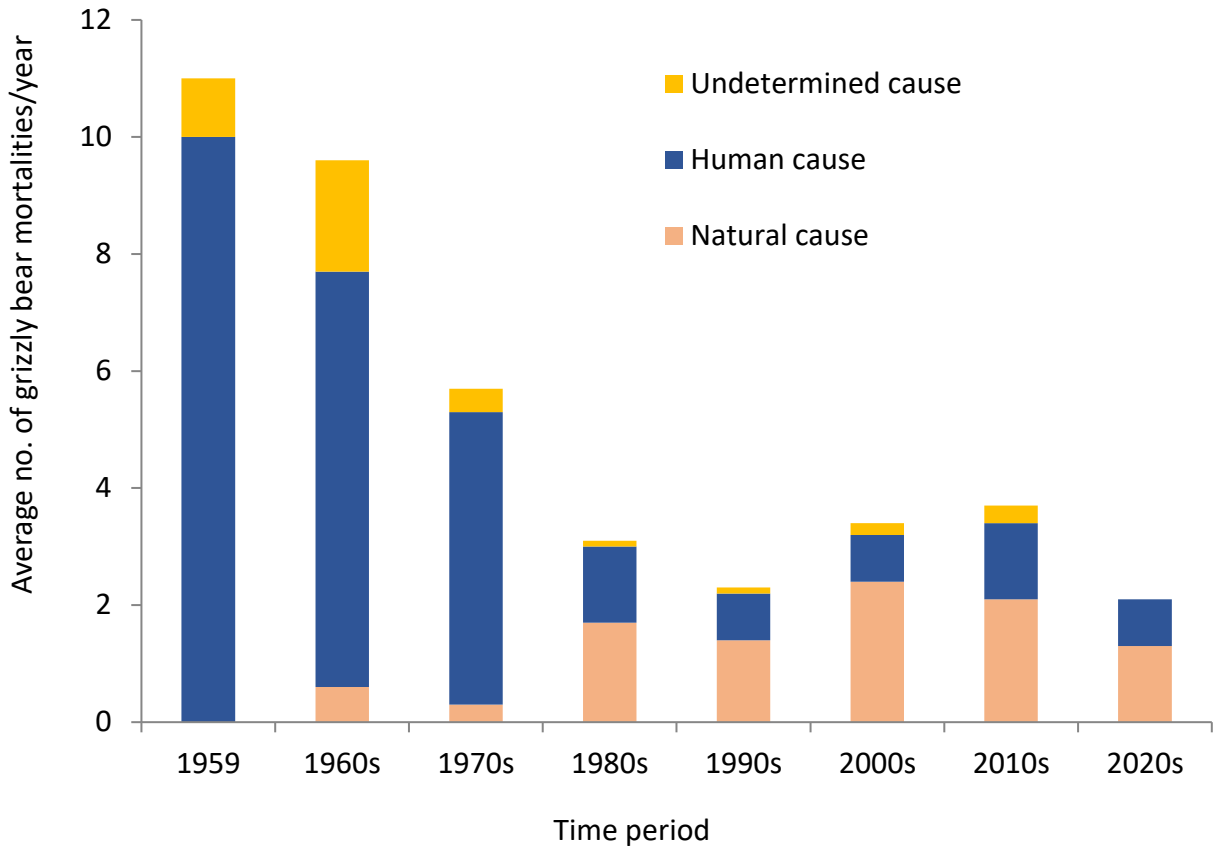

Fig. 29. Average number of known and probable grizzly bear mortalities per year by time-period, Yellowstone National Park, 1959–2024.

Human-Grizzly Bear Conflicts in Idaho

(Cade Bowlin, Idaho Department of Fish and Game)

Human-grizzly bear conflicts in the GYE-portion of eastern Idaho exhibit annual variation but have shown a consistent upward trend since 2005 (Fig. 30). Idaho Department of Fish and Game (IDFG) personnel responded to 53 reported human-grizzly bear conflicts in eastern Idaho during the 2024 season. These conflicts included public safety threats, grizzly bears obtaining anthropogenic foods, encounter situations, property damage, human-caused bear mortalities, and livestock depredations (Table 33). Human-grizzly bear conflicts in 2024 occurred on multiple land jurisdictions. Most conflict incidents occurred on private land (57%) with additional conflicts on federal (36%) and state lands (7%, Fig. 31). Grizzly bear conflicts also varied geographically across the region (Fig. 32). Conflict management actions conducted by IDFG included removing attractants, securing garbage, public outreach/education, and assisting Wildlife Services personnel from the Animal and Plant Health Inspection Service (APHIS) with livestock depredation investigations and associated management captures.

IDFG personnel confirmed nine grizzly bear mortalities in the GYE-portion of Idaho during 2024 (Table 34, Fig. 30 and Fig. 33). Four of these mortalities were management removals associated with grizzly bears depredating cattle. Wildlife Services conducted 43 investigations involving potential grizzly bear-caused cattle deaths, of which 25 confirmed grizzly bear involvement. In response to these conflicts, IDFG assisted Wildlife Services personnel in the capture of five grizzly bears (4 male, 1 female) across six capture events for conflict management purposes. IDFG personnel immobilized and processed all captured conflict bears. One male grizzly bear was captured, fitted with a radio collar and relocated. However, this bear was later involved in further cattle depredations, necessitating its capture and removal. Three additional male grizzly bears were captured and removed from the population due to chronic cattle depredations. The female grizzly bear was immobilized, processed, and relocated after being fit with a radio collar. In 2024, IDFG Enforcement and Wildlife personnel investigated three separate defense of life incidents which resulted in three grizzly bear mortalities—two males and one female. Additional mortalities in the GYE-portion of Idaho included one natural mortality of a female and another female mortality currently under investigation.

To mitigate and prevent human-grizzly bear conflicts, IDFG staff continued outreach and education efforts across the Idaho portion of the GYE. From March to October 2024, IDFG staff and volunteers organized and participated in 26 educational events, reaching a total of 6,999 individuals. These participants received training on bear safety, ecology, and identification in eastern Idaho. Additionally, 166 people were contacted during neighborhood and campground canvassing in the Island Park/Ashton area.

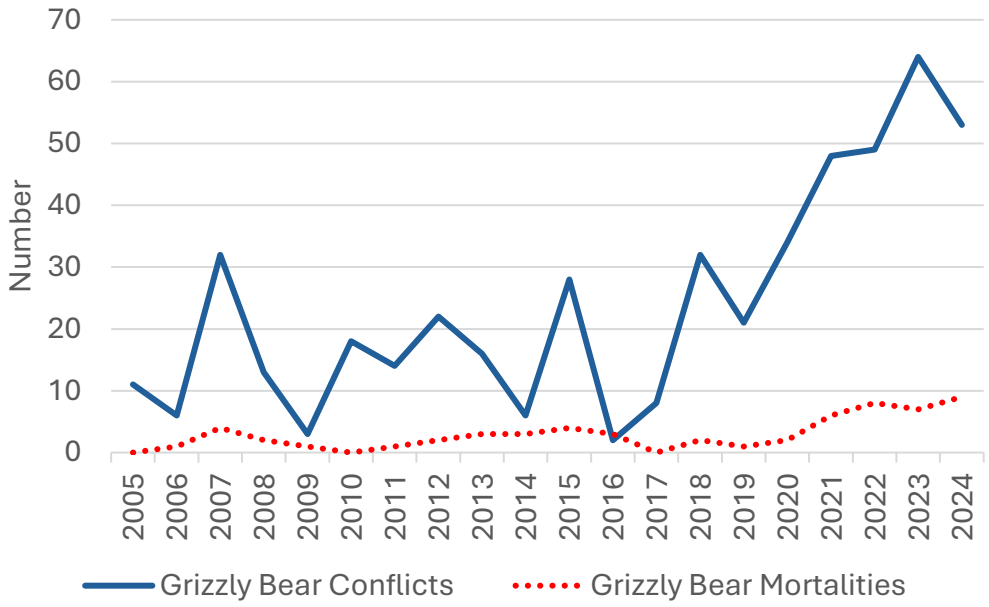

Fig. 30. Frequency of grizzly bear conflicts and grizzly bear mortalities in the Idaho portion of the Greater Yellowstone Ecosystem, 2005-2024.

Table 33. Human-grizzly bear conflicts by type in the Idaho portion of the Greater Yellowstone Ecosystem, 2024.

Conflict Type	Count
Livestock depredation-cattle	29
Other conflict types	10
Unnatural foods-garbage	9
Property damage-building	2
Unnatural foods-livestock/pet foods	1
Property damage-vehicle	1
Human injury	1
Total Conflicts	53

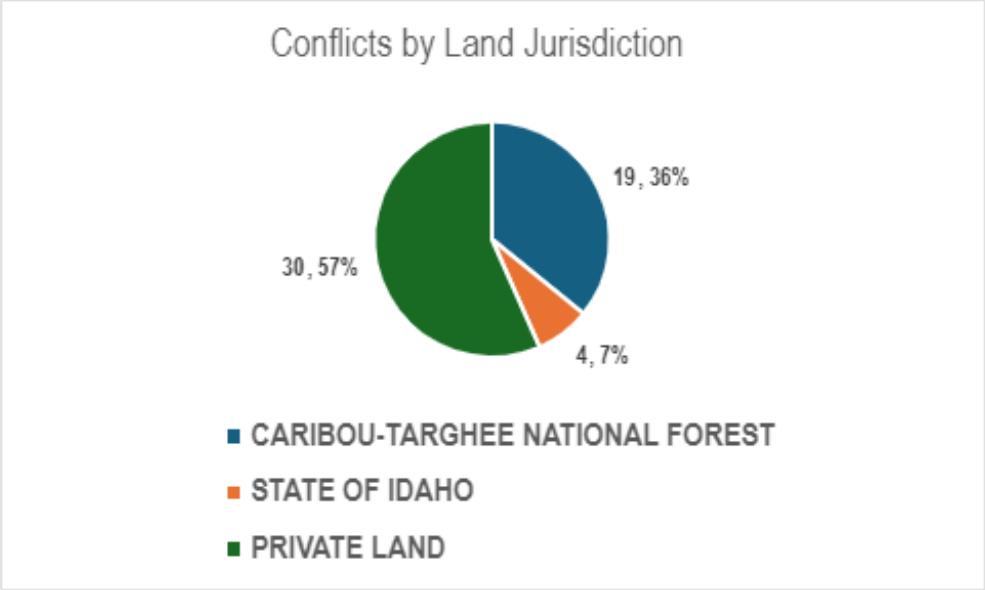

Fig. 31. Number of documented human-grizzly bear conflicts by land jurisdiction in the Idaho portion of the Greater Yellowstone Ecosystem, 2024.

Fig. 32. Locations of human-grizzly bear conflicts in the Idaho portion of the Greater Yellowstone Ecosystem, 2024.

Table 34. Confirmed grizzly bear mortalities in the Idaho portion of the Greater Yellowstone Ecosystem, 2024.	
Mortality Type	**Count**
Management removal	4
Defense of life	3
Natural mortality	1
Unknown cause	1
Total mortalities	9

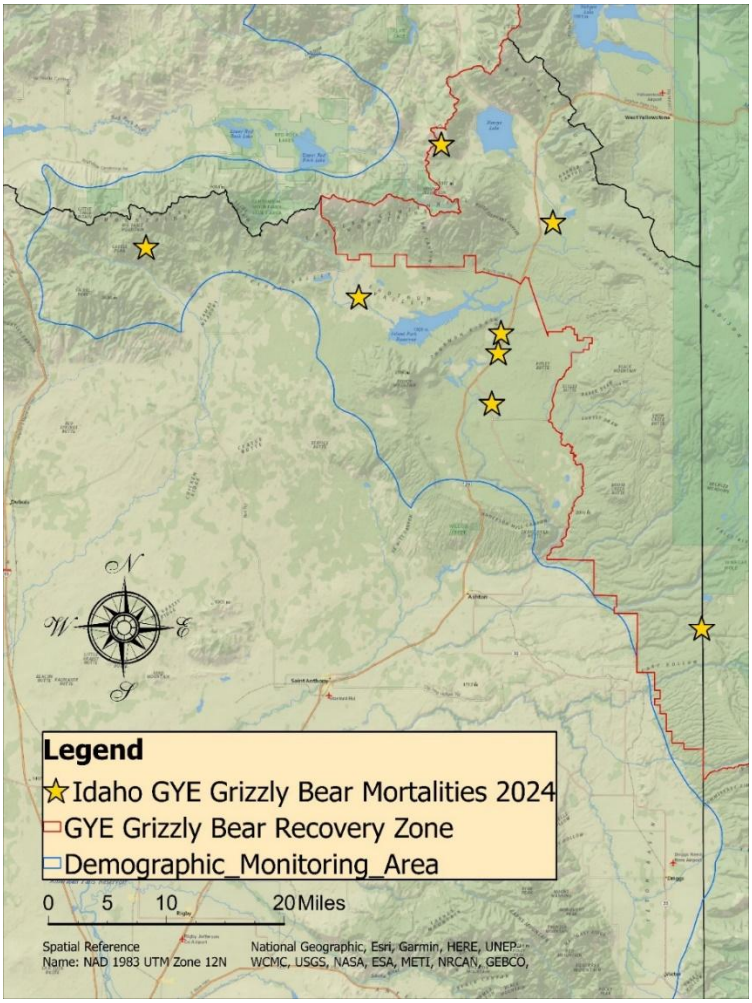

Fig. 33. Locations of confirmed grizzly bear mortalities in the Idaho portion of the Greater Yellowstone Ecosystem, 2024. Because of multiple bear mortalities at a specific location or separate mortalities occurring close to one another, not all locations are visible on this map.

Human-Grizzly Bear Conflicts in Montana

(Jeremiah Smith, Kyle Orozco Montana Fish, Wildlife and Parks)

During 2024 in Montana's portion of the GYE, there were 196 investigated human-bear conflicts and 10 documented grizzly bear mortalities. The number of conflicts is shown by type in Table 35. Annual variation in conflicts and grizzly bear mortalities are shown in Figure 34. For 2015–2024, the average number of grizzly bear conflicts was 118 per year and about 12 grizzly bear mortalities per year.

Table 35. Human-grizzly bear conflict types in the Montana portion of the Greater Yellowstone Ecosystem, 2024.

Conflict type	Conflicts
Livestock - cattle	27 (27 killed or injured)
Livestock - sheep	5 (11 killed or injured)
Livestock - poultry	3 (~20 killed or injured)
Livestock - swine	1 (2 killed or injured)
Other property loss	Region 3: 22; Region 5: 1
Anthropogenic foods	Region 3: 25; Region 5: 3
Anthropogenic foods with property damage	Region 3: 47; Region 5: 0
At developed sites–safety concerns	Region 3: 31; Region 5: 6
Bear mortalities	10 (5 management removals, 3 defense of life, 1 mistaken identity, 1 probable)
Encounters and human injuries	15 (including 0 fatality and 0 human injury) Region 3: 11; Region 5: 4
Total conflicts	196

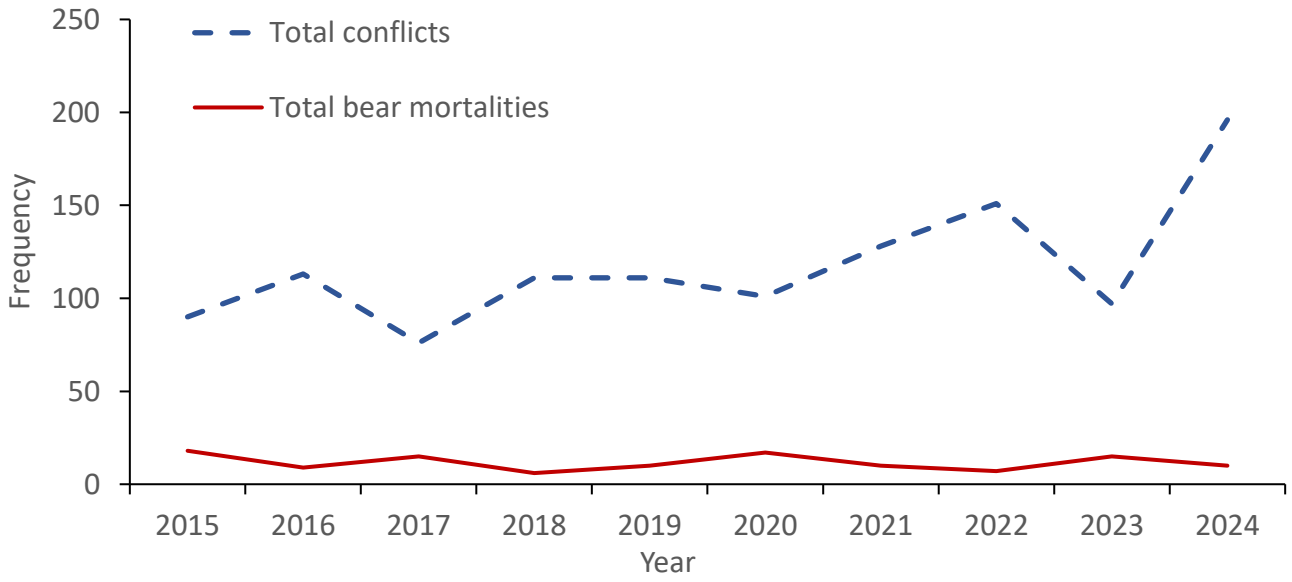

Fig. 34. Frequency of total grizzly bear conflicts and bear mortalities in the Montana portion of the Greater Yellowstone Ecosystem, 2015-2024.

The distribution of grizzly bear conflicts by land jurisdiction is shown in Table 36. During 2024, the largest percentage (76%) of conflicts occurred on private land. The trend in close encounters that can lead to human injuries or defense of life grizzly bear mortalities from 2015 through 2024 are shown in Figure 35. The yearly average of these conflicts is 14 close encounters, 2 human injuries, and 3 defense of life grizzly bear mortalities. During 2024, there were 15 close encounters resulting in 0 human injuries, 0 human fatalities, and 4 grizzly bear mortalities (Table 35).

Cattle depredations are increasing as grizzly bear numbers and their geographic distribution increase (Fig. 36). The annual variation and overall increases in Region 3 and Region 5 are shown in Figure 35. From 2015 through 2024, the yearly average for the geographic portions are 24 depredations in Region 3 and 14 in Region 5. During 2024, there were 26 documented cattle depredations in Region 3 and 1 in Region 5. Figure 37 displays a map of all 2024 grizzly bear mortalities in Montana's portion of the GYE. Figure 38 displays a map of all 2024 conflict types showing the distribution of management efforts and grizzly bear distribution. There is annual variation in these distributions and the numbers of conflicts in any geographic area.

Table 36. Total conflicts by land jurisdiction in the Montana portion of the Greater Yellowstone Ecosystem, 2024.

Jurisdiction	Count
Private	149
State	2
County or local government	1
Federal	0
Bureau of Land Management	0
Custer Gallatin National Forest	14
Beaverhead-Deerlodge National Forest	29
USFWS–National Wildlife Refuge	1
Total	196

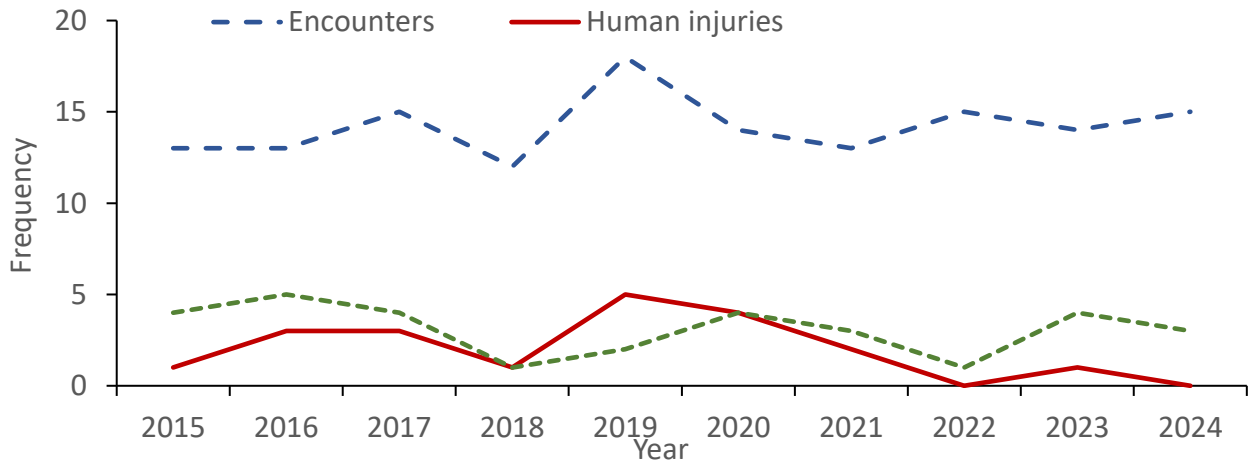

Fig. 35. Frequency of bear encounters resulting in human injuries and defense of life (DL) bear mortalities in the Montana portion of the Greater Yellowstone Ecosystem, 2015–2024.

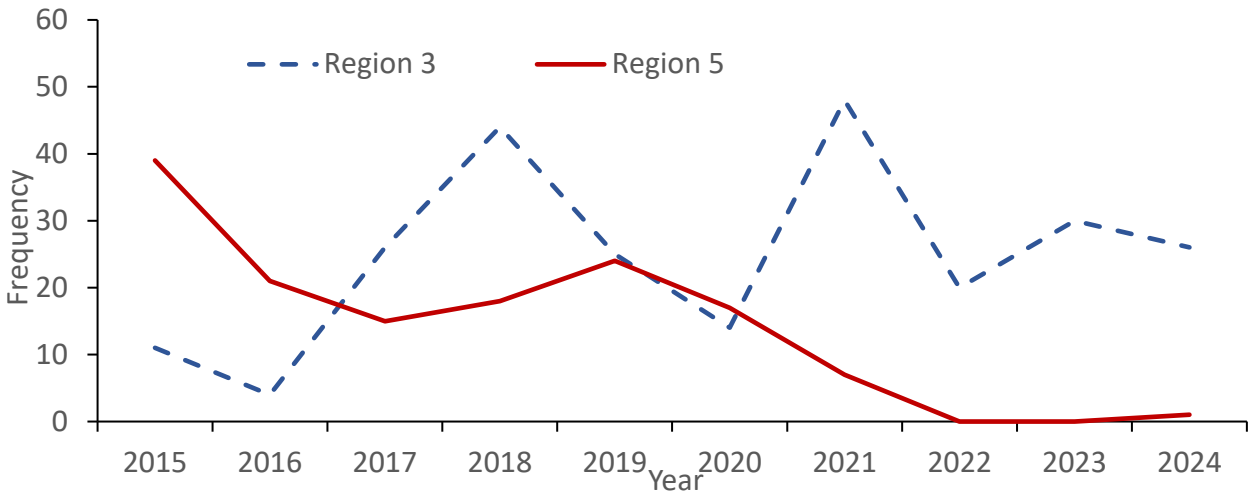

Fig. 36. Frequency of cattle depredation conflicts in the Montana portion of the Greater Yellowstone Ecosystem, 2015–2024.

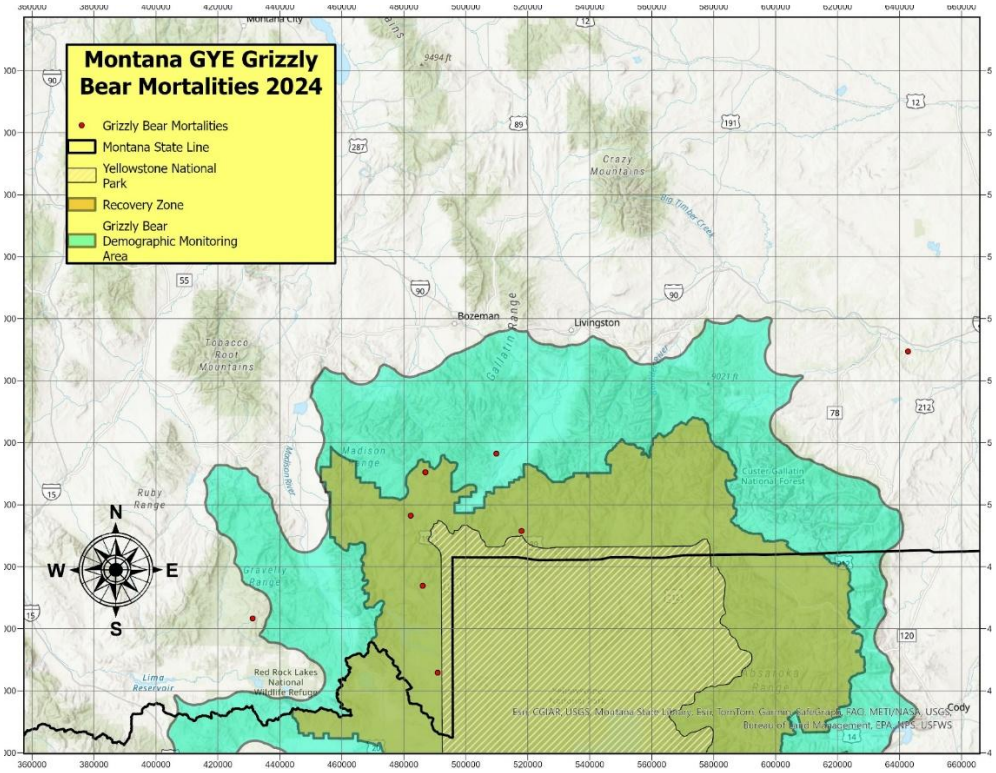

Fig. 37. Locations of all grizzly bear mortalities in the Montana portion of the Greater Yellowstone Ecosystem, 2024. Because of multiple bear mortalities at a specific location or separate mortalities occurring close to one another, not all locations are visible on this map. Base Map: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL.

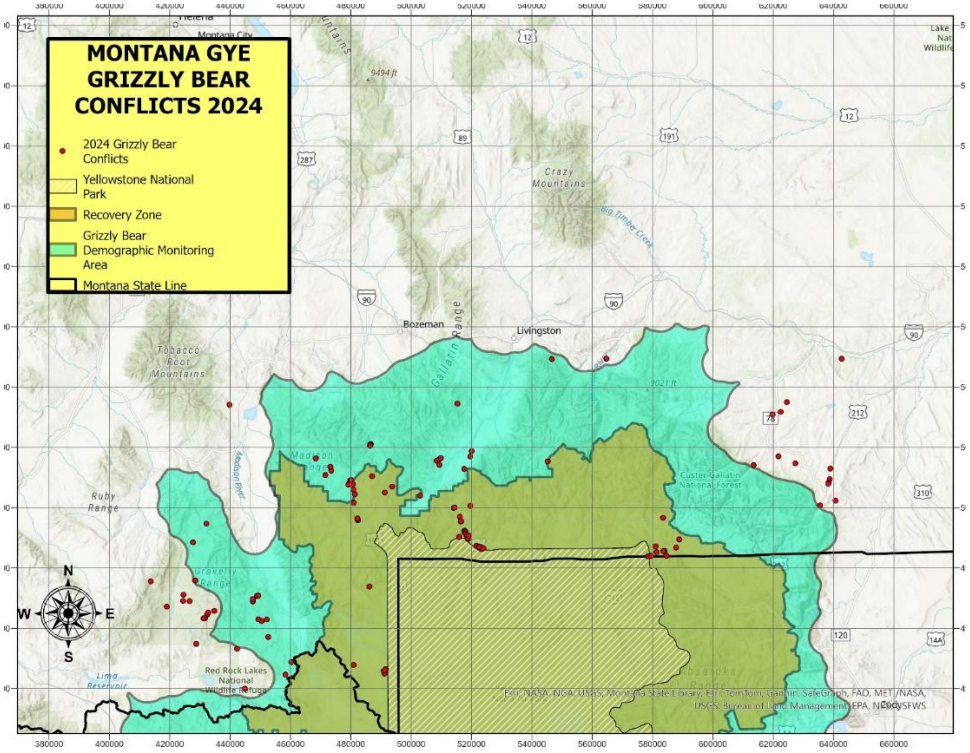

Fig. 38. Locations of all conflict types in the Montana portion of the Greater Yellowstone Ecosystem, 2024. Base Map: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community.

Human-Grizzly Bear Conflicts in Wyoming

(Brian DeBolt, Luke Ellsbury, Michael Boyce, Phil Quick, Scott Stingley, Mark Aughton, Kesley Secrist, Justin Dellinger, Thomas Kelly, Josiah Crump, Justin Clapp, Clint Atkinson, Ken Mills, Ryan Kindermann, and Daniel J. Thompson; Large Carnivore Section, Wyoming Game and Fish Department)

In Wyoming, grizzly bear conflicts are defined as "interactions between grizzly bears, people and their property, resulting in damage to pets, livestock or bees, non-natural food rewards, animal caused human injury or death, and human caused injury or death to an animal other than legal hunting or a management action." Human-grizzly bear interactions and conflicts in Wyoming are a result of an abundance, and in some areas, an over-abundance of bears seeking unnatural foods in association with people and property, close encounters with humans, or when bears kill livestock. Proactive prevention is the goal of the Wyoming Game and Fish Department (Department, or WGDF) in minimizing conflicts. However, the number and location of human-grizzly bear conflicts is influenced by the availability of unsecured unnatural attractants (e.g., human foods and garbage), seasonal distribution and abundance of natural foods, grizzly bear density and distribution, and human- and livestock-use patterns on the landscape. For purposes of this report, we refer directly to grizzly bears regarding any management actions and numbers provided therein. Any relocation or removal of grizzly bears in Wyoming is dependent upon authorization from the U.S. Fish and Wildlife Service after careful and thorough deliberation taking into account multiple factors unique to each conflict situation.

Management techniques used around the world to reduce human-grizzly bear conflicts are deployed by the Department, including the capture and relocation of problem individuals. Proactive outreach, education and preventative measures are the foundation of grizzly bear conflict management, but hands-on mitigation techniques are still necessary in many conflicts. Relocation achieves several social and conservation functions: (a) it reduces the chance of property damage, livestock damage, or human interactions in areas where the potential for conflict is high; (b) it reduces the potential for grizzly bears to become food conditioned and human habituated, which often results in destructive and/or dangerous behaviors; (c) it allows grizzly bears the opportunity to forage on natural foods and remain wary of people; and (d) it could prevent removing grizzly bears from the population, which may be beneficial in maintaining recovery criteria and population management objectives.

In addition to capture and relocation, the Department also removes grizzly bears (lethally or by live placement into a zoo or other facility) in response to human-grizzly bear conflicts, when necessary, as part of routine management operations. All grizzly bear management actions were conducted in coordination with the U.S. Forest Service and the U.S. Fish and Wildlife Service. The decision to relocate or remove a grizzly bear is made after considering a number of factors including the age and sex of the animal, behavioral traits, health status, physical injuries or abnormalities, type of conflict, severity of conflict, known history of the animal, human safety concerns, availability of suitable relocation sites, and population management objectives. Grizzly bears are relocated or removed in accordance with federal and state laws, regulations, and policies. In 2005, the Wyoming Legislature enacted House Bill 203, which created Wyoming Statute §23-1-1001 that requires the Department to:

1) Upon relocating a grizzly bear or upon receiving notification that a grizzly bear is being relocated, the Department shall provide notification to the sheriff of the county to which the grizzly bear is relocated within five (5) days of each grizzly bear relocation and shall issue a press release to the media and sheriff in the county where each grizzly bear is relocated;

2) The notice and press release shall provide the following information:

    a) The date of the grizzly bear relocation;

    b) The number of grizzly bears relocated; and

c) The location of the grizzly bear relocation, as provided by commission rule and regulation;

3) No later than January 15 of each year, the Department shall submit an annual report to the Joint Travel, Recreation, Wildlife, and Cultural Resources Interim committee. The annual report shall include the total number and relocation area of each grizzly bear relocated during the previous calendar year. The Department shall also make available the annual report to the public.

Grizzly Bear Management Captures, Relocations, and Removals

During 2024, the Department captured 42 individual grizzly bears in 43 capture events (bear #1130 was captured twice) in an attempt to prevent or resolve conflicts (Table 37, Fig. 39). Twelve of these captures were females (8 adults, 4 subadults) and 30 were males (18 adults, 12 subadults). Twenty-four of the captures were due to bears killing livestock (cattle, sheep, and chickens) and 15 captures involved bears that obtained food rewards (pet, livestock food, garbage, fruit trees), or were frequenting developed sites or human populated areas unsuitable for grizzly bear occupancy. Three additional grizzly bears captured in management actions were not considered offending bears. Of the 43 capture events, 28 (65%) were in Park County, 6 (14%) in Sublette County, 4 (9%) in Fremont County, 2 (5%) in Hot Springs County, 2 (5%) in Teton County, and 1 in Washakie County (2%) (Table 37).

Of the 42 individual captures, there were seven relocation events (Table 37, Fig. 40). All of the relocated grizzly bears were released on U.S. Forest Service lands in or adjacent to the GBRZ. Of the seven relocation events, five were conducted in Park County (71%), one (14.5%) in Teton County, and one in Sublette County (14.5%; Table 37).

Grizzly bears are removed from the population if they have a history of previous conflicts, a known history of close association with humans, or are deemed unsuitable for release into the wild (e.g., orphaned cubs, poor physical condition, or human safety concern). Of the 42 grizzly bears captured, 31 bears were removed from the population. Of these 31 removals, 19 (61%) were outside of the DMA, which is the area considered suitable for the long-term viability of grizzly bears in the GYE. Two additional grizzly bears (dates 9-15-24 and 9-30-24 in Table 37) were removed by Department personnel without being captured.

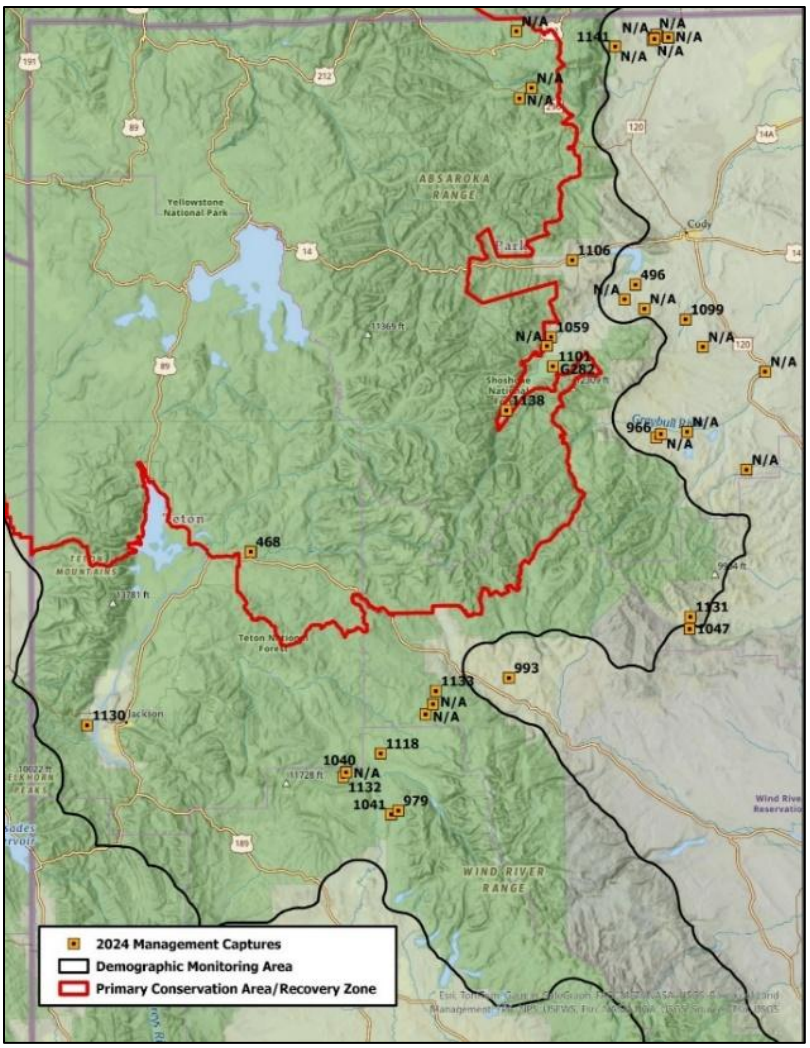

Fig. 39. Capture locations (n = 43) for grizzly bears captured in conflict management efforts in the Wyoming portion of the Greater Yellowstone Ecosystem, 2024. Grizzly bear ID labeled as "N/A" were grizzly bears captured and removed from the population without being given a chronological capture number. Because of the mapping scale, some locations are combined at one symbol, and the 4-15-2024 capture in Washakie County is not visible on this map. A complete list is provided in Table 37.

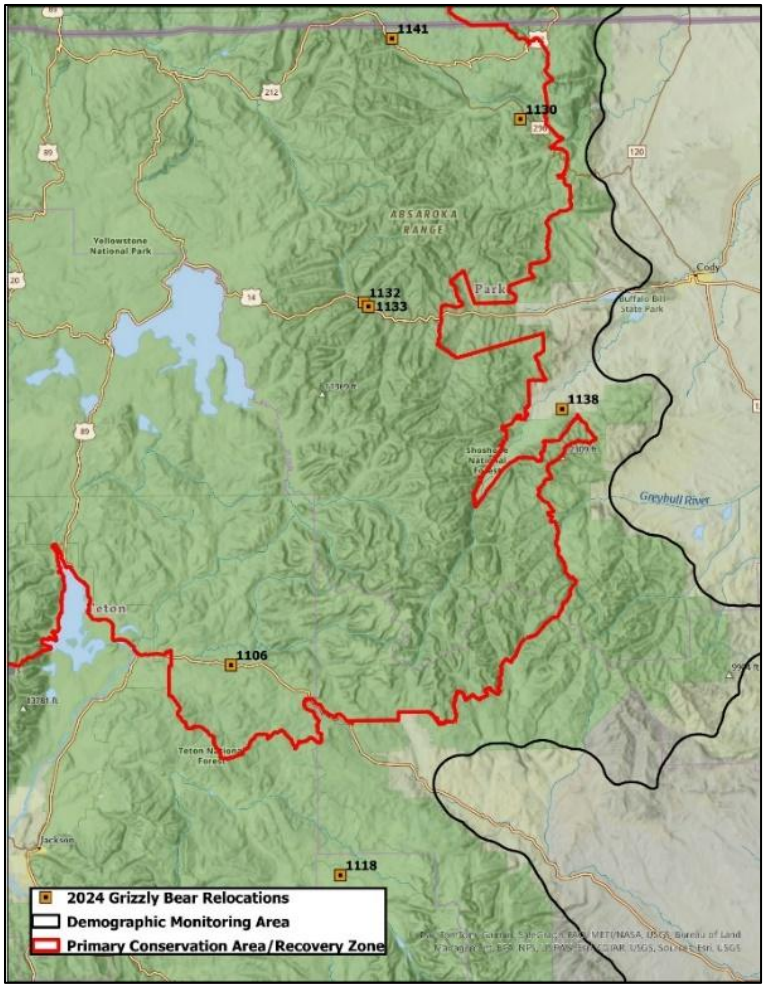

Fig. 40. Release locations (n = 7) for grizzly bears captured and relocated in conflict management efforts in the Wyoming portion of the Greater Yellowstone Ecosystem, 2024. Grizzly bears 1131 and 1147 were not considered the offending bears and were released on site so they are not shown here as relocations. Bear 1118 was also not the offending bear and only moved a short distance from capture. A complete list is provided in Table 37.

Table 37. Capture date, grizzly bear identification number (ID), capture county, relocation site, release county, and reason for capture for all 2024 grizzly bear conflict management captures (*n* = 43) in Wyoming. Grizzly bear ID labeled as "N/A" were grizzly bears removed from the population without being given a chronological capture number.

Date	ID	Capture county	Relocation site[a]	Release county	Reason for capture
4/15/2024	N/A	Washakie			Captured and removed for cattle depredation.
4/25/2024	N/A	Park			Captured and removed for cattle depredation.
4/27/2024	N/A	Park			Captured and removed for cattle depredation.
5/7/2024	1059	Park			Captured and removed for multiple cattle depredations.

Table 37. Capture date, grizzly bear identification number (ID), capture county, relocation site, release county, and reason for capture for all 2024 grizzly bear conflict management captures (n = 43) in Wyoming. Grizzly bear ID labeled as "N/A" were grizzly bears removed from the population without being given a chronological capture number.

Date	ID	Capture county	Relocation site[a]	Release county	Reason for capture
5/9/2024	N/A	Park			Captured and removed for multiple cattle depredations.
5/24/2024	1106	Park	Blackrock Creek, BTNF	Teton	Captured and relocated for cattle depredation.
6/18/2024	N/A	Park			Captured and removed for cattle depredation.
6/24/2024	966	Park			Captured and removed for cattle depredation.
6/29/2024	993	Fremont			Captured and removed for cattle depredation and poor condition.
7/2/2024	N/A	Park			Captured and removed for cattle depredation.
7/7/2024	979	Sublette			Captured and removed for multiple cattle depredations.
7/12/2024	1118	Sublette	Pinion Ridge, BTNF	Sublette	Captured as a non-offender at a cattle depredation site and relocated a short distance.
7/18/2024	N/A	Park			Captured and removed for cattle depredation.
7/27/2024	1040	Sublette			Captured and removed for chronic cattle depredation and previous failed relocations.
7/31/2024	1130	Teton	Camp Creek, SNF	Park	Captured and relocated for frequenting residential areas and ranches.
8/6/2024	N/A	Sublette			Captured and removed for multiple cattle depredations.
8/10/2024	N/A	Fremont			Captured and removed for cattle depredation
8/13/2024	N/A	Park			Captured and removed for cattle depredation.
8/15/2024	1131	Hot Springs	Capture Site		Captured as a non-offender at a sheep depredation site.
8/16/2024	1047	Hot Springs	Capture Site		Captured as a non-offender at a sheep depredation site.
8/19/2024	1132	Sublette	Five Mile Creek, SNF	Park	Captured and relocated for cattle depredation.
8/20/2024	1133	Fremont	Mormon Creek, SNF	Park	Captured and relocated for cattle depredation.
8/23/2024	N/A	Park			Captured and removed for frequenting agricultural areas and human safety concerns.
8/24/2024	N/A	Park			Captured and removed for cattle depredation.

Table 37. Capture date, grizzly bear identification number (ID), capture county, relocation site, release county, and reason for capture for all 2024 grizzly bear conflict management captures (*n* = 43) in Wyoming. Grizzly bear ID labeled as "N/A" were grizzly bears removed from the population without being given a chronological capture number.

Date	ID	Capture county	Relocation site[a]	Release county	Reason for capture
8/24/2024	1041	Sublette			Captured and removed for multiple cattle depredations.
8/26/2024	1101	Park			Captured and removed for multiple cattle depredations.
8/26/2024	G282	Park			Captured and removed for multiple cattle depredations.
8/27/2024	N/A	Park			Captured and removed for crop damage, frequenting agricultural areas, and human safety concerns.
9/6/2024	1097	Park			Captured and removed for past failed relocation attempt, agricultural damage, and human safety concerns.
9/11/2024	468	Teton			Captured and removed for breaking into tack room attached to occupied dwelling and consuming large amount of horse feed.
9/15/2024	N/A	Fremont			Removed for multiple cattle depredations.
9/23/2024	N/A	Park			Captured and removed for agricultural damage and human safety concerns.
9/23/2024	N/A	Park			Captured and removed for agricultural damage and human safety concerns.
9/25/2024	1130	Park			Captured and removed after failed relocation; boldness around humans, presence in residential areas, human safety concerns and crop damage.
9/28/2024	N/A	Park			Captured and removed for frequenting agricultural areas and human safety concerns.
9/28/2024	1138	Park	South Fork Shoshone, SNF	Park	Non-offender captured in a set for a bear breaking into cargo trailer and relocated a short distance.
9/30/2024	N/A	Park			Removed for killing and eating a dog accompanied by its owner. Showed aggression/ predatory behavior towards other dogs. Aggression towards riders on horseback. Frequenting occupied camps and receiving food rewards.
10/3/2024	1099	Park			Captured and removed for cattle depredation.
10/14/2024	496	Park			Captured and removed due to very poor condition; obtaining livestock feed and silage, and frequenting agricultural areas.
10/24/2024	N/A	Park			Captured and removed for property damage, apples and duck feed.

Table 37. Capture date, grizzly bear identification number (ID), capture county, relocation site, release county, and reason for capture for all 2024 grizzly bear conflict management captures (n = 43) in Wyoming. Grizzly bear ID labeled as "N/A" were grizzly bears removed from the population without being given a chronological capture number.

Date	ID	Capture county	Relocation site[a]	Release county	Reason for capture
10/28/2024	1141	Park	Fox Creek, SNF	Park	Captured and relocated for property damage, apples and duck feed.
11/2/2024	N/A	Park			Captured and removed for repeated conflicts with livestock feed, property damage, aggression toward people, and frequenting developed areas.
11/18/2024	N/A	Park			Captured and removed for obtaining grain and cracked corn and feeding with cattle in a feed lot; poor health and human safety concerns.

[a] BTNF = Bridger-Teton National Forest, SNF = Shoshone National Forest

Department personnel investigated and recorded 242 human-grizzly bear conflicts in 2024 (Table 38). As a result of concerted education and conflict prevention efforts, the general pattern of conflicts is relatively steady within currently occupied habitat. The number of annual conflicts is typically a result of abundant natural foods and localized social tolerance of grizzly bears. However, as occupied grizzly bear range has expanded, conflicts continue in areas outside the DMA, often on private lands. In areas where grizzly bears have not been present in recent history, bears are increasingly coming into conflict with people, causing meaningful damage to agricultural crops, and sometimes making routine activities in working landscapes potentially dangerous. Although the joint efforts of the WGFD, USFS, non-governmental organizations, and particularly the public, have resulted in reducing conflicts through education and attractant storage in many areas, the distribution of grizzly bear conflicts in Wyoming continues to expand with the population. Bears frequent lower elevations and developed areas regularly during the non-denning period. Grizzly bear-cattle depredation was the most frequent type of conflict documented in 2024. This has been the trend for decades, simply because there is no effective method to reduce livestock depredation on large open-range areas. Although the annual variation in most human-bear conflicts is correlated with natural food abundance, the numbers of cattle and sheep killed annually do not follow the same pattern. As grizzly bears expand farther into human-dominated landscapes outside the DMA, the potential for conflict between bears and humans increases, which may result in negative outcomes for both grizzly bears and people. The WGFD continues to explore and use multiple options to reduce grizzly bear-livestock conflicts and expand our education and outreach efforts (see Bear Wise Wyoming Report, Appendix C).

Over 40% of the grizzly bear conflicts in Wyoming occurred on private lands and the majority were outside of the GBRZ and DMA (Fig. 41). The increasing distribution of grizzly bears is reflected in the annual documentation of more conflicts in human- and livestock-dominated landscapes outside the DMA. As bears expand and occupy habitats commonly used by humans, there is a greater potential for conflicts to occur. Education and conflict-prevention efforts are used anywhere bears and people coexist, and management actions to resolve a conflict can be a function of human values and their effects on the grizzly bear population in those areas (e.g., relocation, removal).

Long-term trends in the number of conflicts are a result of grizzly bears reaching carrying capacity within portions of the DMA (van Manen et al. 2016, Corradini et al. 2023) and expanding into areas with greater human use, including areas with livestock production on public and private lands, and increased human-use of grizzly bear habitat in recent years. This encroachment on bear habitat includes roadside bear viewing. Some people engage in unethical wildlife viewing practices, often resulting in habituated or food-conditioned grizzly bears. Bears are also anthropomorphized on social media, where some bears are elevated to celebrity status. These situations focus on individuals instead of all grizzly bears in the population and continue to present challenges for bear managers and even bear-caused deaths from vehicle strikes. Based on evidence of density-

dependent effects in the early 2000s (van Manen et al. 2016, Corradini et al. 2023), the GYE grizzly bear population may have reached or exceeded its biological carrying capacity in portions of the ecosystem; individual bears continue to disperse into less suitable habitat beyond the DMA. Therefore, bears are more likely to encounter food sources such as garbage, pet food, livestock and livestock feed, and myriad other attractants, resulting in increased property damage and threats to human safety. Conflict prevention measures such as attractant storage, deterrence, and education are a priority for the WGFD. Nevertheless, conflict management is often reactive. Even with the most stringent food and attractant control, the increasing and expanding grizzly bear numbers could lead to conflicts between bears and people. Particularly in areas where females are teaching their young to be habituated to humans, there will be young bears struggling to find food and survive post-weaning. These situations emphasize the importance of bears remaining wary of people and not becoming conditioned to human foods and other attractants, thus avoiding the need to be relocated or euthanized.

In general, there is less social tolerance and biological suitability for bear occupancy in areas farther from the GBRZ because of development, land use patterns, and various forms of recreation. Although prevention is the preferred option to reduce conflicts, each situation is managed on a case-by-case basis. Education, securing of attractants, relocation or removal of individual bears, or a combination of methods are used for long-term conflict resolution and conservation of grizzly bears. Conflicts may continue to increase, especially in areas not biologically suitable or socially acceptable for grizzly bear occupancy, and bears could be relocated and removed as a result. However, current rates of human-caused mortalities resulting from conflicts have not resulted in negative population growth as shown in this report and Gould et al. (2024).

Table 38. Type and number of human-grizzly bear conflicts in the Wyoming portion of the Greater Yellowstone Ecosystem, 2024.

Conflict type	Number	Approx. Percent (%)
Horse	1	0.41
Properly Stored Game	1	0.41
Poultry	1	0.41
Human Injury	1	0.41
Beehive	1	0.41
Pet/Guard Animal	1	0.41
Fruit Trees	2	0.83
Garbage	2	0.83
Animal Injury	2	0.83
Aggression towards humans	6	2.48
Animal Death	6	2.48
Sheep	6	2.48
Property Damage	11	4.55
Pet-Livestock-Birdfeed	13	5.37
Cattle	188	77.69
Grand Total	242	100.00

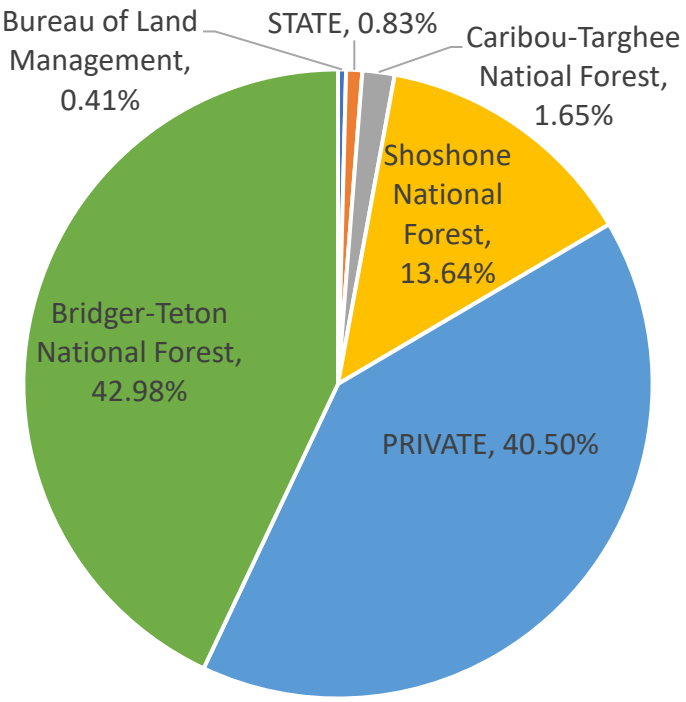

Fig. 41. Percent of human-grizzly bear conflicts on private and public lands in the Wyoming portion of the Greater Yellowstone Ecosystem, 2024.

Human-Grizzly Bear Conflicts on the Wind River Reservation

(*Patrick Hnilicka, Lander Fish and Wildlife Conservation Office, U.S. Fish and Wildlife Service; and Art Lawson, Eastern Shoshone and Northern Arapaho Fish and Game Department*)

One encounter and 0 conflicts were reported on the Wind River Reservation in 2024 (Fig. 42). Encounters occur when bears and people meet and are both aware of each other's presence, but with no ensuing conflict. Conflicts are defined as incidents where bears cause a human safety issue (habituated, in developed areas), damage property, kill or injure livestock, obtain human foods or garbage, or injure people.

During early August, the 1 encounter occurred along a well-traveled gravel road in a riparian corridor-rural-agriculture interface north of Crowheart, Wyoming. As the person was in a vehicle, no escalation or conflict occurred.

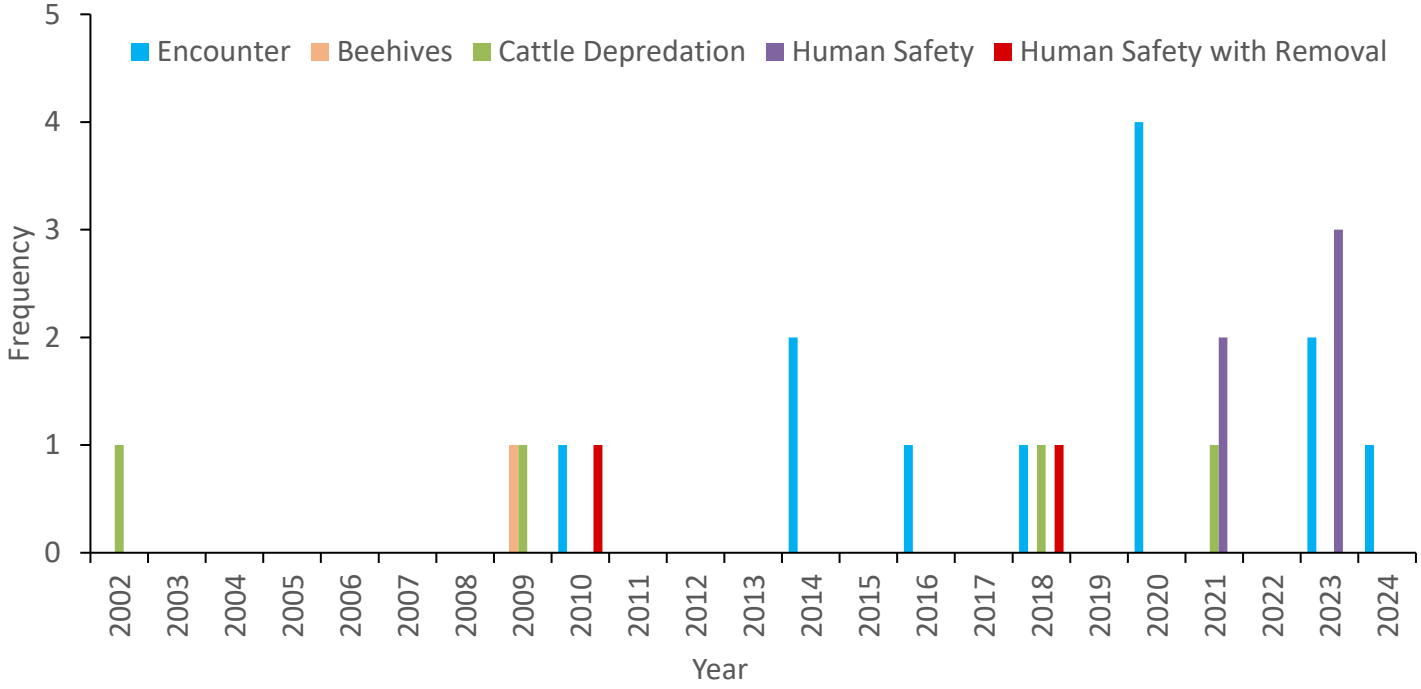

Fig. 42. Reported grizzly bear encounters and conflicts on the Wind River Reservation in the Greater Yellowstone Ecosystem, 2002-2024.

Human-Grizzly Bear Interactions in Yellowstone National Park

(Kerry A. Gunther, Travis C. Wyman, and Eric G. Reinertson, Yellowstone National Park)

Knowledge of the relative risk of bear attack assists park managers in prioritizing bear safety messages for different types of recreational activities occurring in the park. Knowing the probability of attack also provides managers with quantitative information on the significance of risk when making decisions on implementing voluntary versus regulatory mechanisms designed to reduce the frequency of bear attacks. To address this need, we began recording information on human-bear interactions in YNP in 1991. Because the risk of bear attack varies depending on visitor location and activity, we grouped human-bear interactions into six broad categories based on the locations where they occurred, including: 1) within front-country developments; 2) along road corridors; 3) along front-country trails; 4) within backcountry campsites; 5) along backcountry trails; and 6) in off-trail backcountry areas. We considered all human-grizzly bear encounters where the person involved believed the bear was mutually aware of their presence as an interaction.

Human-Bear Interactions within Developed Front-country Sites

Bears enter front-country developments in the park for a variety of reasons, including travel, foraging for natural foods, and avoiding more dominant bears. In addition, human food-conditioned bears sometimes enter park developments seeking human foods or garbage. However, since implementation of a new bear management program in 1970, it is rare for bears to obtain anthropogenic food rewards in park developments. Under the park's Bear Management Plan, front-country developments are managed for people and bears are actively excluded through removal of natural and anthropogenic attractants, hazing, capture and relocation, and capture and removal.

Activity of Bears in Front-country Developed Sites

In 2024, there were 54 incidents where grizzly bears entered park developments (Table 39). In 43% (n = 23) of the incidents, bears foraged for natural foods within developments, and in 33% (n = 18) it appeared the bear was just traveling through the development. In three incidents, bears were investigating anthropogenic foods but did not obtain food rewards; in two incidents bears obtained anthropogenic food rewards; in one incident a bear curiously approached people; and in one incident a bear was bedded down within a developed area. In six incidents the bear's behavior was not reported.

Reactions of Bears to the Presence of People in Front-country Developments

Grizzly bears were known to have encountered people in 41 of the 54 incidents where they entered developments (Table 40). Bears fled in 49% (n = 20) of the encounters and exhibited no overt reaction in 44% (n = 18). In one incident a bear curiously approached a stationary person, and in one incident a bear charged at a person. Grizzly bears did not injure any visitors within park developments in 2024. The last grizzly bear inflicted human injury within a park developed area occurred 22 years ago in 2002. In that incident, a woman initially reacted passively (stood still and looked up toward the sky) to a subadult grizzly that curiously approached her. After the bear bit her on the thigh, the woman changed her response, became aggressive toward the bear, and it immediately left. The woman received only minor injuries.

Human-Bear Interactions along Roads

Bears frequent habitats adjacent to roads in the park for many reasons, including traveling, foraging for natural foods, avoiding more dominant bears, and occasionally seeking discarded food scraps or human food handouts. In the past (1910–1976), black bears commonly panhandled along park roads for food handouts from visitors (Schullery 1992). Strict enforcement of regulations prohibiting the feeding of bears after 1970 has mostly eliminated this behavior in park bears and visitors. However, grizzly and black bears are still regularly observed near park roads traveling and foraging for native foods. Unlike park developments that are managed solely for people and bears are actively excluded, roadside habitats are managed for both human and bear uses. Although bears are not allowed to remain or linger on the paved road, road shoulder, roadside pull-outs, or adjacent drainage ditch, they are tolerated in roadside meadows and are not actively discouraged from using habitats

adjacent to roads to forage for natural foods as long as park visitors maintain a 90-m (100-yard) distance from them and do not feed them.

Bear Activity along Roadsides

In 2024, 499 reports of grizzly bears frequenting habitat along park roads were recorded (Table 41). In most of these incidents, the bears primary activity was foraging for natural foods (75%, *n* = 373) or traveling (18%, *n* = 92). Other activities reported included swimming (1%, *n* = 7), sleeping (1%, *n* = 3), investigating vehicles without obtaining a food reward (<1%, *n* = 2), aggressively approaching people (<1%, *n* = 1), courtship activities, and various other behaviors (*n* = 8). In 12 incidents, the bears reaction to people was not reported.

Bear Reactions to the Presence of People Along Roadsides

Grizzly bears were noticeably aware of the presence of people in 351 of the 499 reports of bear activity along roads (Table 40). Bears reacted with neutral behaviors in 67% (*n* = 236) of the encounters and fled in 31% (*n* = 109). Grizzly bears displayed curious behavior and walked toward people in 1% (*n* = 2) of the roadside encounters. In two incidents (1%), grizzly bears charged toward people without making contact. In two incidents, the bears' reaction to people was not reported. Grizzly bears did not injure any visitors along park roads in 2024. No park visitors have been injured by grizzly bears along park roads outside of developments during the 34-year study period (1991–2024).

Human-Bear Interactions on Front-country Trails

Yellowstone National Park contains approximately 24 kilometers of front-country trails. Front-country trails are short trails located adjacent to roads and developments that contain interpretive signs providing visitors with information about geysers or other natural features. Front-country trails often have boardwalks to provide a stable walking surface with gentle grades or steps to get up and down hills, allowing use by visitors of wide-ranging ages, physical abilities, and hiking experience. During the peak visitor season, hundreds to thousands of visitors walk the front-country trails each day. Bears sometimes travel or forage on or adjacent to front-country trails.

In 2024, there were three incidents where people encountered grizzly bears on front-country trails. In all three incidents the bears fled (Table 40). The last grizzly bear inflicted human injury on a front-country trail occurred 21 years ago in 2003. In that incident, a woman initially reacted passively (dropped to the ground and played dead) to a subadult grizzly that curiously approached her. After the bear pounced on and bit her, her husband aggressively ran at the bear while yelling loudly, which scared the bear away. The woman received only minor injuries.

Human-Bear Interactions in Backcountry Areas

In backcountry areas of the park, bears are generally given priority in recreation management decisions where bear and human activities are not compatible. Yellowstone National Park implements seasonal closures and restrictions on recreational use of backcountry areas during periods when bear activity is concentrated on specific foods in predictable locations. In addition, backcountry trails, campsites, and off-trail areas are sometimes temporarily closed to recreational use for short periods when concentrated bear activity poses a safety threat to park visitors.

Bear Activity in Occupied Backcountry Campsites

In 2024, there were five reports of grizzly bears entering occupied backcountry campsites. Incidents included grizzlies walking through the core camp, foraging native foods in the core camp, investigating a tent without getting a food reward, obtaining a food reward in the core camp, and approaching people in the core camp.

Bear Reactions to Encounters with People in Occupied Backcountry Campsites

Grizzly bears were noticeably aware of the presence of people and responded by fleeing in all five incidents in backcountry campsites. Grizzly bears did not injure any visitors in backcountry campsites in 2024. The last grizzly bear-inflicted human injury in a backcountry campsite occurred 40 years ago in 1984. In that incident, a woman, camping alone, was pulled from her tent, killed, and consumed by a grizzly bear.

Bear Reactions to Encounters with People on Backcountry Trails

In 2024, there were 26 incidents reported where people encountered grizzly bears on backcountry trails (Table 40). Grizzly bears reacted to encounters with people on backcountry trails with flight (42%; n = 11), by charging without making contact (35%; n = 9), neutral behaviors (12%; n = 3), stress/warning/agitation (8%, n = 2), and curiously approaching the people they encountered (4%; n = 1). Grizzly bears did not injure any visitors during encounters along backcountry trails in 2024. The most recent grizzly bear inflicted human injury on a hiking trail occurred in 2021 and involved a surprise encounter between a lone day hiker and female grizzly with a yearling on the Beaver Ponds trail.

Bear Reactions to Encounters with People in Off-Trail Backcountry Areas

In 2024, there were 16 incidents reported where people encountered grizzly bears while traveling off trail in backcountry areas (Table 40). Grizzly bear reactions to encounters in off-trail backcountry areas included flight (38%, n = 6), neutral behaviors (19%, n = 3), charging without making contact (19%; n = 3), curiously approaching without making contact (13%, n = 2), and stress/warning/agitation behaviors (6%, n = 1). In one incident, the bear's reaction to people was not reported. Grizzly bears did not injure any people during off-trail encounters in 2024. The most recent grizzly bear inflicted human injury in an off-trail backcountry area involved a lone day hiker on Elephant Back Mountain in 2015.

Risk of Bear Attack

Because most grizzly bear attacks from 1991 to 2024 (93%, 25 of 27) occurred in backcountry areas, we evaluated the probability of being attacked and injured by a grizzly bear while recreating in the backcountry. We calculated the number of backcountry human-grizzly bear encounters that occurred per grizzly bear-inflicted human injury. From 1991 to 2024, there were 2,265 encounters between grizzly bears and backcountry recreationists where the bears reaction behavior was reported. In 25 of those encounters, grizzly bears injured people. Therefore, the risk of being injured by a grizzly bear was approximately 1 injury for every 91 backcountry encounters. This estimate is likely biased high, because benign encounters where bears fled or behaved in a neutral or unaggressive manner were less likely to be reported than injurious or aggressive encounters, likely skewing the data toward more aggressive interactions.

Discussion

The grizzly bear-human interactions reported in 2024 (Table 42) were typical of those observed since 1991 (Table 43). In 8,102 encounters between grizzly bears and people reported from 1991–2024, grizzly bears reacted with neutral behaviors (no overt reaction) in 56% (n = 4,524) of instances, by fleeing (running or walking away) in 33% (n = 2,678), with curious behaviors (approaching or following) in 3% (n = 244), and with stress, agitation, bluster, threat, or warning behaviors (blowing, huffing, woofing, vocalizing, teeth clacking, paw-slap lunging, hop charging, and charging without contact) in 4% (n = 332). The bears behavioral reaction was not reported in 4% (n = 297) of the interactions. Grizzly bears injured people in <1% (n = 27) of the encounters. Attacks occurred at a higher rate during off-trail backcountry interactions (1 attack for every 55 off-trail backcountry encounters) than during on-trail interactions (1 attack for every 102 on-trail backcountry encounters). Grizzly bears rarely attacked during encounters with people in front-country areas where human presence was spatially predictable to bears, such as along primary roads (0 attacks in 4,860 encounters), within developments (1 attack in 808 encounters), and along front-country trails (1 attack in 83 encounters). The only two attacks in front-country areas both involved people that reacted passively to subadult grizzly bears that approached them in a curious manner. Neutral reactions to encounters with people were most common along roads (70%, 3,423 of 4,860 roadside encounters), whereas flight was the most common response during off-trail encounters in backcountry areas (53%, 262 of 495 off-trail backcountry encounters).

Despite their ferocious reputations, long-term monitoring of human-grizzly bear interactions in YNP indicates grizzly bears were tolerant of people in most encounters, especially those that occurred in areas where human activity was spatially predictable. Overall, grizzly bears reacted with neutral behaviors in more than half of reported encounters parkwide. Neutral responses to encounters may be more common in national parks where human-bear interactions are frequent and rarely result in the bear being harmed or killed, leading to

higher levels of habituation to people in national parks compared to non-park areas (Herrero et al. 2005, Gunther et al. 2018). Grizzly bears seldom displayed threat or warning behaviors and only very rarely made contact or injured people during encounters in the park. However, in rare incidents where contact was made, injuries were sometimes severe or fatal. Most injuries involved people hiking in backcountry areas. To reduce the chances of grizzly bear attack, we recommend backcountry recreationists: 1) hike in groups of three or more people as bears rarely attack large groups; 2) stay on designated trails where bears are more likely to expect encounters with people; 3) make noise in areas with limited visibility to warn bears of their presence; 4) remain vigilant when hiking to reduce the chances of surprise encounters with bears; 5) not run from bears during encounters as running may trigger a chase response; 6) back away slowly from nervous bears to give them space; 7) stand their ground when charged by bears during surprise encounters as most bears will stop short or veer off when hikers stand their ground when being charged; and, 8) play dead when grizzly bears make contact during surprise encounters because bears will generally stop the attack and leave once the perceived threat to themselves, their cubs, or their food has been neutralized (Herrero 2002, Gunther and Haroldson 2020). We also recommend that all backcountry recreationists in YNP and other areas inhabited by grizzly bears carry a bear deterrent. Although the type of deterrent to carry (bear spray, bear bells, firearm, air horn) is a personal choice (Smith et al. 2008, 2012), bear spray requires little training, has proven easy to use, and has been highly effective at stopping or reducing the length and severity of most grizzly bear attacks, and also conserves the lives of bears (Herrero and Higgins 1998, Herrero 2002, Smith et al. 2008, 2020).

Table 39. Primary activity of grizzly bears that entered front-country developments, Yellowstone National Park, 2024.	
Activity of bear while inside development	**Incidents**
Not reported or unknown	6
Travel through	18
Forage for natural foods	23
Investigate anthropogenic foods but no food reward and no property damage	3
Investigate and damage property but no food reward	0
Investigate and obtain anthropogenic foods	2
Other activity	2
Total	54

Table 40. Reactions of grizzly bears to encounters with people reported in Yellowstone National Park, 2024.							
Reaction of bear	**Development**	**Along roadside**	**Front-country trail**	**Backcountry campsite**	**On trail**	**Off trail**	**Total**
Not reported/not known	1	2	0	0	0	1	4
Flight response							
Run away	10	34	2	3	7	3	59
Walk away	10	75	1	2	4	3	95
Adult climb tree	0	0	0	0	0	0	0
Cubs climb tree/adult remain	0	0	0	0	0	0	0
Flight behavior subtotal	20	109	3	5	11	6	154
Neutral behaviors							
No overt reaction	17	235	0	0	3	2	257
Stand up on hind legs	1	1	0	0	0	1	3
Circle down wind	0	0	0	0	0	0	0
Neutral behavior subtotal	18	236	0	0	3	3	260
Curious behaviors							
Approach stationary person	1	2	0	0	1	1	5
Follow mobile person	0	0	0	0	0	1	1
Investigate vehicle	0	0	---	---	---	---	0

Table 40. Reactions of grizzly bears to encounters with people reported in Yellowstone National Park, 2024.							
Reaction of bear	**Development**	**Along roadside**	**Front-country trail**	**Backcountry campsite**	**On trail**	**Off trail**	**Total**
Curious behavior subtotal	1	2	0	0	1	2	6
Stress/agitation/warning signals							
Salivate	0	0	0	0	0	0	0
Sway head side to side	0	0	0	0	0	0	0
Make huffing noises	0	0	0	0	1	0	1
Pop jaws/teeth clacking noises	0	0	0	0	0	0	0
Stood ground watched/stared	0	0	0	0	1	1	2
Slap ground with paw	0	0	0	0	0	0	0
Flatten ears/erect spinal hairs	0	0	0	0	0	0	0
Stiff legged walk/hop	0	0	0	0	0	0	0
Stress/warning behavior subtotal	0	0	0	0	2	1	3
Aggressive behaviors							
Growl/vocalization	0	0	0	0	0	0	0
Stalk	0	0	0	0	0	0	0
Run toward/aggressive charge	1	2	0	0	9	3	15
Aggressive behavior subtotal	1	2	0	0	9	3	15
Attack behaviors							
Defensive attack	0	0	0	0	0	0	0
Predatory attack	0	0	0	0	0	0	0
Attack unknown cause	0	0	0	0	0	0	0
Attack behavior subtotal	0	0	0	0	0	0	0
Total	41	351	3	5	26	16	442

Table 41. Primary activity of grizzly bears observed along roadsides, Yellowstone National Park, 2024.	
Activity of bear	**Incidents**
Not reported/unknown	12
Traveling	92
Foraging natural foods	373
Courtship	1
Swimming	7
Nursing young	0
Playing	0
Bedded/sleeping	3
Investigating vehicles/seeking anthropogenic foods; no food reward	2
Obtain anthropogenic foods	0
Damage property	0
Aggressive approach/posture toward people	1
Attack people	0
Other	8
Total	499

Table 42. Grizzly bear reactions reported in 442 interactions with people in different location settings, Yellowstone National Park, 2024.												
Location of encounter	Reaction of bear											
	Reaction not reported		Flee		Neutral behavior		Curious behavior		Stress, warning, agitation		Attack	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Park development	1	2	20	49	18	44	1	2	1	2	0	0
Roadside corridor	2	1	109	31	236	67	2	1	2	1	0	0
Front-country trail	0	0	3	100	0	0	0	0	0	0	0	0
Backcountry campsite	0	0	5	100	0	0	0	0	0	0	0	0
Backcountry trail	0	0	11	42	3	12	1	4	11	42	0	0
Backcountry off-trail	1	6	6	38	3	19	2	13	4	25	0	0
Total	4	1	154	27	260	67	6	2	18	3	0	0

Table 43. Grizzly bear reactions to interactions with people (n = 8,102) in different location settings, Yellowstone National Park, 1991–2024.												
Location of encounter	Reaction of bear											
	Reaction not reported		Flee		Neutral behavior		Curious behavior		Stress, warning, agitation		Attack	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Park development	27	3	377	47	371	46	18	2	14	2	1	<1
Roadside corridor	151	3	1,144	24	3,423	70	64	1	78	2	0	0
Front-country trail	32	39	35	42	3	4	6	7	6	7	1	1
Backcountry campsite	10	4	94	41	93	41	20	9	11	5	0	0
Backcountry trail	63	4	766	47	488	30	117	7	178	11	16	1
Backcountry off-trail	14	3	262	53	146	30	19	4	45	9	9	2
Total	297	4	2,678	33	4,524	56	244	3	332	4	27	<1

Visitor Compliance with Bear Safety Recommendations in Yellowstone National Park

(Kerry A. Gunther, Eric G. Reinertson, and Travis C. Wyman, Yellowstone National Park)

Improvements in information and education efforts aimed at recreational safety in bear country are paramount in the face of substantial increases in human occupation and recreation, combined with increasing grizzly bear numbers and distribution in the GYE. Two human behaviors that can reduce the risk of bear attack include hiking with large party sizes that are rarely attacked by bears (Herrero 2002) and carrying bear deterrent spray to deter bears that react aggressively to encounters (Herrero and Higgins 1998, Smith et al. 2008). To reduce the risk of bear attack in YNP, park managers distribute safety information to visitors recommending that backcountry recreationists traveling by foot maintain group sizes of ≥3 people and carry bear spray. To evaluate visitor compliance with these safety recommendations, we conduct annual surveys to determine the proportion of recreationists that hike in groups of ≥3 people and the proportion that carry bear spray or use other deterrents, such as firearms, or warning devices such as bear bells.

Data were collected by Bear Management Office staff and instructors and students from Ecology Project International. Due to time, budget, and staffing constraints, surveys were conducted opportunistically. While working on other bear research, monitoring, and management projects throughout the park, we recorded how many recreationists encountered at trailheads and on trails and boardwalks were carrying bear spray or other deterrents. We also recorded information on group size and type of recreational activity. We grouped recreational activity into six broad categories: 1) day hikers (including anglers and photographers); 2) overnight backpackers; 3) boardwalk trail users; 4) stock (horse or mule) day riders; 5) stock overnight riders; and 6) day-use bicyclist trail riders. We conducted our surveys visually. We recorded the presence of bear spray and other deterrents that were visible and, therefore, quickly retrievable. Bear spray or other deterrents stored in backpacks, saddlebags, panniers, or carried under coats would likely not be retrievable fast enough for use during surprise encounters with bears.

In 2024, we surveyed 2,281 people in 818 groups at 28 different backcountry trails and three boardwalk trails. Our surveys included 1,674 backcountry day hikers, 468 people on boardwalk trails, 133 overnight backpackers, and 6 day-use bicyclists. No day-use or overnight-use stock riders were surveyed in 2024.

Day Hikers

Yellowstone National Park contains >1,600 km (1,000 miles) of backcountry hiking trails accessible from 92 trailheads located throughout the park. We surveyed 1,674-day hikers traveling in 586 groups on 22 different trails. Average party size was 2.9 people (Table 44). The most common (mode) group size and the median group size were two people per party. Fifty-seven percent (n = 337) of day hiking parties had less than the recommended party size of three people and 13% (n = 76) hiked alone. Of the 1,674-day hikers, 329 (20%) carried bear spray, 13 (1%) had bear bells, and 3 (<1%) carried firearms (Table 45). Of the 596 groups of day hikers, 241 (40%) had at least one member that carried bear spray, 12 groups (<1%) had at least one person with bear bells, and 3 groups (1%) had at least one person carrying a firearm.

Overnight Backpackers

Yellowstone National Park has 300 designated backcountry campsites. We surveyed 133 backpackers in 54 groups on 10 different trails. Average party size was 2.5 people (Table 44). Both the most common group size (mode) and the median group size were two people per party, respectively. Seventy-four percent (n = 40) of the backpacking groups had fewer than the recommended party size of three people and 41% (n = 22) hiked alone. Of the 133 backpackers, 90 (68%) carried bear spray. None of the backpackers carried bear bells or firearms (Table 45). Of the 54 groups of backpackers, 47 (87%) had at least one person in the party that carried bear spray.

Stock Day Riders

No stock day riders were surveyed in 2024 (Table 44).

Stock Overnight Riders

No stock overnight riders were surveyed in 2024 (Table 44).

Day Use Bicycle Trail Riders

Yellowstone National Park contains 13 designated bike trails. We surveyed six people in three groups on one trail riding bicycles on day trips. Average party size was two people (Table 44). The most common group size (mode) and the median group size were two people per party. One of the six bicyclists carried bear spray; none carried bear bells or firearms (Table 45).

Boardwalk Trails

Yellowstone National Park contains approximately 24 km of front-country boardwalk trails adjacent to park roads that contain interpretive signs providing visitors with information about geysers or other natural features. Park regulations prohibit stock animals and overnight camping on or along boardwalk trails. We surveyed 468 people in 175 groups on three boardwalk trails. Average party size was 2.7 people (Table 44). The most common group size (mode) and the median group size were two people per party. Only 2% (n = 10) of the individuals and 6% (n = 10) of the groups observed carried bear spray (Table 45). None of the people surveyed on boardwalk trails had bear bells or firearms.

Use of Bear Spray

In 2024, there were five incidents reported where people deployed bear spray during encounters with bears. Black bears were involved in three of the incidents, a grizzly bear in one, and in one incident the people were unsure of the species of bear they sprayed.

On June 1 at approximately 7:00 a.m. a concessions employee at the Grant Village Campground was charged by a grizzly bear in Campsite #402 in the K-loop. The grizzly charged to 10 feet when the employee deployed bear spray, causing the bear to turn and run 30 yards away. The grizzly then charged again, and the employee sprayed it again causing the bear to flee into the forest. The bear did not return after being sprayed the second time.

On June 15 at approximately 2:30 p.m., some hikers were charged by a bear approximately 2 miles in on the Ribbon Lake Trail. The bear spray was successful at stopping the charge. The hikers were rather shaken up by the incident, and it happened so fast that they were unsure what species of bear charged them.

On the evening of July 20, a black bear entered backcountry campsite 2S8 while it was occupied by an outfitted stock party. The bear entered the campsite while the people were sitting around the campfire. The outfitter sprayed the bear with bear spray and the bear left and did not come back.

On July 31 at approximately 2:00 p.m., backpackers in backcountry campsite 1Y2 were charged by a black bear. The bear charged to about 8 feet away, the backpackers deployed their bear spray, and the bear left. However, the bear came back around the periphery of their campsite several hours later.

On August 14 at approximately 8:30 a.m., a black bear approached two backpackers preparing breakfast near the food pole in backcountry campsite 3U2. The backpackers yelled at the bear, but it continued to slowly approach them and their food. While one person packed up the food, the other sprayed the bear with bear spray causing the bear to stop, hesitate for a moment, and then walk off into the brush and disappear.

Discussion

In 2024, overnight backpackers had the highest level of compliance with the park's bear spray recommendation; 68% of individual backpackers carried bear spray and 87% of backpacking groups had at least one member that carried bear spray. Overnight backpackers have had the highest proportion of individuals and groups traveling on foot that carried bear spray during all 14 years surveys have been conducted (Tables 46 and 47). We suspect the high level of compliance by this type of recreationist is due to the methods used to convey bear safety information to overnight backpackers. In YNP, permits are required for camping in the backcountry. During the permitting process, backpackers receive face-to-face verbal information about bears and bear spray from the ranger issuing the permit and are required to watch a safety video containing information on hiking and camping in bear country and how to use bear spray. Backpackers also receive the "Beyond Roads End" booklet

containing information on use of bear spray and safety recommendations for hiking and camping in bear country. Surveys indicate YNP visitors retain verbal information from uniformed park staff better than written information from signs or brochures (Taylor et al. 2014). Although the average party size for backpackers was 2.5 people per group, 74% of the backpacking groups had fewer than the recommended party size of 3 people and 41% hiked alone. Therefore, a high proportion of observed backpackers did not follow the park's recommended group size of 3 or more people for hiking in bear country. The most common party size (mode) for overnight backpackers during all 14 years of the study has been <3 people per party (Table 48).

Only 20% of day hikers carried bear spray in 2024; however, 40% of day hiking groups had at least one member that carried bear spray. Fewer than 25% of day hikers have carried bear spray in each of the 14 years surveys have been conducted (Table 46). Permits are not required for day hiking so day hikers may not receive the same level of bear safety information as backpackers. Visitors day hiking in the park can seek and obtain bear safety information from the YNP web page, park app, park newspaper, day hike trip planning handouts, safety cards, brochures, social media posts, and from rangers at visitor centers. However, the only bear safety information day hikers receive if they do not seek it out themselves is from signs posted at trailheads. We speculate many day hikers that arrive at trailheads without bear spray are unlikely to go obtain bear spray before starting their hikes, even after reading the trailhead information sign. The most frequently observed group size among day hikers was 2 people per group, indicating many day hikers did not comply with the recommended group size of ≥3 for hiking in bear country. Because most (68%) grizzly bear attacks in YNP involve day hikers (32 of 47 backcountry attacks since 1970), the low level of compliance with bear safety recommendations among day hikers is a concern.

No overnight stock parties were surveyed in 2024. Bear spray may not be very useful while in the saddle, as deploying it from horseback could result in the rider being bucked off their horse. In general, people riding stock are less likely to be involved in surprise encounters and bear attacks. Horses usually sense a bear's presence before a person does (Herrero 2002), alerting the rider and reducing the chances of surprise encounters at close distances. The large size of horses is also more intimidating to bears, making them less likely to charge and initiate contact with a person on horseback during a surprise encounter. In addition, unlike humans, when charged by bears, horses have enough speed and agility to outrun bears, thus providing an added margin of safety if the rider can stay in the saddle. Although stock users are less likely to have surprise encounters with bears, bear spray is useful and encouraged for carry by stock groups for use during lunch and rest stops along the trail and when in camp.

Only one of the bicyclists we encountered on our surveys carried bear spray. Bicyclists incur greater risk of surprise encounters because bicycles are fast and relatively quiet, therefore increasing the odds of surprise encounters.

Although some backcountry recreationists in YNP carry firearms, and it is legal to do so, it is illegal to discharge them within the park, so they are not considered a viable bear deterrent. Only a small proportion of all types of recreationists openly carried firearms in the 14 years we conducted our surveys. Firearms were openly carried by <1% of the recreationists we observed in 2024. Day (4%) and overnight use (2%) stock riders have had the highest frequency of firearms carry. Recreationists riding horses often carry firearms for euthanizing injured stock; however, if these firearms were carried in saddle bags or panniers they would not have been visible during our surveys and would not have been readily available as a bear deterrent during surprise encounters.

Bear bells were carried by 1% of all recreationists surveyed in YNP in 2024. Day hikers had the highest frequency of bear bell use. The low use of bear bells likely reflects their lack of demonstrated effectiveness as an auditory warning device (Herrero 2002). Although bear bells may provide some benefit in alerting bears to the presence of approaching hikers (Jope 1985), they are generally not effective at preventing surprise encounters when hiking in strong winds, near fast moving water, or in dense brush or thick forest which muffles the bells sound (Herrero 2002).

Table 44. Group size characteristics observed for different types of recreational activities in Yellowstone National Park, 2024.					
Type of recreational activity	**Total people**	**Total groups**	**Average**	**Median**	**Mode**
Boardwalk trail (foot travel walking)	468	175	2.7	2	2
Day hiker (e.g., day use foot travel–hiker, angler, photographer)	1,674	586	2.9	2	2
Overnight backpacker (foot travel camping overnight)	133	54	2.5	2	2
Stock–day use	0	0	0	0	0
Stock–overnight use	0	0	0	0	0
Day bicycle trip	6	3	2.0	2	2
Total	2,281	818	2.8	2	2

Table 45. Number and percent of people and groups of recreationists surveyed that carried bear spray, firearms, or bear bells, Yellowstone National Park, 2024.							
	Type of recreation/mode of travel						
	Boardwalk trail	**Day hiker**	**Day use bicycle**	**Overnight backpacker**	**Stock day use**	**Stock overnight use**	**Total (all types)**
Total people surveyed	468	1,674	6	133	0	0	2,281
Parties surveyed	175	586	3	54	0	0	818
People with bear spray							
Total	10	329	1	90	0	0	430
Percent	2.1	19.7	16.7	67.7	0	0	18.9
Parties with bear spray							
Total	10	241	1	47	0	0	299
Percent	5.7	40.4	33.3	87.0	0	0	36.6
People with firearms							
Total	0	3	0	0	0	0	3
Percent	0	0.2	0	0	0	0	0.1
Parties with firearms							
Total	0	3	0	0	0	0	3
Percent	0	0.5	0	0	0	0	0.4
People with bear bells							
Total	0	13	0	0	0	0	13

Table 45. Number and percent of people and groups of recreationists surveyed that carried bear spray, firearms, or bear bells, Yellowstone National Park, 2024.							
	Type of recreation/mode of travel						
	Boardwalk trail	Day hiker	Day use bicycle	Overnight backpacker	Stock day use	Stock overnight use	Total (all types)
Percent	0	0.8	0	0	0	0	0.6
Parties with bear bells							
Total	0	12	0	0	0	0	12
Percent	0	0.2	0	0	0	0	1.5

Table 46. Percent (%) of people engaged in different types of backcountry recreational activities that carried bear spray, Yellowstone National Park, 2011–2024.						
Year	Overnight backpackers	Day hiker	Boardwalk	Stock day use	Stock overnight use	Bicycle day use
2011	53	15	Not surveyed	0	60	Not surveyed
2012	47	11	0	9	44	0
2013	60	16	0	11	22	0
2014	48	14	<1	0	35	33
2015	50	14	1	Not surveyed	14	0
2016	52	19	1	0	100	0
2017	62	21	1	0	0	43
2018	47	21	1	0	25	0
2019	75	21	2	14	0	50
2020	64	19	Not surveyed	0	11	4
2021	53	23	7	0	0	18
2022	91	30	1	60	20	0
2023	67	24	2	Not surveyed	42	0
2024	68	20	2	Not surveyed	Not surveyed	17
2011–2023 combined	59	19	1	7	29	13

Table 47. Percent (%) of groups engaged in different types of backcountry recreational activities that had at least one member that carried bear spray, Yellowstone National Park, 2011–2024.						
Year	**Overnight backpackers**	**Day hiker**	**Boardwalk**	**Stock day use**	**Stock overnight use**	**Bicycle day use**
2011	64	34	Not surveyed	0	50	Not surveyed
2012	73	27	0	67	50	0
2013	82	33	0	33	60	0
2014	73	29	1	0	60	67
2015	100	35	2	Not surveyed	100	0
2016	79	43	2	0	100	0
2017	93	46	3	0	0	67
2018	81	46	3	0	50	0
2019	92	51	4	50	0	60
2020	84	44	Not surveyed	0	50	13
2021	83	52	10	0	0	33
2022	97	54	3	100	100	0
2023	86	47	5	Not surveyed	83	0
2024	87	40	6	Not surveyed	Not surveyed	33
2011–2024 combined	84	41	3	25	58	21

Table 48. Group size characteristics observed for different types of recreational activities, Yellowstone National Park, 2011–2024.					
Type of recreational activity	**Total people**	**Total groups**	**Average**	**Median**	**Mode**
Boardwalk	11,753	4,172	2.8	2	2
Day hiker (e.g., day foot travel–hiker, angler, photographer)	23,188	7,855	3.0	2	2
Overnight backpacker (overnight-foot travel)	1,541	527	2.9	2	2
Horse–day use	142	28	5.1	4	3
Horse–overnight use	158	31	5.1	5	2
Day bicycle trip	158	61	2.6	2	2
Total	36,940	12,674	2.9	2	2

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Appendix A: 2024 Grizzly Bear Annual Habitat Monitoring Report

Grizzly Bear Habitat Modeling Team, Greater Yellowstone Ecosystem

Background

This report is the collective response from the national forests and national parks within the GYE to monitoring and reporting obligations established in the Conservation Strategy developed by the Yellowstone Ecosystem Subcommittee (2024). The Conservation Strategy and habitat standards therein provide management direction for a recovered grizzly bear population once it has been removed from federal protection under the Endangered Species Act. The Conservation Strategy requires annual monitoring and reporting to evaluate federal adherence of habitat standards for the Yellowstone grizzly bear population. These monitoring requirements and initial habitat standards were formalized for the six national forests (now 5; Custer and Gallatin merged) in the *Forest Plan Amendment for Grizzly Bear Habitat Conservation for the Greater Yellowstone Area National Forests, Record of Decision* (herein referred to as Forest Plan Amendment, U.S. Department of Agriculture 2006a,b). Likewise, the Superintendents' Compendia incorporated the Conservation Strategy habitat standards into the legal plans for the three NPS units in the GYE. The legal status of the population has changed multiple times since the 2007 and 2017 delisting rules and subsequent litigation. Regardless of the legal status of the Greater Yellowstone Ecosystem grizzly bear population, however, land managers throughout the GYE are committed to abiding by habitat standards identified in the Conservation Strategy for the long-term protection and health of the grizzly bear population.

Introduction

The primary intent of habitat standards established in the Conservation Strategy is to preserve adequate and secure habitat to sustain a viable grizzly bear population into the foreseeable future. Three distinct habitat standards were enumerated in the Conservation Strategy pertaining to secure habitat (roadless areas), human development, and commercial livestock grazing. All three factors are surrogate measures of human presence (or absence) on the land. Research identifies humans as the driving factor of grizzly bear mortality and displacement in occupied areas across the landscape. These standards impose measurable sideboards on levels of human activity to reduce the negative impacts of human presence. The standards call for no net loss in secure habitat and no net increase in the number of human-developed sites and livestock grazing allotments with respect to conditions which existed in 1998. The delineation of 1998 as a meaningful baseline is predicated on evidence that habitat conditions at that time, and for the preceding decade, contributed to the 4.2–7.6% annual growth of the Yellowstone grizzly bear population observed between 1983 and 2001. Habitat standards apply only within the GBRZ located at the core of the GYE (Fig. A1).

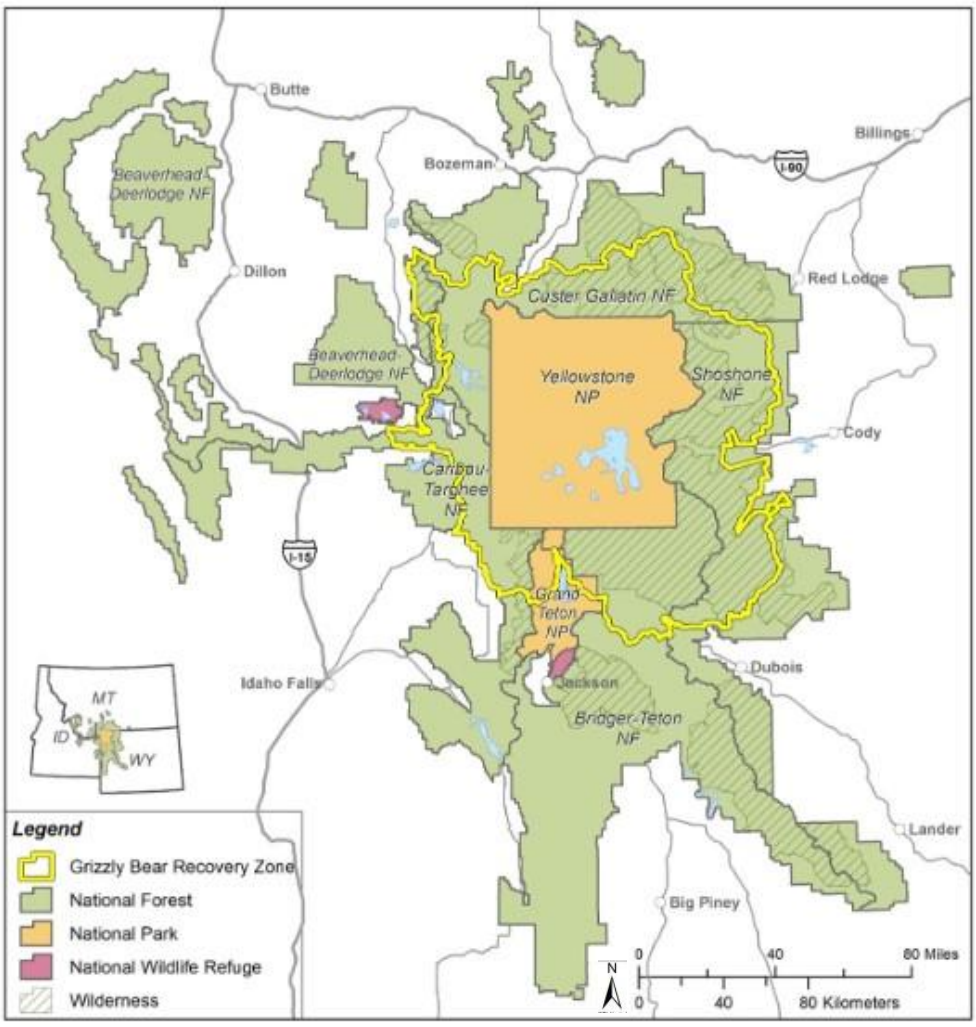

Fig. A1. Federal lands comprising the Greater Yellowstone Ecosystem and the Grizzly Bear Recovery Zone.

Annual Monitoring Requirements inside the Grizzly Bear Recovery Zone

In compliance with annual habitat monitoring protocols, this report summarizes habitat changes incurred annually inside the GBRZ and compares current habitat status with that of 1998 for the following monitored parameters: 1) number and acreage of commercial livestock grazing allotments and permitted domestic sheep animal months; 2) number of developed sites; 3) percent secure habitat; and 4) motorized access route densities. In addition, all grizzly bear conflicts associated with livestock allotments occurring on public land are summarized annually for the ecosystem, both inside and outside the GBRZ. Current status of secure habitat and motorized route densities are evaluated, summarized, and reported against 1998 levels annually for each of the 40 subunits within the 18 Bear Management Units (Fig. A2). The number and status of livestock allotments is annually reported against 1998 levels for each national forest and park unit inside the GBRZ. The 1998 habitat baseline represents the most current and accurate information available documenting habitat conditions inside the GBRZ during 1998. National forest and park personnel continue to improve the quality of their information to reflect more accurately what was on the landscape in 1998.

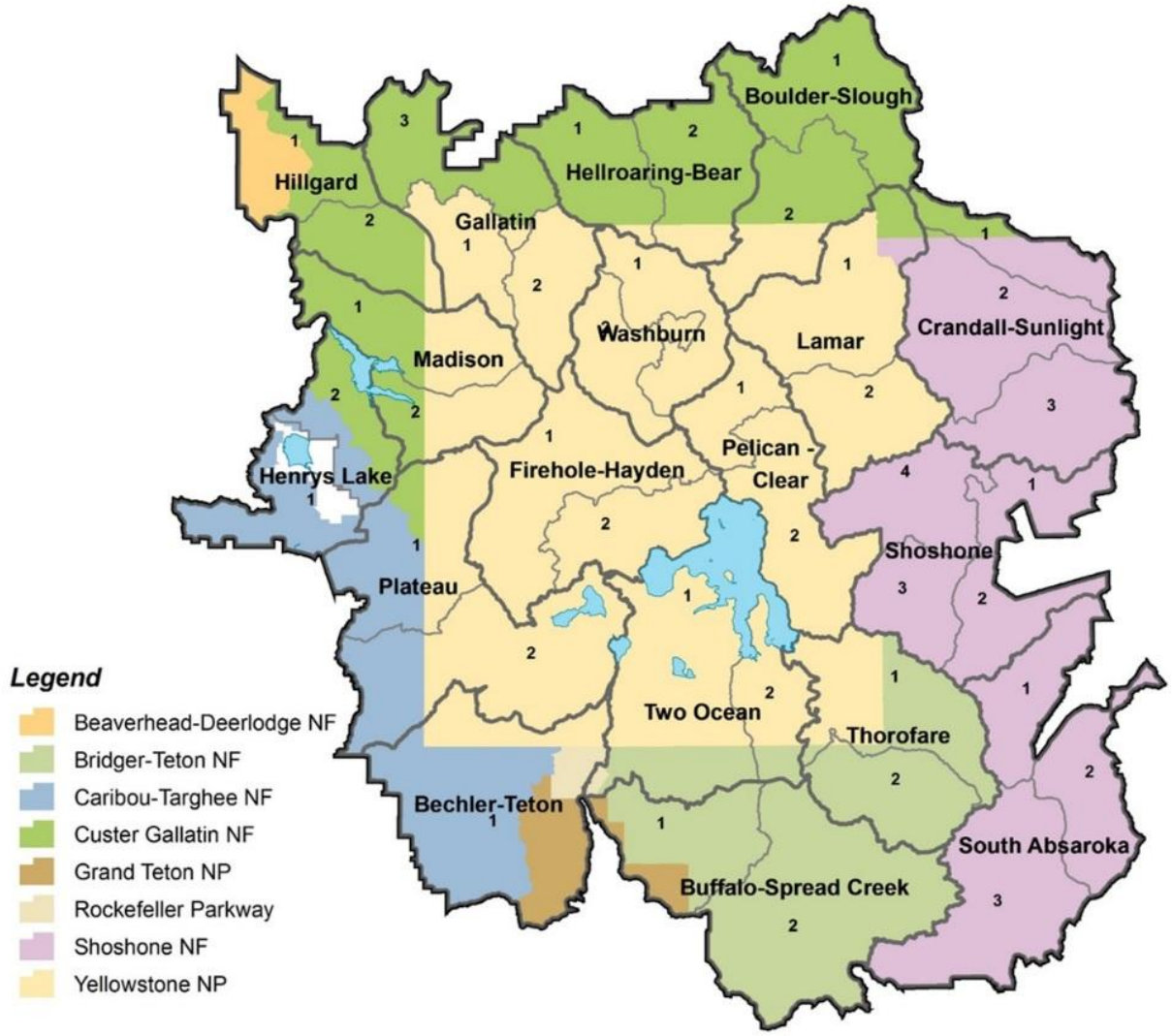

Fig. A2. Bear Management Units and subunits comprising the Grizzly Bear Recovery Zone in the Greater Yellowstone Ecosystem. NF refers to National Forest; NP refers to National Park.

Biennial Monitoring Requirements outside the GBRZ

In addition to annual monitoring requirements identified in the Conservation Strategy, the 2006 Forest Plan Amendment requires the reporting of changes in percent secure habitat on National Forest lands outside the GBRZ every 2 years. Although the requirement is to report changes by National Forest, it was determined that Bear Analysis Units (BAUs) were more consistent with reporting protocols inside the GBRZ. Boundaries of BAUs are tied to areas determined to be biologically suitable and socially acceptable for grizzly bear occupancy and coincide with areas the states are currently managing for grizzly bear populations or are considering for future management. Habitat standards do not apply outside the GBRZ; however, percent secure habitat is reported for monitoring and tracking purposes. There are 43 BAUs (Fig. A3), each the approximate size of BMU subunits inside the GBRZ.

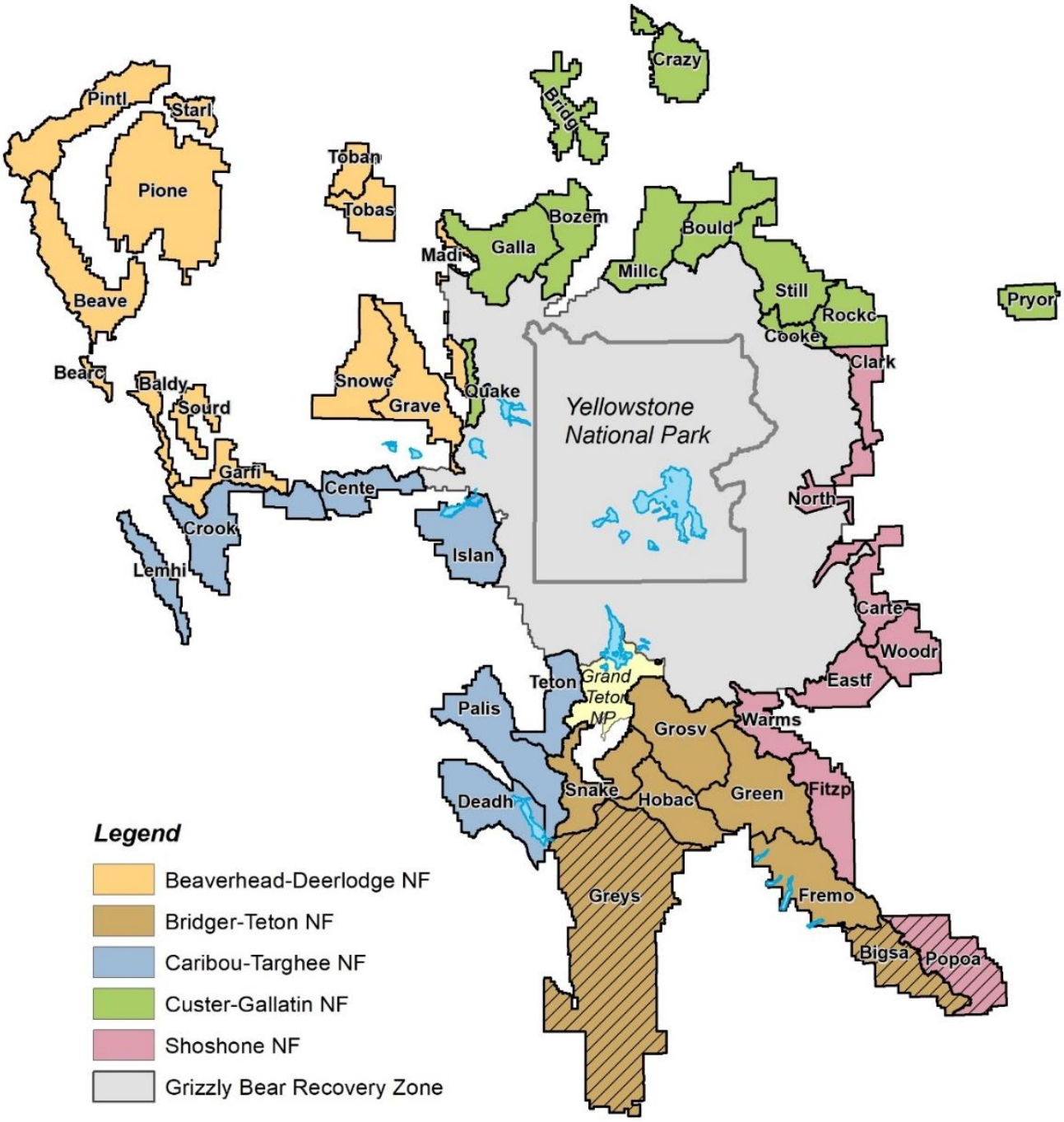

Fig. A3. Bear Analysis Units outside the Grizzly Bear Recovery Zone on the five National Forests in the Greater Yellowstone Ecosystem. Hatched areas are currently not reported as they are determined socially unacceptable for grizzly bear occupancy.

Monitoring of Livestock Grazing

The habitat standard for livestock allotments identified in the 2024 Conservation Strategy requires there be no net increase in the number or acreage of active commercial livestock grazing allotments and no increase in permitted sheep animal months on federal lands inside the GBRZ from that which existed in 1998. Changes in active and vacant livestock allotments cited in this report account for all commercial grazing allotments occurring on federal lands within the GBRZ. Livestock grazing on private inholdings and horse grazing

associated with recreational use and backcountry outfitters are not covered by the grazing standard and are not covered in this report. Operational status of allotments is categorized as active, vacant, or closed. An active allotment is one with a current grazing permit. However, an active allotment can be granted "non-use" on a year-by-year basis when a permittee chooses not to graze livestock or when management seeks a resolution to grazing conflicts. Vacant allotments are those without an associated term grazing permit, but which may be grazed periodically by other permittees at the discretion of the land management agency. Such reactivation of grazing on vacant allotments is typically on a temporary basis to resolve resource issues or other management concerns. Vacant allotments can be assumed non-grazed unless otherwise specified. A closed allotment is one that has been permanently deactivated such that commercial grazing will not be permitted to occur anytime in the future. Sheep animal months are derived by multiplying the number of permitted sheep by the number of months of permitted grazing on a given allotment. Existing sheep allotments inside the GBRZ are to be phased out as opportunity arises with willing permittees.

Commercial grazing allotments on public lands inside the GBRZ are tracked through time to evaluate adherence to the habitat standard at 1998 levels or lower. The number of commercial livestock allotments, by itself, is not a meaningful metric of change because individual allotments can be combined or divided without affecting the overall footprint of commercially grazed land. Likewise, allotment boundaries can be reconfigured or modified over time to enclose smaller or larger areas. Thus, the total acreage of grazed lands constitutes a more meaningful metric of overall change on the landscape. See Table A1 for the 2023 status of livestock allotments compared against the 1998 baseline.

Several corrections to the livestock allotment database were made for the Shoshone and Custer Gallatin National Forests. This resulted in changes to the number and acreage of active cattle allotments in 1998 and 2024.

Change in cattle allotments since 1998

Since 1998, the total acreage of active cattle grazing on public lands inside the GBRZ has been reduced by 33% (213,645 acres, 865 km2). Approximately 74% of this net reduction was the result of permanent closures, and 26% was from active allotments that were vacated. With closure of the only cattle allotment inside GTNP in 2011, there currently is no livestock grazing occurring on national park lands inside the GYE (Table A1).

Change in sheep allotments since 1998

Domestic sheep allotments on public lands inside the GBRZ have largely been phased out since 1998. In 1998 there were 11 active sheep allotments on public lands inside the GBRZ, amounting to 148,368 acres (600 km^2). Since 1998, there has been a 98% net reduction in the acreage grazed by sheep on public lands inside the GBRZ. Of the 11 actively grazed sheep allotments, 8 have been permanently closed and 2 were converted to cattle allotments in 2003 that remain active today (the Beartooth and Pearson allotments on the Shoshone National Forest). The only active sheep allotment remaining on public lands inside the GBRZ today is the Meyers Creek allotment located on the Caribou-Targhee National Forest and part of the U.S. Department of Agriculture Sheep Experiment Station. Although "active", the Myers Creek allotment has not been issued a grazing permit since the Willow Creek fire in 2008. Consequently, there has been no domestic sheep grazing on public lands inside the GBRZ for the past 16 years (Table A1).

Change in livestock allotments during 2024

During 2024, there were no reported changes in livestock grazing allotments on federal lands inside the GBRZ.

Table A1. Number of commercial livestock grazing allotments and sheep animal months inside the GBRZ in 1998 and 2024.

Administrative unit	Cattle allotments				Sheep allotments				Sheep animal months	
	Active		Vacant		Active		Vacant			
	1998	2024	1998	2024	1998	2024	1998	2024	1998	2024
Beaverhead-Deerlodge National Forest	3	3	2	0	0	0	0	0	0	0
Bridger-Teton National Forest	9	6	0	1	0	0	0	0	0	0
Caribou-Targhee National Forest [a]	11	7	1	1	7	1	4	0	14,163	1,970[a]
Custer Gallatin National Forest	18	8	10	5	2	0	4	0	3,540	0
Shoshone National Forest	26	24	0	1	2	0	2	2	5,387	0
Grand Teton National Park	1	0	0	0	0	0	0	0	0	0
Total count in GBRZ	68	48	13	8	11	1	10	2	23,090	1.970
Total acres in GBRZ	650,473	436,828	67,846	70,985	148,368	3,504	77,066	10,255		
Total area in GBRZ (km^2)	2,632	1,767	275	287	600	14	312	42		

[a] The Meyers Creek allotment, the only active sheep grazing unit remaining inside the GBRZ, did not request a permit in 2024.

Livestock Conflicts throughout the Greater Yellowstone Ecosystem

Conflicts between grizzly bears and livestock have historically led to the capture, relocation, and removal of grizzly bears in the GYE. This section summarizes the reported grizzly bear conflicts associated with livestock grazing on sheep and cattle grazing allotments and forage reserves on National Forest lands within the GYE. Livestock-grizzly bear conflicts associated with uses other than commercial livestock production and conflicts occurring on private or state lands are not included in this report.

Livestock conflicts in 2024

In 2024, a total of 169 grizzly bear conflicts associated with livestock depredation on USFS lands were reported inside the GYE (Fig. A4). These conflicts occurred on 35 distinct commercial grazing allotments distributed throughout the ecosystem. Incidents in 2024 involved 164 cattle and 5 sheep depredation occurrences. Conflicts were reported on four National Forests in the GYE including the Beaverhead-Deerlodge (n = 24), Bridger-Teton (n = 99), Caribou-Targhee (n = 18), and Shoshone (n = 28) National Forests. Approximately 88% (n = 148) of the conflicts occurred outside the GBRZ. The five conflicts involving sheep occurred on two Beaverhead-Deerlodge National Forest allotments outside of the GBRZ. Of the 169 livestock-related conflicts, 56% (n = 94)

occurred on the Upper Green River cattle allotment located outside the GBRZ on the north portion of the Bridger-Teton National Forest.

During 2024, 13 grizzly bears were removed in response to livestock depredations on USFS lands. One adult female was removed from the Fossil/Hellroaring allotment on the Beaverhead-Deerlodge National Forest for persistent sheep depredation, but a cub that accompanied her was not captured. The remaining removals were for cattle depredation. Those included two adult males on the Caribou-Targhee National Forest (Grandview and Squirrel Meadows allotments), and two adult females and two adult males on the Bridger-Teton National Forest (Upper Green allotment). Six male bears were removed from the Shoshone National Forest including four adults (Salt Creek (1), Union Pass (1), and Reef Creek (2) allotments) and two subadults (Community (2) allotment). Three of the removals occurred within the GBRZ.

Recurring livestock conflicts 2020–2024

Livestock conflicts are considered recurring when cattle or sheep depredation incidents involving grizzly bears are reported on a given allotment in three or more years during the preceding 5-year period. During 2020–2024, 658 livestock conflict incidents were reported on grazing allotments on National Forest lands inside the GYE (Table A2). Approximately 93% (n = 610) of these conflicts occurred outside the GBRZ. Of the 658 conflicts, 53% (n = 351) occurred on the Upper Green River cattle allotment located outside the GBRZ on the Bridger-Teton National Forest. Twenty-two allotments experienced recurring conflicts, including eight on the Beaverhead-Deerlodge National Forest, two on the Bridger-Teton National Forest, and 11 on the Shoshone National Forest (Table A2).

Over the past 5 years, 27 grizzly bears were removed from the population due to persistent livestock depredation on USFS allotments. These 27 management removals included 6 females (5 adult, 1 subadult) and 21 males (18 adult, 3 subadult). Three removals of adult males occurred within the GBRZ.

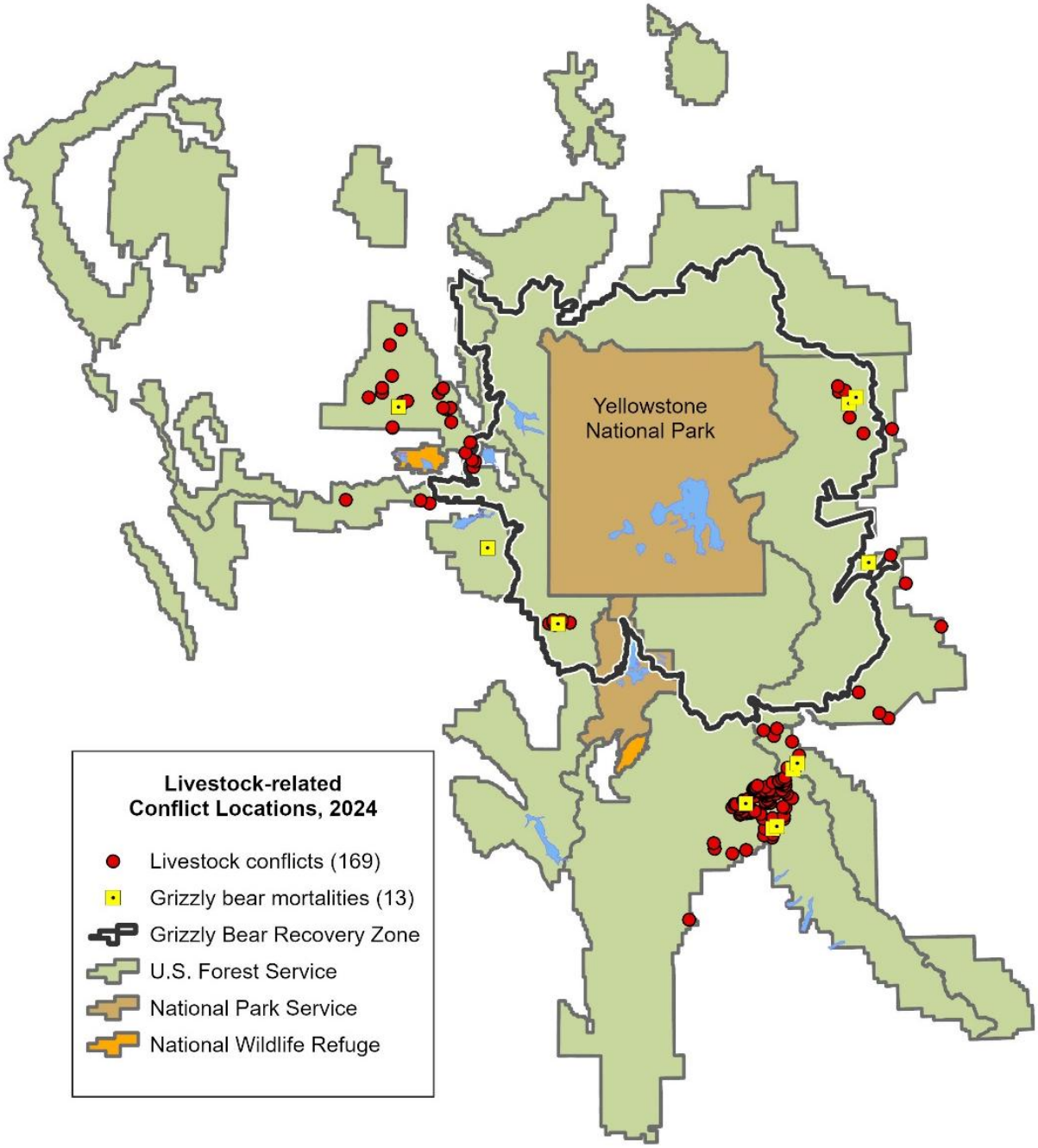

Fig. A4. Grizzly bear conflicts related to commercial livestock grazing on federal lands in the Greater Yellowstone Ecosytem during 2024.

Table A2. Commercial livestock allotments on public lands with documented grizzly bear conflicts during the past 5 years. Allotments with conflicts in three or more of the past 5 years are considered to be recurring conflicts.

U.S. Forest Service allotment name	Total acres	Livestock-related conflicts					Total conflicts (2020–2024)	Recurring conflicts
		2020	2021	2022	2023	2024		
Beaverhead–Deerlodge National Forest								
Anderson/cox	29,826	0	0	1	0	0	1	No
Antelope Basin	4,430	0	1	0	0	0	1	No
Barnett	6,454	1	0	0	0	2	3	No
Bear Wallow	8,761	0	0	1	0	0	1	No
Bufiox	13,077	3	5	2	3	2	15	Yes
Burnt Creek	2,992	0	2	1	0	0	3	Yes
Cliff Lake Bench	2,279	1	0	0	2	0	3	No
Clover Meadows	10,398	1	2	1	0	0	4	Yes
Coal Creek	5,186	0	1	0	0	0	1	No
Crockett Lake	8,156	0	0	0	0	1	1	No
Elk Lake	3,557	0	0	0	1	0	1	No
Elk Mountain	4,415	1	0	1	0	0	2	No
Eureka Basin	11,617	0	7	0	2	0	9	No
Fossil Hellroaring	9,270	0	0	0	0	3	3	No
Hidden Lake Bench	6,609	2	0	0	1	1	4	Yes
Long-pole	9,603	0	1	0	0	0	1	No
Maverick Basin	4,161	0	1	0	0	1	2	No
Mt Carey	12,988	0	0	0	0	1	1	No
North Saddle	3,454	0	0	1	2	1	4	Yes
Red Rock	3,909	1	1	0	0	0	2	No
Standard Creek	12,833	0	0	0	0	3	3	No
Upper Ruby	44,395	2	7	3	2	2	16	Yes
Warm Springs	22,518	1	3	1	3	1	9	Yes
West Fork	53,096	1	11	6	7	6	31	Yes
Wigwam Trail	12,742	0	0	0	1	0	1	No
Bridger-Teton National Forest								
Badger Creek	7,254	0	0	0	6	1	7	No
Beaver-Horse	25,389	0	1	0	0	0	1	No
Beaver-Twin	22,030	2	4	4	7	1	18	Yes
Fisherman Creek	47,629	1	1	0	1	2	5	Yes
Fontenelle	7,792	0	0	0	1	0	1	No
Jack Creek	18,673	1	0	0	1	0	2	No
Little Flattop	4,739	0	0	0	1	0	1	No
Noble Pasture	762	0	0	0	1	0	1	No
Sherman C&H	8,287	0	1	0	0	1	2	No
Union Pass	23,800	2	0	0	1	0	3	No
Upper Green River	125,671	55	77	54	71	94	351	Yes
Upper Gros Ventre	67,497	2	0	0	0	0	2	No
Caribou-Targhee National Forest								

Table A2. Commercial livestock allotments on public lands with documented grizzly bear conflicts during the past 5 years. Allotments with conflicts in three or more of the past 5 years are considered to be recurring conflicts.

U.S. Forest Service allotment name	Total acres	Livestock-related conflicts					Total conflicts (2020–2024)	Recurring conflicts
		2020	2021	2022	2023	2024		
Buffalo	402	0	0	1	0	0	1	No
East Beaver	20,849	0	0	0	0	1	1	No
Grandview	43,478	0	0	0	1	1	2	No
High Five	21,943	0	0	0	0	2	2	No
Ripley Butte	18,533	0	0	2	0	0	2	No
Squirrel Meadows	28,797	0	0	0	0	9	9	No
Teepee Creek	22,134	0	0	1	0	0	1	No
Custer Gallatin National Forest								
Hogan Creek	1,522	1	0	0	0	0	1	No
Tom Miner/ Ramshorn	14,609	0	2	0	0	0	2	No
Shoshone National Forest								
Basin	73,119	1	1	2	0	2	6	Yes
Community	14,979	0	0	0	0	1	1	No
Cottonwood	6,739	0	0	0	1	0	1	No
Crandall	18,641	5	0	0	2	0	7	No
Dick Creek	9,569	2	0	2	1	3	8	Yes
Fish Lake	12,743	2	0	2	2	0	6	Yes
Ghost Creek	11,579	2	2	0	0	0	4	No
Greybull	34,641	0	1	0	0	0	1	No
Hardpan/Table Mtn	17,575	1	2	3	4	0	10	Yes
Kirwin	17,588	1	0	1	1	0	3	Yes
Lake Creek	21,399	0	1	0	1	0	2	No
Pickett Creek	14,263	0	0	0	0	1	1	No
Reef Creek	11,449	0	0	1	0	2	3	No
Rock Creek	16,833	0	1	0	0	1	2	No
Salt Creek	8,263	1	5	1	2	1	10	Yes
Table Mountain	13,895	0	1	1	0	3	5	Yes
Timber Creek	9,187	0	0	1	0	0	1	No
Union Pass	39,497	3	5	0	0	6	14	Yes
Warm Springs	16,875	1	8	1	0	2	12	Yes
Wiggins Fork	37,655	0	0	1	0	1	2	No
Wind River	44,158	1	3	4	1	2	11	Yes
Wood River	4,049	1	0	1	1	0	3	Yes
Total conflicts		**100**	**158**	**100**	**131**	**169**	**658**	

[a] The Fish Creek and Union Pass grazing units on the Bridger-Teton National Forest are forage reserves that are grazed only occasionally as a short-term solution to reduce conflict, protect resources, or compensate for natural landscape hazards (i.e., fire) in other grazing areas.

Monitoring of Developed Sites inside the GBRZ

Habitat standards identified in the 2024 Conservation Strategy require the number of developed sites and capacity of human-use of developed sites on public lands inside the GBRZ be maintained at or below levels existing in 1998. Administrative site expansions are exempt from mitigation if such developments are deemed necessary for enhanced management of public lands and when other viable alternatives are not plausible. Developed sites include all sites or facilities on public lands with infrastructure intended for human use and which accommodate administrative needs and public recreational use. Examples of developed sites include, but are not limited to, campgrounds, trailheads, lodges, administrative structures, service stations, summer homes, restaurants, visitor centers, and permitted natural resource development sites such as oil and gas exploratory wells, production wells, mining activities, and work camps. Developments on private lands inside the GBRZ are not counted against this standard.

Key adaptations in developed sites monitoring under the 2024 Conservation Strategy

Since 2007, when the grizzly bear habitat standards were first implemented, the number of visitors on public lands throughout the GYE has increased substantially. In YNP, annual visitation increased by more than 40% during the period 2008–2018, surpassing 4 million visitors per year since 2016 (NPS 2023). The habitat standards were not flexible enough to allow managers to adequately respond to such extraordinary increases in visitation. As a result, federal land managers requested the 1998-based habitat standards be re-evaluated. An interagency technical team (Developed Sites Technical Team) was tasked with recommending changes to the habitat standards and application rules that would provide managers the needed flexibility for authorizing new infrastructure to accommodate the demands of increased public visitation and aging infrastructure. Imposed constraints require these recommendations strike a balance between management needs and habitat protection and adhere to the original intent of the 1998 habitat standards.

The recommendations of the technical team were incorporated into the 2024 version of the Conservation Strategy. Chief among these was the adoption of defined polygons around qualified developed areas rather than defining them as point locations alone. Definitions of developed site categories were also clarified. All data were subjected to a comprehensive review using the most recently available administrative records and spatial data. Additionally, under the 2024 version of the Conservation Strategy, construction of new visitor day-use sites within 300 meters of primary roads (Figure A5) is now permitted without mitigation under specific limitations. Major developments are included by count in this report section, and the defined polygons are included in the calculation of secure habitat in subsequent sections of this report. The approach and methods for these changes are detailed in Chapter 3 and Appendix E of the Strategy (2024 Conservation Strategy Appendix E).

Changes in developed sites since 1998

The number of distinct developed sites known to exist in 1998 is 609. In the intervening years, a number of sites have been condemned or permanently closed and dismantled. New sites that were built have been mitigated for by closing one or more sites of equivalent human use within the same subunit. Today, the number of known developed sites on public lands inside the GBRZ is 590, accounting for a net decrease of 19 sites between 1998 and 2024. From 1998 to present, the number of developed sites has remained at or below 1998 counts for all subunits inside the GBRZ except for the Henry's Lake #2, Hilgard #2, and Gallatin #3 subunits, which each increased by a count of one. In 2005, the Taylor Falls/Lightning trailhead, originally located in subunit #1 of the Hilgard Bear Management Unit, was moved from one side of a road to the other, placing it in subunit #2 of the Hilgard Bear Management Unit. In this case, the loss in one subunit yielded a gain in the other. Although this transfer technically accounted for an increase in developed sites on Hilgard #2, it was determined to have no

detrimental effect on grizzly bears and did not violate the intent of the developed site standard. Table A3 shows a comparison of developed site counts between 1998 and 2024.

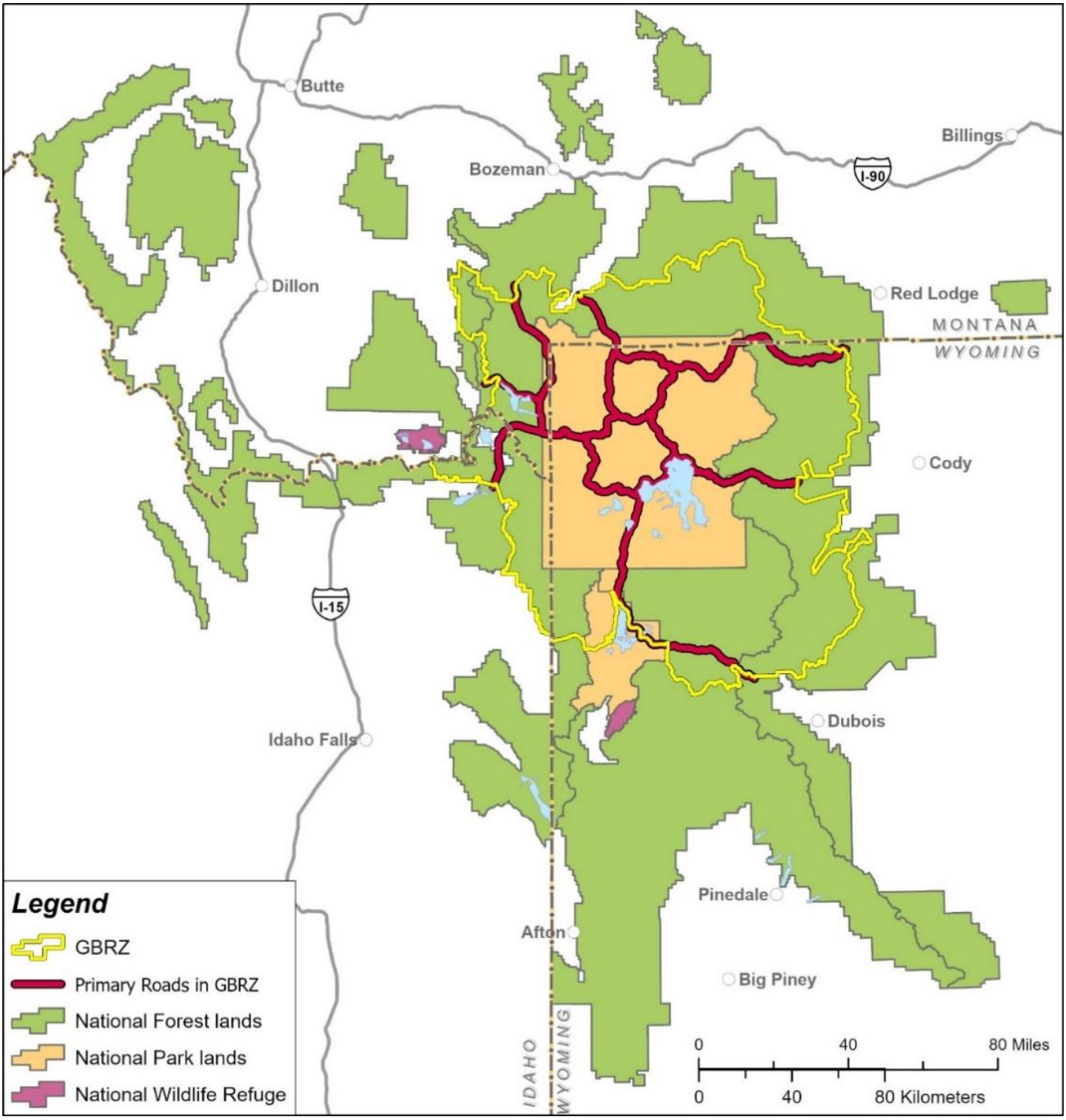

Fig. A5. Primary roads within the Grizzly Bear Recovery Zone.

Changes in developed sites in 2024

There were no reported changes to developed sites on federal lands in the GBRZ in 2024.

Table A3. Number of developed sites in 1998 and 2024 on public lands per bear management subunit in the Greater Yellowstone Ecosystem.

Bear Management Subunit	Admin Units[1]	Admin Sites		Backcountry Cabins		Developed Campgrounds		Major Developments [2]		Plans of operation [3]		Summer Homes		Trailheads		Visitor Day Use Sites		Visitor Overnight Sites		Total # of developed sites	
		1998	2024	1998	2024	1998	2024	1998	2024	1998	2024	1998	2024	1998	2024	1998	2024	1998	2024	1998	2024
Bechler-Teton #1	CTNF	3	3	0	0	2	2	0	0	0	0	0	0	8	8	4	4	2	2	44	44
	GTNP	0	0	3	3	8	8	1	1	0	0	0	0	2	2	3	3	0	0		
	YNP	2	2	1	1	0	0	0	0	0	0	0	0	3	3	2	2	0	0		
Boulder-Slough #1	CGNF	0	0	1	1	1	1	0	0	8	2	3	3	8	8	1	1	0	0	22	16
Boulder-Slough #2	CGNF	0	0	2	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	9	9
	YNP	0	0	2	2	1	1	0	0	0	0	0	0	2	2	1	1	0	0		
Buffalo-Spread Creek #1	BTNF	0	0	1	1	1	1	0	0	0	0	0	0	2	2	1	1	0	0	18	18
	GTNP	3	3	0	0	1	1	0	0	0	0	0	0	8	8	1	1	0	0		
Buffalo-Spread Creek #2	BTNF	3	3	2	2	4	2	0	0	1	0	1	1	7	7	4	2	3	3	25	20
Crandall - Sunlight #1	CGNF	0	0	2	2	2	1	0	0	0	0	0	0	3	3	2	2	0	0	21	20
	SNF	2	2	0	0	2	2	0	0	0	0	0	0	5	5	2	2	1	1		
Crandall - Sunlight #2	SNF	3	3	0	0	5	5	0	0	0	0	0	0	6	6	3	3	1	1	19	19
	WG&F	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Crandall - Sunlight #3	SNF	1	1	0	0	2	2	0	0	0	0	0	0	4	4	2	2	0	0	12	12
	WG&F	1	1	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0		
Firehole-Hayden #1	YNP	5	5	2	2	0	0	2	2	0	0	0	0	22	22	12	12	0	0	43	43
Firehole-Hayden #2	YNP	0	0	0	0	0	0	2	2	0	0	0	0	4	4	9	9	0	0	15	15
Gallatin #1	YNP	0	0	1	1	0	0	0	0	0	0	0	0	4	4	0	0	0	0	5	5
Gallatin #2	CGNF	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	20
	YNP	4	4	4	4	1	1	1	1	0	0	0	0	7	7	2	2	0	0		
Gallatin #3	CGNF	1	1	2	2	2	2	0	0	0	0	2	2	6	7	3	3	0	0	17	18
	YNP	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

Table A3. Number of developed sites in 1998 and 2024 on public lands per bear management subunit in the Greater Yellowstone Ecosystem.

Bear Management Subunit	Admin Units[1]	Admin Sites		Backcountry Cabins		Developed Campgrounds		Major Developments [2]		Plans of operation [3]		Summer Homes		Trailheads		Visitor Day Use Sites		Visitor Overnight Sites		Total # of developed sites	
		1998	2024	1998	2024	1998	2024	1998	2024	1998	2024	1998	2024	1998	2024	1998	2024	1998	2024	1998	2024
Hellroaring-Bear #1	CGNF	4	4	0	0	4	4	0	0	7	7	0	0	12	12	3	3	0	0	31	31
	YNP	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Hellroaring-Bear #2	CGNF	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	4	4
	YNP	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Henrys Lake #1	CTNF	5	5	2	2	3	3	0	0	1	1	2	2	0	0	5	5	0	0	20	20
	IBLM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0		
Henrys Lake #2	CGNF	0	0	1	1	3	3	0	0	0	0	5	5	8	8	2	3	0	0	23	24
	CTNF	0	0	1	1	0	0	0	0	1	1	0	0	1	1	1	1	0	0		
Hilgard # 1	BDNF	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	16	14
	CGNF	1	0	3	3	0	0	0	0	0	0	1	1	6	5	1	1	1	1		
Hilgard # 2	CGNF	0	0	2	2	0	0	0	0	0	0	0	0	2	3	0	0	0	0	6	7
	YNP	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0		
Lamar #1	CGNF	4	4	0	0	1	1	0	0	9	9	0	0	6	6	0	0	0	0	35	34
	YNP	2	2	1	1	1	1	0	0	0	0	0	0	8	8	3	2	0	0		
Lamar #2	YNP	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4
Madison #1	CGNF	2	1	2	2	1	1	0	0	0	0	0	0	10	10	4	4	0	0	19	18
Madison #2	CGNF	6	6	0	0	2	2	0	0	0	0	8	8	1	1	3	3	1	1	27	27
	YNP	2	2	1	1	0	0	0	0	0	0	0	0	3	3	0	0	0	0		
Pelican-Clear #1	YNP	0	0	0	0	0	0	0	0	0	0	0	0	3	3	1	1	0	0	4	4
Pelican-Clear #2	YNP	1	1	4	4	0	0	1	1	0	0	0	0	6	6	4	4	0	0	16	16
Plateau #1	CTNF	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	4	3
	YNP	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Plateau #2	CTNF	1	1	0	0	2	2	0	0	0	0	0	0	1	1	0	0	0	0	7	7
	YNP	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Shoshone #1	SNF	0	0	1	1	2	2	0	0	0	0	2	2	0	0	2	1	0	0	7	6
Shoshone #2	SNF	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	2	2
Shoshone #3	SNF	0	0	0	0	0	0	0	0	0	0	2	2	1	1	0	0	1	1	4	4

Monitoring Secure Habitat and Motorized Access inside the Grizzly Bear Recovery Zone

Habitat standards identified in the 2024 Conservation Strategy require there be no net loss in grizzly bear secure habitat with respect to levels that existed in 1998 for each of the 40 subunits inside the GBRZ. The sole exception to the 1998 baseline applies to three subunits identified in the 2007 Conservation Strategy (Gallatin #3, Henry's Lake #2, and Madison #2) as "*in need of improvement*" above 1998 levels. In 2016, new baseline values were established that hold these three subunits to improved levels of secure habitat. These increased levels were achieved in 2016 with full implementation of the Gallatin National Forest 2006 Travel Management Plan. New threshold values raise the baseline bar for these three subunits and supersede 1998 values for secure habitat.

Calculations of secure habitat are based entirely on proximity to motorized routes (roads and trails) and serve as a metric of human presence in grizzly bear habitat. Secure habitat is defined as any contiguous area ≥10 acres in size and more than 500 meters from an open or gated motorized route. Lakes larger than 1 mi^2 (square mile; 2.59 km^2) in size are excluded from habitat calculations.

The Conservation Strategy does not impose mandatory standards on motorized route density. However, changes in this parameter are monitored and reported annually for tracking purposes. The monitoring protocol requires secure habitat, open motorized access route density, and total motorized access route density be reported annually against baseline levels per subunit inside the GBRZ. Open motorized access route density is a measure of the density of routes open to public motorized use at least one or more days during the non-denning portion of the year when grizzly bears are considered active (March 1–November 30). Total motorized access route density is a measure of the density of roads and trails that are open to the public or administrative personnel for motorized use on one or more days during the active season. Route densities are reported as the percent area of each subunit where open motorized access route density is greater than 1 mi/mi^2 (mile per square mile; >0.62 km/km^2) and total motorized access route density is greater than 2 mi/mi^2 (>1.2 km/km^2). Thus, values of total motorized access route density are typically lower than open motorized access route density because the threshold density is at a higher level. Table A4 shows historic and current values of secure habitat and motorized route density. Routes that are gated closed to the public yearlong but accessible to administrative personnel detract from secure habitat and contribute to total motorized access route density only.

Gains in secure habitat are achieved primarily through decommissioning of open, motorized access routes. In context to the measurement of grizzly bear secure habitat, a route is considered decommissioned when it has been treated on the ground so that motorized access by the public and administrative personnel is effectively restricted. Road decommissioning can range from complete obliteration of the road prism to physical barriers permanently and effectively blocking motorized access. Decommissioned roads do not detract from secure habitat and do not contribute to open or total motorized access route density.

Permanent changes in secure habitat since 1998 (inside the Grizzly Bear Recovery Zone)

The standard criterion for no net loss in secure habitat with respect to 1998 baseline levels has been consistently met in all 40 subunits inside the GBRZ since it was initially formalized in the 2007 Conservation Strategy. For the three subunits identified in the 2007 Conservation Strategy as in need of improvement above 1998 levels (Gallatin #3, Henry's Lake #2, and Madison #2), new baseline thresholds ensure secure habitat will be maintained well into the future at levels higher than what was attained in 1998. Since 1998, a net gain of approximately 131 miles^2 (339 km^2) in secure habitat has been attained inside the GBRZ. This gain is comparable in size to the area of Yellowstone Lake. The greatest improvement in secure habitat is the 17.2 % increase occurring on the Gallatin #3 Bear Management Subunit on the Custer Gallatin National Forest. The gain in secure habitat for this subunit, as well as Henry's Lake #2 (6 %) and Madison #2 (1.0%) was achieved by road closures commissioned for implementation of the Gallatin Travel Management Plan (U.S. Forest Service,). Values achieved with full implementation of the Gallatin Travel Management Plan constitute new baselines against which future change will be measured (Table A4; see footnote). Other notable gains in secure habitat range from 3.4% on the Hellroaring-Bear #1 subunit to 13.4% on the Hilgard #1 subunit. Changes in secure habitat, when averaged over all 40 subunits, account for a mean gain of 1.4% since 1998. All gains in secure habitat throughout the GBRZ were achieved by the decommissioning of motorized routes on public lands. Permanent changes in secure habitat or open and total motorized access route density inside the GBRZ are reported with respect to baseline levels in Table A4.

Permanent changes in secure habitat during 2024 (inside the Grizzly Bear Recovery Zone)

In June of 2022, a storm system dropped unprecedented amounts of rainfall on top of melting snow across the northern parts of YNP, the Absaroka Range, and Beartooth Mountains within the Custer Gallatin National Forest. This resulted in substantial flooding, mudslides, and washouts which severely damaged several roads and other infrastructure. Actions taken in YNP to re-route around the catastrophic washout on the North Entrance Road increased secure habitat by 0.6%, but these gains are currently considered temporary pending a final decision and implementation of a permanent solution.

The Custer Gallatin National Forest implemented several small changes to motorized access in 2024, none of which decreased secure habitat. A 0.36-mile access road to a private inholding was approved in Gallatin #3 subunit. The route did not detract from secure habitat and was added to baseline calculations per the Chapter 3 implementation rules. Three administrative changes were implemented in Henry's Lake #2 subunit to roads which already affect secure habitat: Omni Road #1752 (0.3 miles) was converted from open to administrative use only, and administrative roads Corrette Ridge #1704 (2.2 miles) and Mosquito Gulch #6786 (0.7 miles) were opened to the public. In Plateau #1 subunit, a 0.2-mile portion of Strip Road No 1 (NFSR #1756) was converted to administrative use only.

Table A4. *1998 and 2024 percent areas of open motorized access route density (OMARD, total motorized access route density (TMARD), and secure habitat per bear management subunit inside the Grizzly Bear Recovery Zone of the Greater Yellowstone Ecosystem.*

Bear management subunit	% OMARD (subunit % > 1 miles / mile²)			% TMARD (subunit % > 2 miles / mile²)			% Secure Habitat			Area (miles²) (excluding major lakes)		
										Subunit	Secure Habitat	
	1998	2024	% chg	1998	2024	% chg	1998	2024	% chg		1998	2024
Bechler/Teton	17.1	17.0	-0.1	6.0	6.0	0.0	78.0	78.0	0.0	534.3	416.5	416.5
Boulder/Slough #1	3.2	3.3	0.1	0.4	0.4	0.0	96.5	96.6	0.1	281.9	272.2	272.4
Boulder/Slough #2	2.2	2.2	0.0	0.0	0.0	0.0	97.6	97.6	0.0	232.4	226.9	226.9
Buffalo/Spread Creek #1	10.6	9.9	-0.7	3.9	3.4	-0.5	89.3	90.0	0.7	219.9	196.4	197.9
Buffalo/Spread Creek #2	16.9	13.9	-3.0	11.8	10.1	-1.7	73.3	80.7	7.4	507.6	372.0	409.5
Crandall/Sunlight #1	19.3	18.5	-0.8	7.1	6.2	-0.9	81.0	81.7	0.7	129.8	105.1	106.1
Crandall/Sunlight #2	16.5	16.0	-0.5	10.1	9.8	-0.3	82.3	82.7	0.4	316.2	260.3	261.4
Crandall/Sunlight #3	19.2	18.5	-0.7	9.8	9.3	-0.5	80.4	81.2	0.8	221.8	178.3	180.1
Firehole/Hayden #1	10.5	10.7	0.2	3.1	2.9	-0.2	87.5	87.7	0.2	339.2	296.9	297.6
Firehole/Hayden #2	9.7	9.7	0.0	2.6	2.7	0.1	87.9	87.9	0.0	172.2	151.3	151.3
Gallatin #1	3.5	2.8	-0.7	0.3	0.1	-0.2	96.3	96.9	0.6	127.7	123.0	123.8
Gallatin #2	9.8	9.4	-0.4	5.6	5.6	0.0	89.1	89.1	0.0	155.2	138.2	138.2
Gallatin #3 *	45.8	27.5	-18.3	23.1	12.7	-10.4	**55.1**	72.4	17.3	217.6	120.0	157.6
Hellroaring/Bear #1	23.3	17.8	-5.5	16.1	12.1	-4.0	76.6	80.3	3.6	184.7	141.5	148.3
Hellroaring/Bear #2	0.1	0.0	-0.1	0.1	0.0	-0.1	99.5	99.6	0.1	228.9	227.8	228.0
Henry's Lake #1	49.2	49.4	0.2	31.9	31.8	-0.1	45.3	46.9	1.6	191.2	86.6	89.7
Henry's Lake #2 *	48.1	41.1	-7.7	35.3	29.0	-6.3	**45.6**	52.0	6.4	140.2	64.0	72.9
Hilgard #1	29.7	17.3	-12.4	15.5	6.7	-8.8	69.5	80.5	11.0	201.2	139.8	161.9
Hilgard #2	20.9	16.3	-4.6	13.4	4.6	-8.8	71.5	80.1	8.6	140.5	100.5	112.6
Lamar #1	10.1	10.2	0.1	4.3	4.5	0.2	89.0	89.5	0.5	299.9	267.0	268.5
Lamar #2	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	180.8	180.8	180.8
Madison #1	30.0	20.4	-9.6	13.2	7.6	-5.6	71.5	80.6	9.1	227.9	162.8	183.7
Madison #2 *	34.3	32.5	-1.8	25.8	22.7	-3.1	**66.3**	67.4	1.0	149.4	99.1	100.7
Pelican/Clear #1	2.2	2.2	0.0	0.5	0.5	0.0	97.7	97.7	0.0	108.4	105.9	105.9

Table A4. *1998 and 2024 percent areas of open motorized access route density (OMARD, total motorized access route density (TMARD), and secure habitat per bear management subunit inside the Grizzly Bear Recovery Zone of the Greater Yellowstone Ecosystem.*

Bear management subunit	% OMARD (subunit % > 1 miles / mile²)			% TMARD (subunit % > 2 miles / mile²)			% Secure Habitat			Area (miles²) (excluding major lakes)		
										Subunit	Secure Habitat	
	1998	2024	% chg	1998	2024	% chg	1998	2024	% chg		1998	2024
Pelican/Clear #2	5.8	5.8	0.0	0.7	0.7	0.0	93.8	93.8	0.0	251.6	236.1	236.1
Plateau #1	22.3	19.0	-3.3	13.2	10.3	-2.9	68.6	70.6	2.0	286.3	196.3	202.0
Plateau #2	8.5	8.5	0.0	3.5	3.2	-0.3	88.7	88.7	0.1	419.9	372.2	372.6
Shoshone #1	1.5	1.5	0.0	1.2	1.1	-0.1	98.5	98.5	0.1	122.2	120.3	120.4
Shoshone #2	1.3	1.2	-0.1	0.7	0.7	0.0	98.8	98.9	0.1	132.4	130.8	130.9
Shoshone #3	3.9	2.8	-1.1	2.1	1.5	-0.6	96.9	97.8	0.8	140.7	136.4	137.6
Shoshone #4	5.4	5.3	-0.1	3.0	2.8	-0.2	94.8	94.8	0.0	188.8	179.0	179.0
South Absaroka #1	0.6	0.6	0.0	0.1	0.1	0.0	99.2	99.2	0.0	163.2	161.9	161.9
South Absaroka #2	0.0	0.0	0.0	0.0	0.0	0.0	99.9	99.9	0.0	190.6	190.3	190.3
South Absaroka #3	2.4	2.4	0.0	1.8	1.7	-0.1	96.8	96.8	0.0	348.3	337.0	337.0
Thorofare #1	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	273.4	273.4	273.4
Thorofare #2	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	180.1	180.1	180.1
Two Ocean/Lake #1	3.9	3.9	0.0	1.4	1.4	0.0	96.0	96.0	0.0	371.9	356.8	356.8
Two Ocean/Lake #2	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	0.0	124.9	124.9	124.9
Washburn #1	16.7	16.8	0.1	6.1	6.2	0.1	81.9	81.9	0.0	178.3	146.1	146.1
Washburn #2	7.6	7.7	0.1	1.6	1.5	-0.1	91.8	91.8	0.0	144.1	132.3	132.3
GBRZ Mean / Total Area	**12.8**	**11.0**	**-1.8**	**6.9**	**5.5**	**-1.4**	**85.4**	**87.2**	**1.8**	**9,025**	**7,707**	**7,874**

**As of 2016, three subunits (Gallatin #3, Henrys Lake #2, and Madison #2) have new secure habitat baselines established at thresholds achieved with full implementation of the 2006 Gallatin National Forest Travel Management Plan. These 3 subunits were identified in the 2007 Conservation Strategy as needing improved secure habitat levels above 1998 conditions. New baseline thresholds established in 2016 raise the bar for these 3 subunits and supersede 1998 baseline values for secure habitat.*

Travel Plan Baselines (supersedes 1998 thresholds)		
Bear management subunit	**% Secure habitat baseline**	**Area (mile²) Secure habitat**
Gallatin #3	55.3	71.1
Henrys Lake # 2	45.7	52.0
Madison #2	66.5	67.4

Temporary Changes to Secure Habitat, 2024 (inside the Grizzly Bear Recovery Zone)

Reductions in secure habitat below baseline levels are allowed on a temporary basis inside the GBRZ when associated with authorized federal projects. In these cases, adherence to the "one percent" application rule and other provisions must be met. The one percent rule states that any temporary loss of secure habitat below baseline values within a given Bear Management Unit cannot exceed 1% of the total acreage of the largest subunit within that unit. Application rules allow only one temporary project to be active in a particular subunit at any given time. Six projects involving potential reductions in secure habitat within the GBRZ were operational in 2024 (Table A5). Below are brief summaries of these USFS projects.

Crandall-Sunlight Subunit #2

The Dutch Charlie timber sale is located on the Clark's Fork Ranger District of the Shoshone National Forest and was authorized under the Budworm Response Project EA and Decision Notice. As of January 1, 2024, there was one temporary road open to travel by a timber-sale contractor within the project area. This road was created December 1, 2023, and remained open for the duration of 2024. It was a 776-yard extension from a pre-existing two-track road that traverses a powerline corridor. The temporary timber sale road has remained open to contractor use through 2024.

Henry's Lake #1

The Yale Creek Fuels Reduction Project was authorized to reduce hazardous fuels and produce a timber product on 3,161 acres of public lands interfacing with private lands in the Yale Creek and Shotgun subdivisions in the north portion of the Ashton-Island Park Ranger District on the Caribou-Targhee National Forest. Temporary roads used for the project were closed in October 2024. Some rehabilitation activities will occur on slash pile burn scars in 2025.

Plateau Subunit #1

The Black Mountain Salvage Project was authorized by a Categorical Exclusion in 2019. The purpose of this project is to salvage 138 acres of wind-thrown mature lodgepole pine on the Madison-Pitchstone Plateau of the Ashton-Island Park Ranger District on the Caribou-Targhee National Forest. Two temporary roads totaling 0.5 mile in length were used and closed in 2024. A contract extension was granted to one of the operators on this project so it will finish in 2025.

South Absaroka Subunit #3

Two salvage timber sales were authorized under the 2015 Long Creek Decision Notice on the Wind River District of the Shoshone National Forest. The Wolf Creek Salvage will be active into 2026 due to contract extensions and uses three temporary roads totaling 0.6 miles as well as an existing administrative road. The Brooks Lake Salvage uses four temporary roads totaling 0.7 miles as well as three NFS roads. The sale was paused during the 2024 Pack Trail Fire but will resume in 2025.

The Deception Salvage on the Shoshone National Forest was authorized under the 2018 Lava Mountain Environmental Assessment and is located partially within the southern edge of the subunit. The harvest and hauling activities were completed in 2024, and rehabilitation activities will occur in 2025. This project used 1.7 miles of temporary and administrative roads.

Table A5. *Secure habitat affected by temporary projects inside the Grizzly Bear Recovery Zone, 2024.*

Project Name and National Forest	Bear Management Unit Subunit	Secure habitat (miles^2)					Project Status
		Allowed reduction below baseline[a]	1998 Baseline	2024 (without project)	2024 (with project)	Reduction in secure habitat	
Budworm Response Project Shoshone National Forest	Crandall-Sunlight #2	3.2	260.3	261.4	261.1	0.1	Open
Yale Creek WUI Caribou-Targhee National Forest	Henry's Lake #1	1.9	86.8	89.7	88	0.8	Open
Black Mountain Salvage Caribou-Targhee National Forest	Plateau #1	3.7	196.3	202	202	0.01	Open
Brooks Lake, Wolf Creek, and Deception Salvage Sales Shoshone National Forest	South Absaroka #3	3.4	337	337	336.7	0.7	Open

[a] The maximum allowed temporary reduction in secure habitat below baseline is 1% of the area of the largest subunit within the Bear Management Unit.

Monitoring Secure Habitat outside the GBRZ

The 2006 Forest Plan Amendment requires monitoring and reporting of changes in percent secure habitat on National Forest lands outside the GBRZ every 2 years in areas identified in state management plans as biologically suitable and socially acceptable for grizzly bear occupancy (USDA 2006, p.45, 52). Table A6 represents the best estimates available for current values of percent secure habitat per Bear Analysis Unit (BAU) outside the GBRZ. Refer to Fig. A3 for delineation of BAU.

Changes in secure habitat outside the GBRZ (2022–2024)

Rock Creek BAU: The Custer Gallatin National Forest completed reconstruction and partial realignment of Nichols Creek Road #2478, but this had no impact on secure habitat.

Table A6. Percent secure habitat in Bear Analysis Units (BAU) outside the Grizzly Bear Recovery Zone for each of the five National Forests inside the Greater Yellowstone Ecosystem. Current levels of secure habitat are compared against previous reporting year levels.

Bear Analysis Unit (BAU)	Percent Secure Habitat			BAU Area * (miles^2)
	2022	2024	Change (2022 – 2024)	
Beaverhead-Deerlodge National Forest				
Baldy Mountain	55.0	55.0	0.00	96.9
Bear Creek	62.6	62.6	0.00	36.4
Beaver Creek	57.3	57.3	0.00	478.9
Garfield	71.6	71.6	0.00	182.0
Gravelies	58.5	58.5	0.00	384.4
Madison Range	99.4	99.4	0.00	89.2
Pintler Mountains	57.6	57.6	0.00	410.3
Pioneer Mountains	55.1	55.1	0.00	912.2
Snowcrest Range	74.8	74.8	0.00	357.2
Sourdough	46.9	46.9	0.00	111.2
Starlight	34.8	34.8	0.00	79.0
Tobacco Roots North	53.4	53.4	0.00	106.7
Tobacco Roots South	47.5	47.5	0.00	186.3
Mean Secure / Total Area	**59.6**	**59.6**	**0.00**	**3,431**
Bridger-Teton National Forest				
Fremont	87.7	87.7	0.00	440.0
Green River	64.8	64.8	0.00	527.9
Gros Ventre	63.5	63.5	0.00	507.7
Hoback Range	58.4	58.4	0.00	292.9
Snake River	65.9	65.9	0.00	348.9
Mean Secure / Total Area	**68.1**	**68.1**	**0.00**	**2,117**
Caribou-Targhee National Forest				
Centennials	50.9	50.9	0.00	199.1
Crooked Creek	59.5	59.5	0.00	403.0
Dead Horse Ridge	50.2	50.2	0.00	364.8
Island Park	38.3	38.3	0.00	333.9
Lemhi Mountains	70.0	70.0	0.00	143.1
Palisades Reservoir	59.7	59.7	0.00	472.5
Teton	75.9	75.9	0.00	209.5
Mean Secure / Total Area	**57.8**	**57.8**	**0.00**	**2,126**
Custer Gallatin National Forest				
Boulder	69.7	69.7	0.00	277.9
Bozeman	59.3	59.3	0.00	270.5
Bridger	38.4	38.4	0.00	236.3
Cooke City	99.6	99.6	0.00	68.7

Table A6. Percent secure habitat in Bear Analysis Units (BAU) outside the Grizzly Bear Recovery Zone for each of the five National Forests inside the Greater Yellowstone Ecosystem. Current levels of secure habitat are compared against previous reporting year levels.

Bear Analysis Unit (BAU)	Percent Secure Habitat			BAU Area * (miles^2)
	2022	2024	Change (2022 – 2024)	
Crazy	66.8	66.8	0.00	254.8
Gallatin	59.2	59.2	0.00	415.0
Mill Creek	83.8	83.8	0.00	312.2
Pryor Mountains	38.8	38.8	0.00	121.8
Quake	92.1	92.1	0.00	66.2
Rock Creek	83.8	83.8	0.00	237.2
Stillwater	85.5	85.5	0.00	404.7
Mean Secure / Total Area	**70.6**	**70.6**	**0.00**	**2,023**
Shoshone National Forest				
Carter	77.9	77.9	0.00	261.1
Clarks Fork	70.1	70.1	0.00	160.5
East Fork	73.2	73.2	0.00	251.0
Fitzpatrick	98.4	98.4	0.00	317.8
North Fork	78.0	78.0	0.00	143.2
Warm Springs	30.9	30.9	0.00	183.0
Wood River	85.3	85.3	0.00	228.5
Mean Secure / Total Area	**73.4**	**73.4**	**0.00**	**1,545**

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(Artwork courtesy of the U.S. Forest Service)

Appendix B: Monitoring Whitebark Pine in the Greater Yellowstone Ecosystem

Monitoring Whitebark Pine in the Greater Yellowstone Ecosystem – 2024 Annual Report

The 2024 whitebark pine monitoring report was not available at time of publication of the IGBST 2024 annual report. Once finalized, it can be obtained in digital format from the Greater Yellowstone Inventory & Monitoring Network website (https://www.nps.gov/im/gryn/reports-publications.htm) and the Natural Resource Publications Management website (https://www.nps.gov/im/publication-series.htm). If you have difficulty accessing information in this publication, particularly if using assistive technology, please email irma@nps.gov.

Appendix C: 2024 Wyoming Bear Wise Project Updates

2024 Wyoming Bear Wise Wyoming Project Update

Introduction

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

This report provides a summary of program accomplishments in 2024. Past accomplishments are reported in the 2006 - 2023 annual reports of the Interagency Grizzly Bear Study Team (IGBST) and in the 2011-2023 Annual Job Completion Reports of the Wyoming Game and Fish Department (WGFD).

Background

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

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

In 2005, the Department began implementation of the Bear Wise Community Program. Although the program's efforts were focused primarily in the Wapiti area, the Department initiated a smaller scale project in Teton County to address the increasing number of black and grizzly bear conflicts in the Jackson, Wyoming area. For the last 18 years, the Bear Wise Community Programs in northwest Wyoming have deployed a multi-faceted

education and outreach campaign in an effort to minimize human-bear conflicts and promote proper attractant management. Although a wide array of challenges remain and vary between communities, many accomplishments have been made and progress is expected to continue as Bear Wise efforts gain momentum. In an effort to broaden the scope of the program, this work was rebranded as the Bear Wise Wyoming Program.

Cody Area Update

The Cody Bear Wise Community Program continues to utilize radio, television and print media, mass mailings, and the use of signing on private and public land to convey the educational messages surrounding human-bear conflict prevention. Conflict prevention information is also disseminated through public workshops and presentations and by contact with local community groups, governments, the public school system, and various youth organizations. To compliment educational initiatives, the program uses an extensive outreach campaign that assists the community in obtaining and utilizing bear-resistant products and implementing other practical methods of attractant management. Ongoing efforts and new accomplishments for 2024 are as follows:

- The Carcass Management Program continues to provide a domestic livestock carcass removal service for livestock producers located in occupied grizzly bear habitat within Park County, Wyoming. The program has been traditionally funded by the Park County Predator Management District and Wyoming Animal Damage Management Board. In addition to those donors, the program received contributions from Bureau of Land Management, National Fish and Wildlife Foundation. The program provides livestock producers and owners with an alternative to the use of on-site carcass dumps, which are a major bear attractant and indirectly contribute to numerous human-bear conflicts.

- Large Carnivore Section personnel maintained and built many new permanent and temporary electric fences. The fences are around bee apiaries that have been in the same place long term. These projects were completed in cooperation with USDA wildlife service non-lethal specialists and funding to do livestock conflict prevention.

- Numerous informational presentations were given that focused on human-bear conflict prevention to students at the following schools: Powell High, South Side Elementary, Cody High, Middle, and Elementary, Basin Library, the 8th grade expo for all Basin schools, Riverside Middle/High, Worland Elementary, Meeteetse School District, Burlington Middle, and Northwest College in Powell, Wyoming.

- 700 canisters of bear spray and 300 canisters of inert training spray were purchased with funding from the Safari Club International Foundation. After a short training session with the inert spray and mechanical charging “Robobear”, the cans of live bear spray were given free of charge to hunters, anglers and the general public in March and August. A total of seven giveaways were held; twice in Cody and Lander and once in Dubois and Pinedale.

The remote-control charging "Robobear" continues to be a big hit at bear spray giveaways and other educational events throughout Wyoming.

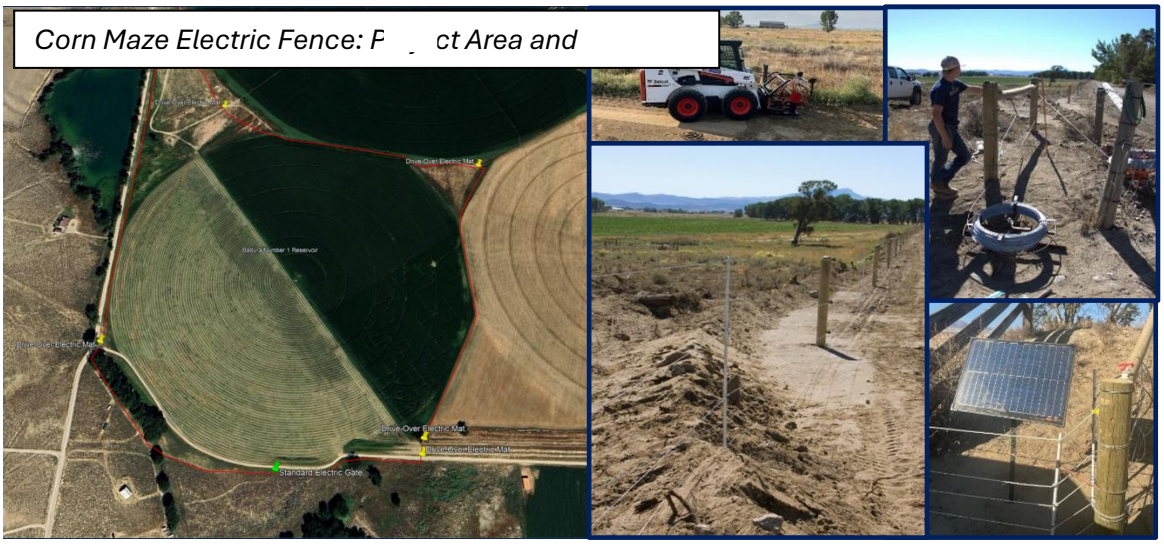
(Photo courtesy of Wyoming Game and Fish Department)

- "Working in Large Carnivore Country" workshops were conducted for numerous organizations and venues across the county. Including but not limited to Park County Weed and Pest District, Powell Recreation District Outdoor Kids Event, the Town of Dayton, Buffalo Bill State Park, Medicine Lodge Kids Outdoor Day, Park County Search and Rescue, and Rocky Mountain Power.

- A permanent electric fence was built in 2018 at the Park County Landfill. To ensure the fence is in good working order WGFD personnel spent several days repairing and maintaining the fence in 2024. The partnerships with Wyoming Outdoorsmen, BLM, Park County Commissioners, Western Bear Foundation, and Greater Yellowstone Coalition were vital in making this project a reality.

- Regional hunters' education classes and numerous other public outreach events were held in Cody, Powell, Meeteetse, Thermopolis, Wapiti, Burgess Junction, Newton Lakes, Basin, and Sunlight.

- In partnership with Greater Yellowstone Coalition, USFWS, USDA, and Defenders of Wildlife the permanent electric fence to the Gallagher Corn Maze and Pumpkin Patch was completed and made operational before the opening of the maze. This site had become a major conflict hotspot and represented a unique and growing human safety concern. Over a five-week period the maze is open, it would see in excess of 9,000 visitors coincident with the peak of grizzly bear activity and conflict potential within the area. Since completion of the fence, there have been zero conflict captures in close proximity to the corn maze, and the landowner reports no evidence of bears on the property.



(Photos courtesy of Wyoming Game and Fish Department)

- In cooperation with Safari Club International Foundation, Yellowstone Regional Airport, and Wyoming Outfitters and Guides Association, we were able to complete a successful video advertising run at the Yellowstone Regional Airport (see more details in the 2024 Accomplishments section below).

Lander Area Update

- Participated in a biannual Bear Spray Giveaway program, giving away 200 cans of bear spray and interacting with hunters, anglers, hikers, recreationists and people with general interest of grizzly bear ecology and management.

(Photo courtesy of Wyoming Game and Fish Department)

- Larger carnivore section (LCS) personnel provided numerous educational workshops and training events including for the Lander school system, Wyoming Outdoor Wildlife Day, Teton Valley Ranch Youth Camp, Lander Child Development Services, Washakie County Outdoor Day, a Game and Fish sponsored open house at the Lander Regional office, and Wildlife on Tap at the Coalter Loft in downtown Lander, Wyoming.

(Photo courtesy of Wyoming Game and Fish Department)

- Participated in hunter education classes that emphasize hunting safely in bear country.

- Conducted safety training for Shoshone National Forest Trail Crew, Fremont County Weed and Best, National Audubon Society, Wyoming Catholic College and seasonal Wyoming Game and Fish employees.

- Conducted multiple radio and television interviews regarding bear safety and being Bear Wise in Wyoming that was timed in accordance with den emergence, spring/summer human use activities and hunting seasons. Section personnel continued to promote resources to the public such as the LCS educational video which demonstrates how to properly deploy electric fences to secure attractants.

- Provided comment and information for numerous news releases for local, statewide, national and international media outlets.

- Provided numerous large carnivore safety presentations and trainings at Whiskey Mountain Conservation Camp and in coordination with the Eastern Shoshone and Northern Arapaho Tribes of the Wind River Reservation.

(Photo courtesy of Wyoming Game and Fish Department)

Pinedale Area Update

In 2011, a Bear Wise Community effort was initiated targeting residential areas north of Pinedale, Wyoming, where the occurrence of human-bear conflict has increased in recent years. Accomplishments for the Pinedale area in 2024 are as follows:

- Hunting in Bear Country presentations were given to hunter safety classes throughout the region in an effort to educate future sportsmen and women to increase safety potential.

- LCS personnel provided range rider safety training to local cowboys and ranches that have a high potential of encounters with grizzly bears and livestock.

- Bear safety presentations were given to the U.S. Forest Service and other groups throughout Sublette County.

- LCS personnel provided training for local Sublette County Conservation District employees.

- LCS personnel conducted the bear spray giveaway to Pinedale for the third year and distributed 100 cans of bear spray.

- LCS personnel provided large carnivore safety training to the local Bureau of Land Management regional office.

(Photo courtesy of Wyoming Game and Fish Department)

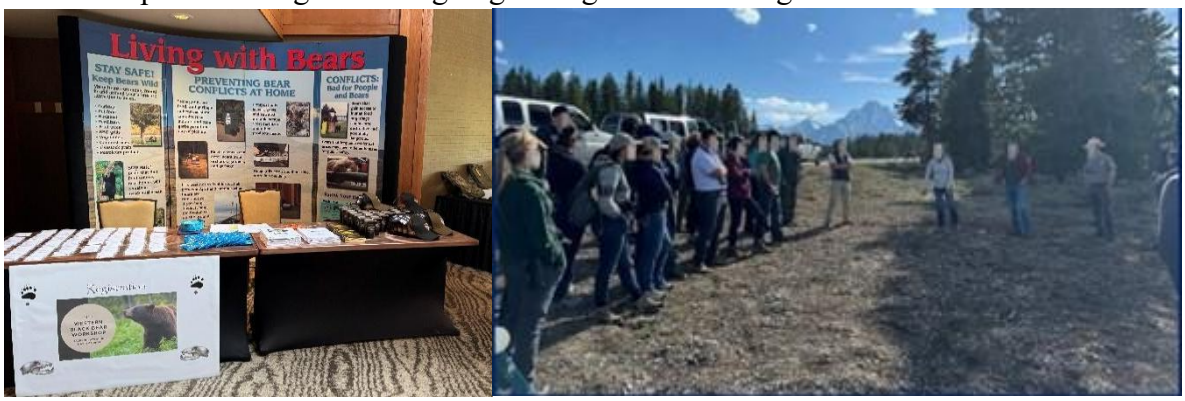
Objectives for 2025 include continued expansion of the program into the other areas of the state where human-bear conflicts continue to be a chronic issue and the continuation of current educational and outreach efforts in the Cody area with specific focus on areas that have not adopted proper attractant management methods.

The Wapiti and Pinedale area Bear Wise Community programs face the ongoing challenges of: 1) the absence of ordinances, regulations, or laws prohibiting the feeding of bears; 2) limited educational opportunities and contact with portions of the community due to a large number of summer-only residents and the lack of organized community groups and; 3) decreased public tolerance for grizzly bears due to record numbers of human-bear conflicts and continued federal legal protection. The future success of the Bear Wise program lies in continued community interest and individual participation in proper attractant management.

Jackson Area Update

The Bear Wise Jackson Hole program continues educational and outreach initiatives in an effort to minimize human-bear conflicts within the community of Jackson and surrounding areas. In 2024, the program's public outreach and educational efforts included the use of signage, public workshops and presentations, distribution of informational pamphlets, promoting awareness about bear spray, carcass and fruit tree management, and utilizing our bear education trailer.

- LCS personnel organized and conducted the Western Black Bear Workshop in Jackson, Wyoming. This brought together over 100 black bear biologists and managers from three countries in North America to share research and provide insight into ongoing management challenges and successes.



2024 Western Black Bear Workshop.

(Photos courtesy of Wyoming Game and Fish Department)

- Public service announcements were broadcast on local radio stations in Jackson throughout the spring, summer, and fall of 2024. The announcements focused bear safety, conflict avoidance, and advertising for a Large Carnivore workshop conducted in Jackson.

- Numerous educational talks were presented to various groups including homeowner's associations, guest ranches, youth camps, Jackson residents, tourists, school groups, Heart Six Ranch, Jackson Gun Club and local Government employees.

- Educational workshop focusing on bear ecology and situational awareness was held at the Jackson outdoor day as part of the larger bear spray giveaway event in April.

- A second bear spray giveaway was held in August in which 100 cans of spray were given to the public free of charge.

- A considerable amount of time was spent removing ungulate and livestock carcasses from residential areas and ranches in the Jackson region.

- LCS personnel continued to work with a Jackson catering company, Roots Kitchen & Cannery. They have been involved in picking apples from trees that have been identified as a source of bear conflict by WGFD.

- LCS personnel assisted hunting outfitters with the installation and maintenance of electric fence systems around their field camps located in the Bridger-Teton National Forest. Annually, personnel meet with hunters and outfitters to reduce conflict potential between humans and grizzly bears.

- LCS personnel worked extensively with the apiarists in Teton County to electrify bee yards and chicken coops to secure the potential attractants.

- Signage detailing information on hunting safely in bear country, bear identification, recent bear activity, and proper attractant storage was placed at USFS trailheads and in private residential areas throughout Teton County; including extensive work on Togwotee Pass to deal with habituated roadside grizzly bears.

- LCS personnel provided a “Living in Large Carnivore Country” workshop to the residents of Thayne and Alpine, Wyoming, as well as provided a short radio interview for the residents of Alpine pertaining to bear safety.

Objectives for the Bear Wise Jackson Hole program in 2024 were focused on supporting Teton County and local waste management companies with projects that will help disseminate information and achieve compliance with the recently adopted Teton County Bear Conflict Mitigation and Prevention Land Development Regulations (LDR). In addition, more work will be done to identify areas within the city limits of Jackson and Star Valley community where additional attractant management and sanitation infrastructure is needed.

The recent implementation of the Teton County Bear Conflict Mitigation and Prevention LDR has greatly reduced the amount of available attractants on the landscape and is a tremendous step forward for the Bear Wise Jackson Hole program. The new challenges faced by the Department will be achieving full compliance with this regulation, even in years with low conflict, when it may appear that the conflict issues are resolved. The Bear Wise Jackson Hole Program will convey the importance of compliance and strive to maintain public support for the LDR through public outreach and education projects. In order for the Jackson program to be successful, the program must continually identify information and education needs within the community while being adaptive to changing situations across different geographic areas. This will require the Department to coordinate with other government agencies and local non-government organizations working across multiple jurisdictions to develop a uniform and consistent message. If this level of coordination is achieved, the Department may be more effective in gaining support and building enthusiasm for Bear Wise Jackson Hole, directing resources to priority areas, and reaching all demographics.

An example of people crowding a roadside grizzly bear to obtain photos and/or video.

(Photo courtesy of Wyoming Game and Fish Department)

Information and Education

2024 Accomplishments

- **Total Numbers Reached**
  - Across all outreach avenues (in person, print, video, etc.) a total of 1,138,894 people were reached by the Bear Wise Wyoming program. This is a record high for the Bear Wise program.

- **Physical/Electronic Print Media Outreach**
  - The Large Carnivore section provided a number of interviews for a magazine series on preventing and reacting to large carnivore attacks for U.S. Concealed Carry Association Magazine (USCCA Magazine). The series spanned multiple issues and allowed us to provide safety information and recommendations for black bear, grizzly bear, and mountain lion encounters directly from the Bear Wise Wyoming program to a large audience. The series was seen by at least 730,280 paid subscribers to the magazine.

  - Large Carnivore Section personnel distributed at least 3,100 Bear Wise Wyoming informational brochures titled “Bears in Wyoming – A guide for recreating in bear country” at numerous venues and events all across the states. These contain detailed bear safety information covering a wide range of topics and scenarios.

Samples from "Bears In Wyoming" brochure.

(Photos courtesy of Wyoming Game and Fish Department)

- As per Wyoming Statute, grizzly bear relocation from one county to another must be announced through local media and to the local sheriff of the county into which the bear was relocated (n = 7 for 2024). Each announcement is posted in a timely fashion to the web page.

- Personnel issued multiple educational news releases throughout the season informing readers and listeners of bear safety, behavior, conflict avoidance, food storage and natural food availability.

- **Gas Pump Video Advertising**
  - In partnership with Safari Club International Foundation and Wyoming Outfitters and Guides Association, the Bear Wise Wyoming program developed a 30 second video advertisement focused on bear safety while hunting. The goal was to provide Bear Wise Wyoming safety information to traditionally hard to target demographics (short term 1–3-day visitors, out of state hunters, residents with little to no digital footprint or very little free time) that are typically unavailable or simply not visiting long enough to reach with standard outreach methods, i.e. in person presentations, workshops, and training events. The ad was scheduled to run for 84 days starting at the beginning of the fall hunting season which coincides with the peak of human-bear conflicts. This advertisement reached 327,859 people in 23 locations across Wyoming over the course of 84 days; exceeding our initial goal by more than 50,000 people.

- **Airport Terminal/Baggage Claim Video Advertising**
  - In partnership with Safari Club International Foundation, Yellowstone Regional Airport, and Wyoming Outfitters and Guides Association, the Bear Wise Wyoming program developed a different 30 second video advertisement addressing bear safety for anyone visiting Wyoming. This campaign was aimed at all of the same difficult to target demographics but with a broader message that pertained to all outdoor recreationalists. This advertisement was played year-round in the Yellowstone Regional Airport on TV screens in the main terminal and the baggage claim area and reached at least 74,732 people.

- **Western Black Bear Workshop**
  - In March 2024, the Western Black Bear Workshop was organized and carried out by WGFD Large Carnivore Section personnel. During this event, over 100 bear biologists/managers from three North American countries received bear safety training directly from the Bear Wise Wyoming program.

- **In Person Outreach (Presentations, Workshops, Training)**
  - In 2024, the Bear Wise program carried out 67 in-person presentations around the state and provided a total of 6,023 people with high quality in-depth information and training on large carnivore safety. This was a record number of presentations for the Bear Wise program in a single calendar year.

- **Grizzly Bear Management Web Page**
  - The new grizzly bear management web page and Bear Wise Wyoming web page have been maintained and updated on a regular basis in order to provide timely information to the public regarding grizzly bear management activities conducted by the department. Accessibility to the Grizzly Bear Management and Bear Wise Wyoming web pages has been dramatically improved. Both web pages can now be accessed in only one click from the WGFD homepage. The web pages' contents include information on bear and large carnivore safety, various interagency annual reports and updates, and links to other grizzly bear recovery web sites.

- **Hunter Education**
  - Every hunter education class in Wyoming is required to discuss how to hunt safely in bear country. To assist instructors, most have been provided inert bear spray canisters for demonstration purposes and DVDs entitled Staying Safe in Bear Country, A Behavioral Based Approach to Reducing Risk. A section on bear safety is included in the student manual. Approximately 5,000 students are certified each year.

- **Bear Spray Giveaways**
  - We had a successful year training recipients on how to use bear spray at our seven (7) bear spray giveaway events. Public participation continues in our community events where bear spray giveaways occur, and these events also give our personnel an excellent opportunity to talk with the public about bear ecology and safety and other wildlife issues throughout Wyoming.

Publications

The primary link to other publications, annual reports, and peer reviewed literature for the Yellowstone population of grizzly bears is summarized on the U.S. Geological Survey web site at https://www.usgs.gov/science/interagency-grizzly-bear-study-team

For information specific to the Wyoming Game and Fish Department's grizzly bear management program; including links to publications, reports, updates, and plan visit: https://wgfd.wyo.gov/wyoming-wildlife/large-carnivore/grizzly-bears-wyoming