

***NORTHERN CONTINENTAL DIVIDE ECOSYSTEM***

***GRIZZLY BEAR POPULATION MONITORING***

***ANNUAL REPORT – 2015***



**Monitoring Team Cooperators:**

**Montana Fish, Wildlife & Parks**

**U.S. Fish and Wildlife Service**

**U.S. Forest Service**

**National Park Service, Glacier National Park**

**Parks Canada, Waterton Lakes National Park, Alberta**

**Blackfeet Tribe**

**Confederated Salish and Kootenai Tribes**

**British Columbia Ministry of Forests**

**Prepared By:**

**Cecily M. Costello, MTFWP**

**Lori L. Roberts, MTFWP**

**This annual report summarizes data collection efforts to date. It is not a peer-reviewed document, and data summaries and interpretations are subject to change.**

**Suggested Citation:**

**Costello, C.M., and L.L. Roberts. 2016. Northern Continental Divide Ecosystem Grizzly Bear Monitoring Team Annual Report, 2015. Montana Fish, Wildlife & Parks, 490 N. Meridian Road, Kalispell, MT 59901. Unpublished data.**

**Core Field Team Members:**

**Dan Carney, Blackfeet Tribe**

**Cecily Costello, MTFWP**

**Stacey Courville CSKT**

**Jamie Jonkel, MTFWP**

**Mike Madel, MTFWP**

**Tim Manley, MTFWP**

**Lori Roberts, MTFWP**

**John Waller, NPS**

**Erik Wenum, MTFWP**

**This Annual Report is available on the web at:**

<http://fwp.mt.gov/fishAndWildlife/management/grizzlyBear/monitoring.html>

## ***ABSTRACT***

A program to monitor the population trend of grizzly bears in the Northern Continental Divide Ecosystem (NCDE) of Montana was initiated in 2004. The goal of this program is to estimate population trend by monitoring the survival and reproductive rates of radio-instrumented female grizzly bears. During 2015, 14 females and 11 males were captured for trend monitoring. An additional 7 females and 15 males were captured for management or other purposes. Forty-two females and 12 males were radio-monitored during 2015. Three deaths (1F, 2M) were documented among the radio-monitored sample. Reproductive status was documented for 37 radio-marked adult females. Survival of accompanying dependent offspring (<2 years old) was monitored for 18 of these adult females. Among 14 cub litters and 4 yearling litters monitored, 10 known or probable cub mortalities and 3 known or presumed yearling mortalities occurred. Within the NCDE, 22 known or probable mortalities of grizzly bears were documented (including unmarked bears). This included 3 independent ( $\geq 2$  years old) females and 11 independent males that died within the Demographic Monitoring Area (DMA). We estimated total reported and unreported mortalities for independent grizzly bears within the DMA to be 28 bears (6F, 22M). During 2015, we verified presence of reproductive females within 17 of 23 BMUs inside the Primary Conservation Area (74%) and within 5 of 7 supplementary BMUs in Zone 1 (72%). Using a 6-year tally for 2011-2016, all BMUs within the DMA were occupied by females with offspring.

**TABLE OF CONTENTS**

I. Introduction and Statement of Need ..... 1

II. Program Objectives ..... 1

III. Geographic Scope of Monitoring Program..... 2

IV. Methods & Results..... 4

    Grizzly Bear Captures ..... 4

    Radio-monitoring, Survival, and Reproduction ..... 5

    Grizzly Bear Mortalities in the NCDE ..... 7

    Occupancy by Females with Offspring..... 10

V. Literature Cited..... 11

**LIST OF APPENDICES**

Appendix A. Fate of radio-marked grizzly bears monitored in the NCDE, 2015 ..... 13

Appendix B. Observed reproductive status and fate of offspring for adult female grizzly bears monitored with radio-telemetry in the NCDE, 2015 ..... 15

Appendix C. Summary of known and probable grizzly bear mortalities in the NCDE, 2015.. ..... 16

Appendix D. Occupancy of Bear Management Units by female grizzly bear with offspring, 2004–2015.....17

## ***I. INTRODUCTION AND STATEMENT OF NEED***

The grizzly bear (*Ursus arctos horribilis*) occupies over 8 million wilderness and non-wilderness acres in the Northern Continental Divide Ecosystem (NCDE) of western Montana. Notable regions within this ecosystem include Glacier National Park and the Bob Marshall wilderness complex. Grizzlies were listed as Threatened under the Endangered Species Act in 1975 for lack of information on its population status and habitat requirements. The NCDE has the largest population of grizzly bears in the lower 48 states; population size during 2004 was estimated to be 765 bears (Kendall et al. 2009).

Managers and the public agree that information on both population size and trend is needed. Having these estimates will greatly improve our collective knowledge of grizzly bear ecology, and provide more measurable and precise information with which to judge the status of the grizzly population in the NCDE. Therefore in 2004 Montana Fish, Wildlife & Parks (MTFWP), in cooperation with other state, federal, and tribal agencies, established a team to monitor the population trend of grizzly bears in the NCDE. The purpose of this long-term program is to monitor grizzly bear survival rates, reproductive rates, and population trend by radio-monitoring female grizzly bears and their young.

## ***II. PROGRAM OBJECTIVES***

The primary objective of this program is to monitor the population trend of grizzly bears in the NCDE using known-fate estimators of survival, and documentation of reproductive rates. This is accomplished by following the survival and reproductive rates of female grizzly bears throughout the ecosystem. Estimates of population vital rates will be required for recovery

programs in this area. The ultimate responsibility of the monitoring team is to collect demographic data on grizzly bears in western Montana and summarize findings in a comprehensive annual report. Major population monitoring categories will initially include:

1. population trend,
2. survival rates,
3. reproductive rates,
4. movements and habitat selection,
5. distribution in western Montana,
6. mortality levels in the NCDE, and
7. levels of unreported mortality.

### ***III. GEOGRAPHIC SCOPE OF THE MONITORING PROGRAM***

Our trend monitoring program is focused within the Demographic Monitoring Area (DMA), which encompasses the 23,119 km<sup>2</sup> Primary Conservation Area (PCA: equivalent to the Federal Recovery Zone) and the 19,460 km<sup>2</sup> Zone 1, which roughly correlates to a 10-mile buffer surrounding the PCA (USFWS 2013; Fig. 1). The DMA includes Glacier National Park, parts of five National Forests (Flathead, Helena, Kootenai, Lewis and Clark, and Lolo); parts of the Blackfeet and Confederated Salish and Kootenai Reservations; Bureau of Land Management lands; state lands, and private lands. The NCDE grizzly bear population is also contiguous with those in the Canadian provinces of British Columbia and Alberta, therefore some captures and monitoring occurred north of the United States in Canada. Within the DMA, we designated 9

subunits for localized analyses, based on distinct land ownerships and grizzly bear population management authorities.

Although our focus for trend monitoring is the DMA, we also document mortalities and other observations outside of the DMA. Notable areas include: Zone 2, an area of potential connectivity between the NCDE and the Greater Yellowstone Ecosystem (GYE), and Zone 3, an area sometimes occupied by grizzly bears but considered unsuitable habitat to support grizzly bear population growth (USFWS 2013).



**Fig. 1. The Demographic Monitoring Area (DMA; red line), where our grizzly bear population monitoring is conducted, consists of the Primary Conservation Area (PCA; blue) and Zone 1 (green). DMA is divided into subunits (gray lines) for localized population analyses. Zone 2 (pink) is the area of potential genetic connectivity between the NCDE and the Greater Yellowstone Ecosystem. Zone 3 (orange) consists of largely unsuitable habitat that may be irregularly occupied by grizzly bears.**



## **V. METHODS & RESULTS**

### ***Grizzly Bear Captures***

#### ***Methods***

We capture grizzly bears using leg-hold snares and culvert traps, by helicopter darting, and in some instances, we darted and immobilized bears over baits. We follow the handling and immobilization procedures found in the Montana Animal Care and Use Committee protocols for grizzly bears and black bears (Montana Fish, Wildlife and Parks 2004). We tag all bears subcutaneously with passive transponder tags and pulled a pre-molar tooth for age determination (Stoneberg and Jonkel 1966). Most females and a sample of males are radio instrumented using a variety of transmitters, including: standard very high frequency (VHF) neck-mounted collars (Telonics, Inc., Mesa, AZ); VHF ear-tag transmitters (Advanced Telemetry Systems, Inc., Isanti, MN); standard global positioning system (GPS) collars (TGW-4500; Telonics, Inc.); GPS-Argos collars (Models TGW-3580 and TGW-3583; Telonics, Inc.); and spread-spectrum collars (TGW-3690; Telonics, Inc.). We capture research bears throughout the study area. Using the DMA subunits, we attempt to distribute our sample of research females in proportion to relative grizzly bear density, based on the distribution of female bears detected at DNA hair traps in 2004 (Kendall et al. 2009). Grizzly bears are also captured and radio-marked for management purposes. Individual bears are classified as either research bears or management bears using the terminology of Mace et al. (2012).

#### ***Results***

In 2015, the team captured 25 individuals for research purposes (Table 1), including 14 females and 11 males. All 14 females and 4 of the males were fitted with radio-transmitters for

trend monitoring. In addition to research captures, bears were also captured for management purposes. These included 7 captures of 6 females and 16 captures of 14 males. All 6 females and 12 of the males (including 4 dependent young) were fitted with radio-transmitters. Finally, other captures within the NCDE included 1 male captured for augmentation to the Cabinet-Yaak Ecosystem and 1 unintentional capture of a female cub in a wolf research trap. The augmentation male was radio-marked and the cub was released without a radio-transmitter.

**Table 1. Number of individual grizzly bears captured and fitted with radio-transmitters in the NCDE, 2015.**

Type	Captured			Radio-marked		
	Female	Male	Total	Female	Male	Total
Research	14	11	25	14	4	18
Management	6	14	20	6	12	18
Other	1	1	2	0	1	1
Total	23	31	54	20	17	37

### ***Radio-monitoring, survival, and reproduction***

#### ***Methods***

We monitored survival and reproduction using aerial telemetry flights and internet downloads of telemetry data monthly. We attempted to investigate potential mortalities (i.e., mortality signals from VHF monitoring or stationary locations persisting for  $\geq 24$  hrs from downloaded data) within 2 weeks, to ascertain whether the bear had died. For dead bears, we conducted preliminary necropsies in the field and collected relevant samples for laboratory analyses.

For adult female bears, we conducted observation flights in early spring when grizzly bears were emerging from their dens to ascertain which females had dependent offspring and

the number of offspring per litter. We continued to conduct monthly telemetry flights throughout the active season to check on the monthly survival of the dependent offspring.

### **Results**

During 2015, we radio-monitored 42 independent female grizzly bears during all or part of the year: 31 females monitored solely for research and 11 females monitored for conflict management and research. We radio-monitored 12 males during 2015: 5 males monitored solely for research and 12 monitored for conflict management and research. We documented the death of 1 radio-marked female during 2015 that was attributed to poaching/malicious kill. We documented the death of 2 radio-marked males during 2015: 1 agency removal and 1 undetermined cause. A summary of the fates of radio-marked bears during 2015 are presented in Appendix A.

We recorded the reproductive status of 37 adult females during 2015, including 15 with cubs, 6 with yearlings, 2 with 2-year-old offspring, and 14 with no offspring. We documented 6 litters with 1 cub, 6 litters with 2 cubs, and 3 litters with 3 cubs. First observations for these litters ranged from April 17 (flight observation) to September 12 (new capture). We monitored survival of 14 cub litters and 4 yearling litters through repeated observations during the year. We documented the known or probable mortalities of 10 cubs and 3 yearlings. A summary of the reproductive observations of radio-marked females are presented in Appendix B.

## ***Grizzly Bear Mortalities in the NCDE***

### ***Methods***

An interagency grizzly bear mortality database for the NCDE was established in 1967 by FWP and is currently maintained cooperatively through state, federal, and tribal wildlife agencies. Here, we report all of the mortalities documented throughout the NCDE during 2015. In addition, we also estimated the total number of independent ( $\geq 2$  years old) female and male grizzly bear mortalities that occurred inside the DMA, using the method of Cherry et al. (2002) which inflates the documented count to an estimate summing reported and unreported mortalities.

### ***Results***

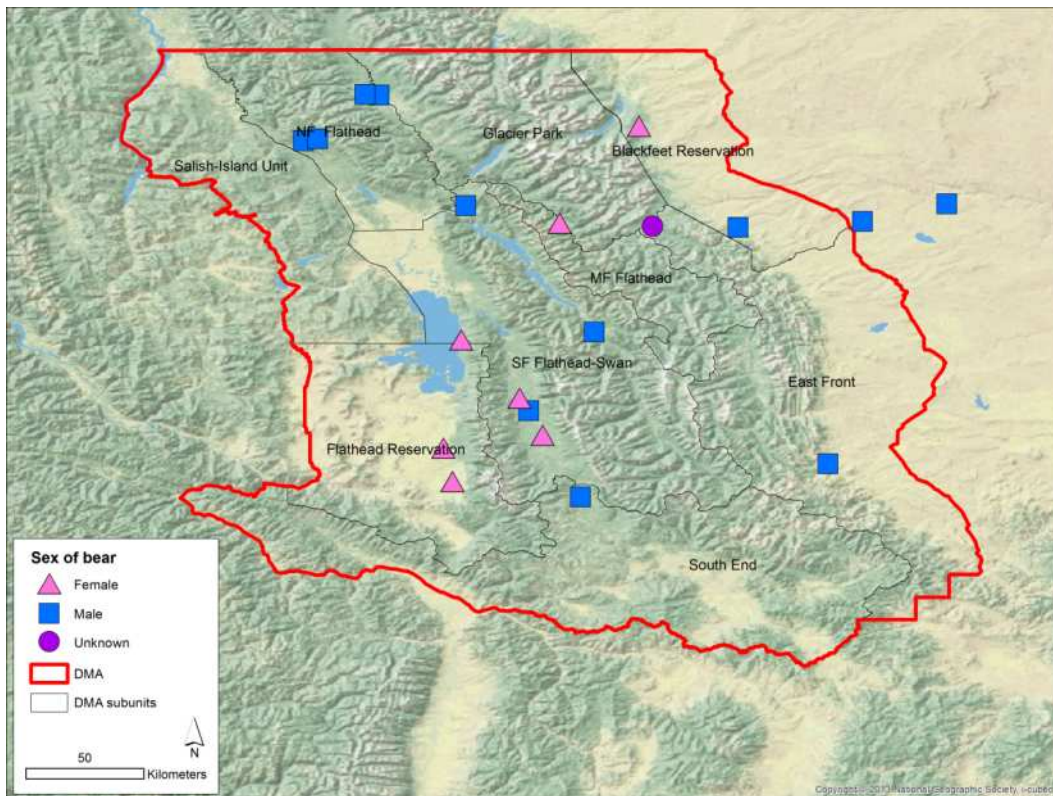
Twenty-two known or probable grizzly bear mortalities were documented in the NCDE during 2015 (Table 2). Twenty occurred within the DMA: 14 inside the PCA and 6 within Zone 1 (Fig. 2). The other two mortalities occurred outside of the DMA in Zone 3. Causes of death for independent bears were agency removal (4), poaching/malicious kill (4), automobile collisions (2), defense of life kill (1), illegal hunting due to mistaken identification (1), and undetermined (2). One of the agency removals was not actually killed, but translocated to the CYE for population augmentation; however the removal was counted as a mortality for the NCDE. Causes of death for dependent bears were automobile collisions (4), agency removals (2), capture mortality (1), and undetermined (1). A summary of all documented mortalities in the NCDE during 2015 is reported in Appendix C.

Within the DMA, there were 3 independent females and 11 independent males that died (the other deaths were of dependent young). Using the methods of Cherry et al. (2002)

we estimated a total of 28 reported and unreported mortalities of independent grizzly bears within the DMA (Table 3). The documented and estimated total numbers of mortalities during 2015 were well within average for recent years, and declined from those observed during 2014 (Fig. 3).

**Table 2. Number of documented known or probable mortalities of grizzly bears in the NCDE, 2015.**

	Ageclass	Sex		Total
		Female	Male	
Inside DMA	Dependent	5	3	8
	Independent	3	9	12
	Total	8	12	20
Outside DMA	Dependent	0	0	0
	Independent	0	2	2
	Total	0	2	2



**Fig. 2. Location of known and probable grizzly bear mortalities in the NCDE, 2015.**

**Table 3. Summary of independent grizzly bear mortalities within the DMA, NCDE, 2015.**

Sex	Documented mortalities by method of discovery				Estimated reported and unreported <sup>e</sup> (C)	Estimated total mortality (A + B + C)
	Agency removal <sup>a</sup> (A)	Telemetry <sup>b</sup> (B)	Reported <sup>c</sup> (high)	Reported <sup>d</sup> (low)		
Female	0	1	1	1	5	6
Male	4	1	3	3	17	22
Total	4	2	4	4	22	28

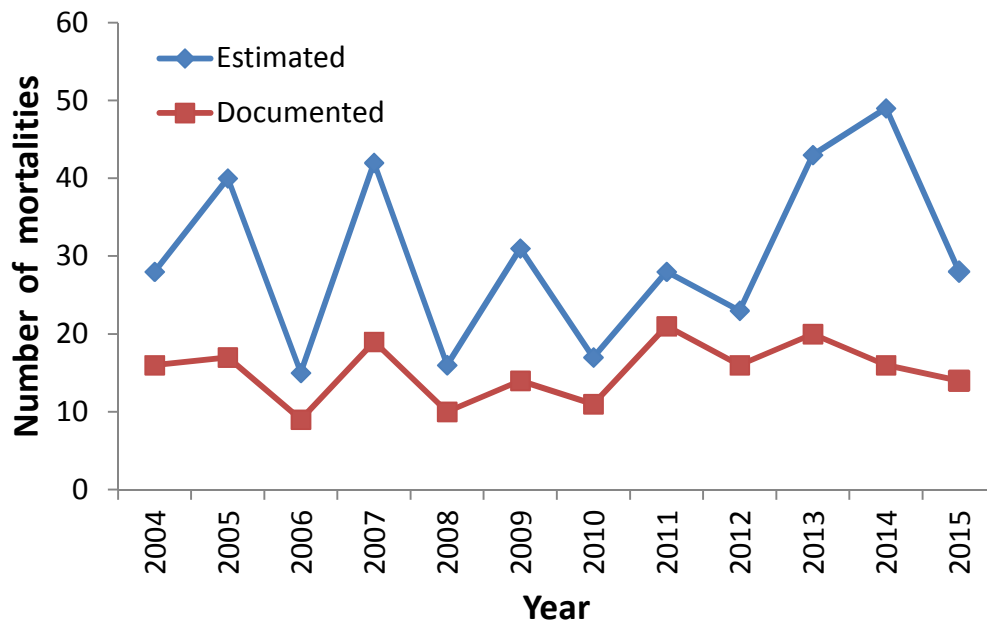
<sup>a</sup> Count of agency-sanctioned removals, including those involving radio-marked bears

<sup>b</sup> Count of deaths for bears wearing functional radio-transmitters, except for agency removals

<sup>c</sup> Count of non-radioed bear deaths reported by the public or discovered by agency personnel with high reporting rates (illegal defense-of-property, defense-of-life, train collision, automobile collisions, illegal hunting-misidentification)

<sup>d</sup> Count of non-radioed bear deaths reported by the public or discovered by agency personnel with low reporting rates (poaching/malicious, natural, undetermined)

<sup>e</sup> Bayesian estimate of the total number of reported and unreported deaths of non-radioed bears, predicted from the number of reported deaths of non-radioed bears in the high- and low-reporting rate categories (as per Cherry et al. 2002).



**Fig. 3. Documented and estimated total mortalities (i.e., reported and unreported) of independent grizzly bears (sexes combined) within the DMA, 2004–2015.**

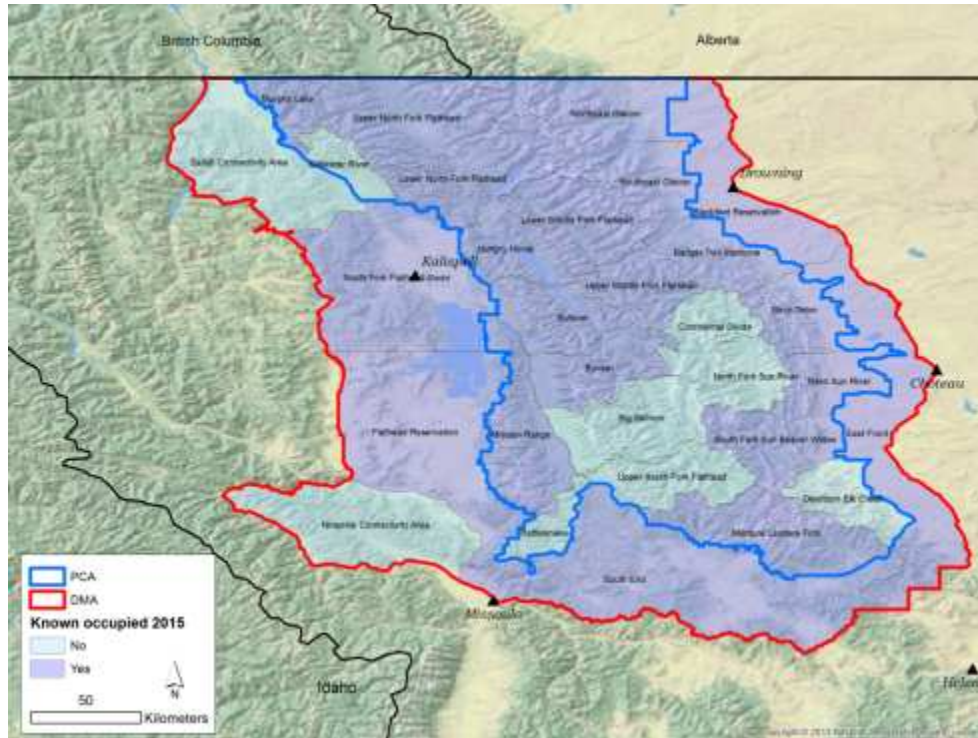
## ***Occupancy of Female Grizzly Bears with Offspring***

### ***Methods***

We documented presence of reproductive females within Bear Management Units (BMUs; USFWS 1993, USFWS 2013) each year, based on visual observations obtained from radio-marked females; verified remote camera photos; other verified visual observations; and from known or probable mortalities of family units (death of the mother, dependent young, or both). Telemetry or GPS locations of radio-marked females known to have offspring were also used to document presence. Because the BMUs were confined to the PCA, we also documented presence of reproductive females in Zone 1 to encompass the entire DMA. We established supplementary BMUs by dividing the area of Zone 1 based on the Demographic Connectivity Areas (USFWS 2013) and our DMA subunit boundaries outside of the PCA.

### ***Results***

During 2015, we verified presence of reproductive females within 17 of 23 BMUs (74%) and within 5 of 7 supplementary BMUs (72%; Fig. 4). For the 6-year period 2011-2016, all BMUs were occupied by females with offspring, thus exceeding the standard of 21 of 23 BMUs occupied (USFWS 1993, USFWS 2013). Similarly, all supplementary BMUs were occupied during the last 6 years. Using the 6-year tally, full occupancy of the PCA has been documented each year since 2009 and full occupancy of Zone 1 has been documented each year since 2013 (Appendix C).



**Fig. 4. Documented occupancy by female grizzly bears with offspring of the 23 BMUs within the PCA and the 7 supplementary BMUs within Zone 1 during 2015. All BMUs have been occupied during the last 6 years.**

## VI. LITERATURE CITED

- Cherry, S., M. A. Haroldson, J. Robinson-Cox, and C. C. Schwartz. 2002. Estimating total human-caused mortality from reported mortality using data from radio-instrumented grizzly bears. *Ursus* 13:175–184.
- Kendall, K.C., J.B. Stetz, J. Boulanger, A.C. McLeod, D. Paetkau, and G.C. White. 2009. Demography and genetic structure of a recovering grizzly bear population. *Journal of Wildlife Management* 73:3–16.
- Mace, R. D., D. W. Carney, T. Chilton-Radandt, S. A. Courville, M. A. Haroldson, R. B. Harris, J. Jonkel, B. McLellan, M. Madel, T.L. Manley, C. C. Schwartz, C. Servheen, G. Stenhouse, J. S. Waller, and E. Wenum. 2012. Grizzly bear population vital rates and trend in the Northern Continental Divide Ecosystem, Montana. *The Journal of Wildlife Management*, 76: 119–128.
- Montana Fish, Wildlife and Parks. 2004. Biomedical protocol for free-ranging Ursidae in Montana: black bears (*Ursus americanus*) and grizzly bears (*Ursus arctos horribilis*): capture, anesthesia, surgery, tagging, sampling, and necropsy procedures. Helena, Montana, USA.



- Stoneberg, R. P., and C. J. Jonkel. 1966. Age determination in black bears by cementum layers. *Journal of Wildlife Management* 30:411–414.
- U.S. Fish and Wildlife Service. 1993. Grizzly Bear Recovery Plan. U.S. Fish and Wildlife Service, Office of the Grizzly Bear Recovery Coordinator, University Montana, Missoula. 181pp.
- U.S. Fish and Wildlife Service. 2013. Draft NCDE Grizzly Bear Conservation Strategy. U.S. Fish and Wildlife Service, Office of the Grizzly Bear Recovery Coordinator, University Montana, Missoula. 127pp.

## Appendix A. Fate of radio-marked grizzly bears monitored in the NCDE, 2015.

Sex	Capture type	DMA subunit	Bear ID	Fate
Female	Research	Blackfeet Reservation	55588561	Censored
Female	Research	Blackfeet Reservation	79560108	Alive
Female	Research	Blackfeet Reservation	81279315	Dead
Female	Research	East Front	39036349	Alive
Female	Research	East Front	39088856	Alive
Female	Research	East Front	76553865	Alive
Female	Research	Flathead Reservation	18122343	Alive
Female	Research	Glacier National Park	10876305	Alive
Female	Research	Glacier National Park	10888790	Alive
Female	Research	Glacier National Park	36554783	Censored
Female	Research	Glacier National Park	55599346	Alive
Female	Research	Glacier National Park	76361015	Censored
Female	Research	Glacier National Park	79565368	Alive
Female	Research	Glacier National Park	79589512	Alive
Female	Research	Glacier National Park	107565854	Alive
Female	Research	Middle Fork Flathead River	11062853	Alive
Female	Research	North Fork Flathead River	11027854	Alive
Female	Research	North Fork Flathead River	11052544	Alive
Female	Research	North Fork Flathead River	36558355	Censored
Female	Research	North Fork Flathead River	79570382	Alive
Female	Research	North Fork Flathead River	97630806	Alive
Female	Research	South End	11036115	Alive
Female	Research	South End	55588533	Alive
Female	Research	South End	55597781	Alive
Female	Research	South Fork Flathead River-Swan Valley	11052060	Censored
Female	Research	South Fork Flathead River-Swan Valley	11077801	Alive
Female	Research	South Fork Flathead River-Swan Valley	11087071	Alive
Female	Research	South Fork Flathead River-Swan Valley	36547078	Alive
Female	Research	South Fork Flathead River-Swan Valley	79050043	Alive
Female	Research	South Fork Flathead River-Swan Valley	11060268	Alive
Female	Research	South Fork Flathead River-Swan Valley	38052875	Alive
Female	Management	Blackfeet Reservation	79561849	Alive
Female	Management	East Front	39050514	Alive
Female	Management	Flathead Reservation	18097536	Alive
Female	Management	Flathead Reservation	18112314	Censored
Female	Management	Flathead Reservation	18119870	Censored
Female	Management	North Fork Flathead River	107794628	Alive
Female	Management	South End	51586884	Censored
Female	Management	South Fork Flathead River-Swan Valley	10874562	Alive
Female	Management	South Fork Flathead River-Swan Valley	11032039	Censored

Sex	Capture type	DMA subunit	Bear ID	Fate
Female	Management	South Fork Flathead River-Swan Valley	41635876	Alive
Female	Management	South Fork Flathead River-Swan Valley	55586851	Censored
Male	Research	North Fork Flathead River	11080074	Censored
Male	Research	South End	36567786	Alive
Male	Research	South Fork Flathead River-Swan Valley	55599288	Censored
Male	Research	North Fork Flathead River	93583873	Censored
Male	Research	Glacier National Park	107588047	Alive
Male	Management	Blackfeet Reservation	81278368	Unresolved
Male	Management	East Front	39089622	Unresolved
Male	Management	North Fork Flathead River	11011817	Alive
Male	Management	South End	10882367	Alive
Male	Management	South End	10885078	Censored
Male	Management	South Fork Flathead River-Swan Valley	11031601	Censored
Male	Management	South Fork Flathead River-Swan Valley	11033127	Dead
Male	Management	South Fork Flathead River-Swan Valley	11051614	Censored
Male	Management	South Fork Flathead River-Swan Valley	39071057	Dead
Male	Management	South Fork Flathead River-Swan Valley	55579327	Censored
Male	Management	South Fork Flathead River-Swan Valley	11056850	Unresolved
Male	Management	South Fork Flathead River-Swan Valley	55579327	Censored

**Appendix B. Observed reproductive status and fate of offspring for adult female grizzly bears monitored with radio-telemetry in the NCDE, 2015.**

Capture type	DMA subunit	Bear ID	Status	Litter size	Offspring mortality
Research	Blackfeet Reservation	55588561	Cubs	2	1
Research	Blackfeet Reservation	79560108	Yearlings	2	Unknown
Research	Blackfeet Reservation	81279315	Two-year-olds		
Research	East Front	39036349	Cubs	3	2
Research	East Front	39088856	Cubs	2	1
Research	East Front	76553865	Cubs	3	0
Research	Glacier National Park	10876305	None		
Research	Glacier National Park	55599346	Yearlings	1	Unknown
Research	Glacier National Park	76361015	None		
Research	Glacier National Park	79565368	None		
Research	Glacier National Park	79589512	None		
Research	Glacier National Park	107565854	None		
Research	Middle Fork Flathead River	11062853	Cubs	1	0
Research	North Fork Flathead River	11052544	None		
Research	North Fork Flathead River	36558355	None		
Research	North Fork Flathead River	79570382	None		
Research	North Fork Flathead River	97630806	Yearlings	2	0
Research	South End	55588533	None		
Research	South End	55597781	Cubs	1	1
Research	South Fork Flathead River-Swan Valley	11052060	Cubs	2	
Research	South Fork Flathead River-Swan Valley	11077801	Cubs	1	0
Research	South Fork Flathead River-Swan Valley	11087071	Yearlings	2	1
Research	South Fork Flathead River-Swan Valley	36547078	Two-year-olds	2	
Research	South Fork Flathead River-Swan Valley	79050043	Cubs	1	1
Research	South Fork Flathead River-Swan Valley	11060268	Cubs	2	2
Research	South Fork Flathead River-Swan Valley	38052875	None		
Management	Blackfeet Reservation	79561849	None		
Management	East Front	39050514	Cubs	2	0
Management	Flathead Reservation	18097536	Cubs	3	1
Management	Flathead Reservation	18112314	Yearlings	2	2
Management	Flathead Reservation	18119870	None		
Management	North Fork Flathead River	107794628	None		
Management	South End	51586884	None		
Management	South Fork Flathead River-Swan Valley	10874562	Cubs	2	0
Management	South Fork Flathead River-Swan Valley	11032039	Cubs	1	1
Management	South Fork Flathead River-Swan Valley	41635876	Cubs	1	0
Management	South Fork Flathead River-Swan Valley	55586851	Yearlings	2	0

### Appendix C. Summary of known and probable grizzly bear mortalities in the NCDE, 2015.

Mortality date	Date accuracy	DMA	Sex	Ageclass	Bear ID	Collared	Cause
3/28/2015	Day	Inside	Male	Adult		No	Agency removal (livestock)
5/16/2015	Day	Inside	Male	Subadult		No	Hunting (mistaken ID)
5/17/2015	Week	Inside	Female	Adult		No	Poached/malicious
5/31/2015	Day	Inside	Male	Yearling		No	Capture mortality
6/9/2015	Day	Inside	Female	Yearling		No	Agency removal (livestock)
6/9/2015	Day	Inside	Female	Yearling		No	Agency removal (livestock)
6/28/2015	Day	Inside	Male	Adult	79559313	No	Agency removal (livestock)
7/8/2015	Day	Inside	Female	Adult	81279315	Yes	Poached/malicious
8/4/2015	Day	Inside	Male	Subadult		No	Augmentation
8/6/2015	Day	Inside	Male	Cub		No	Automobile
9/9/2015	Month	Outside	Male	Adult	39071057	Yes	Undetermined
9/12/2015	Day	Inside	Female	Subadult		No	Automobile
9/18/2015	Week	Inside	Unk (male) <sup>1</sup>	Adult		No	Poached/malicious
9/21/2015	Week	Inside	Male	Yearling	79557361	Yes	Undetermined
10/3/2015	Day	Inside	Male	Adult		No	Defense of life
10/11/2015	Day	Outside	Male	Adult		No	Under investigation
10/14/2015	Day	Inside	Female	Cub		No	Automobile
10/27/2015	Day	Inside	Female	Cub		No	Automobile
10/27/2015	Day	Inside	Male	Adult	55585291	No	Automobile
11/1/2015	Week	Inside	Male	Subadult		No	Poached/malicious
11/2/2015	Day	Inside	Female	Yearling		No	Automobile
11/12/2015	Day	Inside	Male	Adult	11033127	Yes	Agency removal (property)

<sup>1</sup>Randomly classified as male for analysis of total mortality.

**Appendix D. Occupancy by female grizzly bears with offspring, within 23 Bear Management Units (BMUs) within the PCA and 7 supplementary BMUs within Zone 1. Shading signifies years when occupation was verified within a 6-year period ending with the current year.**

Bear Occupancy Unit	Year											
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Monture Landers Fork	0	1	0	0	0	0	1	1	1	1	1	1
Rattlesnake	0	0	1	1	0	1	1	0	1	1	1	0
Upper South Fork Flathead	0	0	1	1	0	1	1	0	1	1	0	0
Mission Range	1	1	1	1	1	1	1	1	1	1	1	1
Big Salmon	0	0	1	1	0	1	1	0	1	1	1	0
Dearborn Elk Creek	0	0	0	0	0	1	1	0	1	0	0	0
South Fork Sun Beaver Willow	0	0	0	0	0	0	1	0	0	0	0	1
Teton Sun River	1	1	1	1	0	1	1	1	1	1	1	1
Bunker	1	1	1	1	0	1	1	1	1	1	1	1
North Fork Sun River	0	1	0	0	0	0	0	1	1	0	0	0
Continental Divide	1	0	0	1	0	1	0	1	1	0	0	0
Sullivan	1	1	1	1	1	1	1	1	1	1	1	1
Birch Teton	0	0	1	1	1	1	1	1	1	1	0	1
Upper Middle Fork Flathead	1	1	0	1	0	1	0	1	1	1	1	1
Badger Two Medicine	1	0	1	1	1	1	1	1	1	1	1	1
Hungry Horse	1	1	1	1	1	1	1	1	1	1	1	1
Lower Middle Fork Flathead	1	1	1	1	1	1	1	1	1	1	1	1
Southeast Glacier	0	0	1	1	1	1	1	1	0	1	1	1
Lower North Fork Flathead	1	1	1	1	1	1	1	1	1	1	1	1
Stillwater River	0	1	1	1	1	1	1	0	1	1	1	0
Northeast Glacier	0	1	1	1	1	1	1	1	1	1	1	1
Upper North Fork Flathead	1	1	1	1	1	1	1	1	1	1	1	1
Murphy Lake	1	1	1	1	1	0	1	1	1	0	1	0
Occupied during year	12	14	17	19	12	19	20	17	21	18	17	15
Occupied during last 6 years	12	16	21	21	21	22	23	23	23	23	23	23
Salish Connectivity Area	1	1	1	1	0	1	1	1	1	1	1	0
S Fork Flathead-Swan Valley	1	0	1	1	1	1	1	1	1	1	1	1
Flathead Reservation	0	0	1	1	1	1	1	1	1	1	1	1
Ninemile Connectivity Area	0	0	0	0	0	0	0	0	0	1	0	0
South End	0	1	0	1	0	0	1	1	1	1	1	1
East Front	1	1	1	1	1	1	1	1	1	0	0	1
Blackfeet Reservation	1	1	1	1	1	1	1	0	0	1	1	1
Occupied during year	4	4	5	6	4	5	6	5	5	6	5	5
Occupied during last 6 years	4	5	6	6	6	6	6	6	6	7	7	7