2016 Wyoming Grizzly Bear
Job Completion Report

BEAR WISE WYOMING

Wyoming Game and Fish Department
Large Carnivore Section
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INTRODUCTION

This completion report summarizes grizzly bear work completed by the Wyoming Game and Fish Department's (Department) Large Carnivore Section (LCS) and regional personnel during 2016. In the past, this information was included in multiple reports that were not readily available to agency personnel, the legislature, or the public. This report allows the Department to present information pertaining to grizzly bears in Wyoming in one cohesive document available to all interested parties.

POPULATION MONITORING – TRAPPING SUMMARY

Annual trapping of grizzly bears by the Department for population monitoring is similar to the annual monitoring programs for other species such as elk or deer. While the methods may differ, the goal is the same; to collect the data necessary to conserve and manage the populations. In addition, data collected during annual monitoring has been extremely useful in answering many important questions regarding the Greater Yellowstone Ecosystem (GYE) grizzly bear population.

Data on grizzly bear survival and reproduction, biological samples, body condition, and collar locations are vital components of the overall population monitoring program. This information provides data necessary to ensure that we can accurately monitor the status of the grizzly bear population and maintain recovery goals for grizzly bears in the GYE.

To maintain a representative sample of the overall population, trapping crews systematically trap areas within known grizzly bear distribution. Trapping locations are chosen annually based on information needs with some instances of opportunistic trapping efforts occurring. Once collars are deployed in a specific area, crews move to another area and trapping continues. This effort occurs through the spring and summer, with trapping ceasing early in the fall to avoid conflicts with hunters during fall big game hunting seasons. The following summaries describe trapping efforts for the 2016 season.

Wind River Reservation

Trapping took place in the Crow Creek and East Fork of the Wind River drainages on the Wind River Reservation from 23 May to 13 June, 2016. Eight trap sites (6 culvert, 2 snare) were set in the area. All traps, baits, scent lures, and other equipment were removed from sites on or before 13 June. All trapping area warning and closure signs were removed on 17 June. Six grizzly bears were captured during seven capture events. Radio collars were placed on five of the six bears (Table 1).

Table 1. Grizzly bears captured during population monitoring efforts on the Wind River Reservation, Wyoming, 2016.

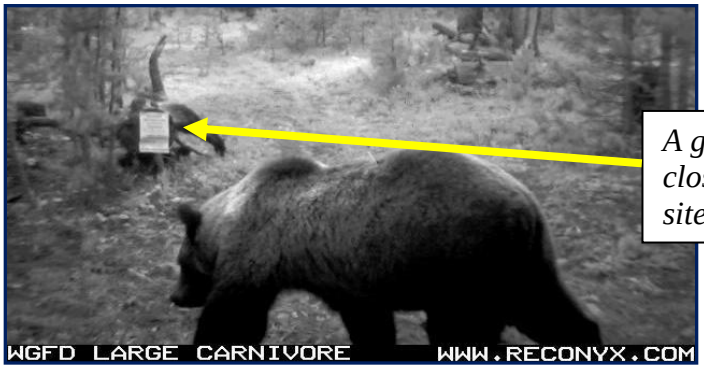
Bear ID	Capture Date	Sex/Age	Location	Collar
848	5/29/16	Adult female	East Fork Wind R.	GPS collar
849	6/1/16	Adult male	Crow Cr	GPS collar
803	6/4/16	Subadult male	East Fork Wind R.	GPS collar
733	6/6/16	Adult male	Crow Cr	GPS collar
849	6/7/16	Adult male	East Fork Wind R.	GPS collar
G215	6/12/16	Adult male	Crow Cr	No collar
851	6/13/16	Subadult female	Crow Cr	VHF collar

Blackrock/Spread Creek

Trapping was conducted in the Blackrock/Spread Creek area of the Bridger-Teton National Forest from 27 June to 20 July, 2016. Nine trap sites (4 culvert, 5 snare) were set in the area. All traps, baits, scent lures, and other equipment were removed from sites on or before 20 July. All trapping area warning and closure signs were removed on 22 July. Eight grizzly bears were captured. Radio collars were placed on seven of the eight bears (Table 2).

Table 2. Grizzly bears captured during population monitoring efforts in the Blackrock/Spread Creek area, Wyoming, 2016.

Bear ID	Capture Date	Sex/Age	Location	Collar
678	7/5/16	Adult female	Grouse Cr	GPS collar
859	7/6/16	Subadult male	Kettle Cr	GPS collar
861	7/12/16	Subadult female	Kettle Cr	GPS collar
819	7/13/16	Subadult male	Poison Bench	GPS collar
G217	7/15/16	Subadult male	Grouse Cr	No collar
506	7/17/16	Adult male	Kettle Cr	GPS collar
863	7/17/16	Subadult female	Poison Bench	VHF collar
867	7/20/16	Subadult female	Kettle Cr	VHF collar



A grizzly bear checks out the area closure sign at a capture site – capture sites are closed to all human presence.

Soda Fork

Trapping was conducted from horseback from 16 August to 1 September, 2016. Four ground snare trap sites were set in the Soda Fork Drainage. Two grizzly bears were captured and a radio collar was placed on one of them. One black bear was also captured and released without collaring. All traps, baits, scent lures, and other equipment were removed from sites and all trapping area warning and closure signs were removed on 1 September (Table 3).

Table 3. Grizzly bears captured during population monitoring efforts in the Soda Fork area, Wyoming, 2016.

Bear ID	Capture Date	Sex/Age	Location	Collar
875	8/20/16	Adult female	Crater Lake	VHF collar
G220	8/30/16	Subadult male	Crater Lake	No collar

A grizzly bear captured for monitoring purposes is watched while it safely recovers from immobilization – every bear captured provides insight into the population.

GRIZZLY BEAR OBSERVATION FLIGHTS

The Department, along with other member agencies of the Interagency Grizzly Bear Study Team (IGBST), conducts observation flights in order to monitor the Greater Yellowstone grizzly bear population and estimate abundance. In 2016, the Grizzly Bear Observation Units (GBOUs) in the southern portion of the Greater Yellowstone Ecosystem (GYE; Figure 1) were flown once in an effort to reduce flight time and due to the low sightability of grizzly bears in these areas. This round was conducted in June to maximize the potential for observations in these units. An exception to this were GBOUs 26A and 26B, which were flown once in June and once in July due to higher numbers of grizzly bears in these areas. The remaining GBOUs in the northern GYE were flown twice, once each in July and August. There were more grizzly bear observations during Round 1 (including June flights) than in 2015, with 202 total grizzly bears observed in the Wyoming GBOUs compared to 178 in 2015. The number of females with cubs-of-year (Fcoy or COY) groups observed during Round 1 was also higher than that of 2015, with 20 observed compared to 17 in 2015 (Table 4).

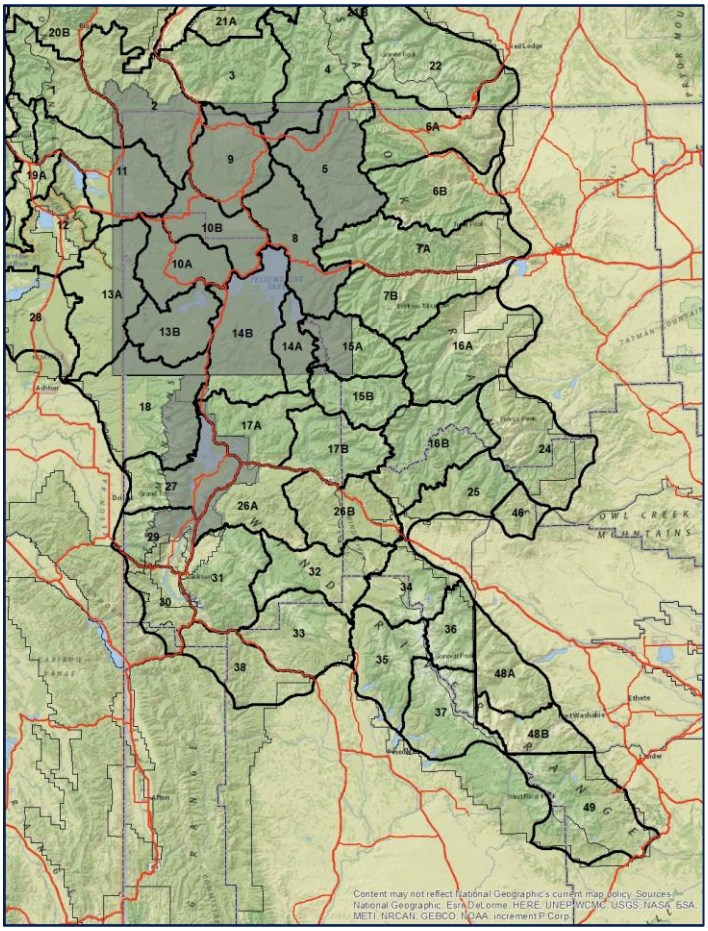


Figure 1. Grizzly Bear Observation Units (GBOUs) in the Wyoming portion of the Greater Yellowstone Ecosystem.

Table 4. Composition of grizzly bears observed in Round 1 during 2016 observation surveys in Wyoming.

		Females with COY			Females with Yearlings			Females with 2 Year Olds			All Other Grizzly Bears	Total No. Bears Observed
		# of COY			# of Yrlngs			# of 2 Yr Olds				
Date	Unit	1	2	3	1	2	3	1	2	3		
7/15	6A	0	0	0	0	0	0	0	0	0	0	0
7/15	6B	0	1	0	0	0	0	0	0	0	7	10
7/16	7A	0	0	0	0	0	0	0	0	0	6	6
7/17	7B	0	2	0	0	0	0	0	0	0	9	15
7/21	15A	1	1	0	0	1	0	0	0	0	1	6
7/20	15B	0	0	0	0	1	0	1	0	0	4	9
7/18	16A	0	2	0	0	3	0	0	0	0	33	51
7/19	16B	1	5	0	1	0	1	0	0	0	8	31
7/23	17A	0	0	0	0	0	0	0	0	0	0	0
7/24	17B	1	0	0	1	0	0	0	0	0	7	11
7/22	24	0	5	1	1	2	0	0	0	0	31	58
7/13	25	0	0	1	0	0	0	0	0	0	0	4
6/13	26A	0	0	0	0	0	0	0	0	0	0	0
6/10	26B	0	0	0	0	0	0	0	0	0	0	0
6/11	29	0	0	0	0	0	0	0	0	0	0	0
6/22	30	0	0	0	0	0	0	0	0	0	0	0
6/14	31	0	0	0	0	0	0	0	0	0	0	0
6/15	32	0	0	0	0	0	0	0	0	0	1	1
6/23	33	0	0	0	0	0	0	0	0	0	0	0
6/17	34	0	0	0	0	0	0	0	0	0	0	0
6/20	35	0	0	0	0	0	0	0	0	0	0	0
6/19	36	0	0	0	0	0	0	0	0	0	0	0
6/18	37	0	0	0	0	0	0	0	0	0	0	0
All Areas		3	16	2	3	7	1	1	0	0	107	202

Only the northern GBOUs were flown during the second round of flights, with the exception of GBOUs 26A and 26B. Unlike most years, the number of grizzly bears observed in Round 2 was lower than in Round 1. The peak of grizzly bear use of army cutworm moth sites usually occurs during Round 2. However, compared to 2015, the number of grizzly bears observed decreased to 139 in 2016 from 204 the previous year. Much of this decrease was attributable to fewer grizzly bears observed on army cutworm moth sites in 2016, likely due to low numbers of moths in many of these areas. Sixteen coy were observed during Round 2 flights; the same as observed in 2015 (Table 5).

Table 5. Composition of grizzly bears observed in Round 2 during 2016 observation surveys in Wyoming.

		Females with COY			**Females with Yearlings**			**Females with 2 Year Olds**			**All Other Grizzly Bears**	**Total No. Bears Observed**
		# of COY			**# of Yrlngs**			**# of 2 Yr Olds**				
Date	Unit	1	2	3	1	2	3	1	2	3		
8/16	6A	0	0	0	0	0	0	0	0	0	0	0
8/16	6B	0	1	0	1	0	0	0	0	0	3	8
8/17	7A	0	0	0	0	0	0	0	0	0	3	3
8/18	7B	0	0	0	0	0	0	0	0	0	6	6
8/26	15A	0	0	0	0	0	0	0	0	0	0	0
8/26	15B	0	0	0	0	0	0	0	0	0	2	2
8/24	16A	0	0	1	0	0	0	0	0	0	15	19
8/20	16B	3	5	1	0	1	0	1	0	0	10	40
8/27	17A	0	0	0	0	0	0	0	0	0	0	0
8/28	17B	0	0	0	0	0	0	0	0	0	1	1
8/21	24	1	3	1	1	3	1	0	0	0	28	58
8/15	25	0	0	0	0	0	0	0	0	0	1	1
7/26	26A	0	0	0	0	0	0	0	0	0	0	0
7/27	26B	0	0	0	0	0	0	0	0	0	1	1
All Areas		4	9	3	2	4	1	1	0	0	70	139

MOTH SITE USE BY GRIZZLY BEARS

Taken from: *Grizzly Bear Use of Insect Aggregation Sites* *(Dan D. Bjornlie, Wyoming Game and Fish Department; and Mark A. Haroldson, Interagency Grizzly Bear Study Team)*

Army cutworm moths (*Euxoa auxiliaris*) 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 specific site fidelity. These sites are generally high alpine areas dominated by talus and scree adjacent to areas with abundant alpine flowers. Because insects other than army cutworm moths may be present and consumed by bears (e.g., ladybird beetles [Coccinellidae family]) as well, we generally refer to such areas as "insect aggregation sites." Within the GYE, observations indicate army cutworm moths are the primary food source at these sites.

Since their discovery, numerous bears have been counted on or near these aggregation sites due to excellent sightability from a lack of trees and simultaneous use by multiple bears. However, complete tabulation of grizzly bear presence at insect 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 that the size and location of aggregation sites fluctuate from year to year with moth abundance and variation in environmental factors such as snow cover.

Since 1986, when insect aggregation sites were initially included in aerial observation surveys, our knowledge of these sites has increased annually. Our techniques for monitoring grizzly bear use of these sites have changed in response to this increase in knowledge. Prior to 1997, we delineated insect aggregation sites with convex polygons drawn around locations of bears seen feeding on moths and buffered these polygons by 500 m. However, this technique overlooked small sites due to the inability to create polygons around sites with fewer than 3 locations. During 1997–1999, the method for defining insect aggregation sites was to inscribe a 1-km circle around the center of clusters of observations in which bears were seen feeding on insects in talus and scree habitats (Ternent and Haroldson 2000). This method allowed trend in bear use of sites to be annually monitored by recording the number of bears documented in each circle (i.e., site).

We developed a new technique in 2000 (D. Bjornlie, Wyoming Game and Fish Department, unpublished data) that delineates sites by buffering only the locations of bears observed actively feeding at insect aggregation sites by 500 m; this distance was used to account for error in aerial telemetry locations. The borders of the overlapping buffers at individual insect 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 cutworm 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. This new technique substantially decreased the number of sites described in prior years, in which locations from both feeding and non-feeding bears were used. Therefore, we use this technique for the annual analysis completed for all years. Areas suspected as insect aggregation sites but dropped from the list of confirmed sites using this technique, and sites with only one observation of an actively feeding bear or multiple

observations in a single year, are termed "possible" sites and will be monitored in subsequent years for additional observations of actively feeding bears. These sites may then be added to the confirmed sites list. When possible sites are changed to confirmed sites, analysis is done on all data back to 1986 to determine the historic use of that site. Therefore, the number of bears using insect aggregation sites in past years may change as new sites are added, and data from this annual report may not match that of past reports. 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 insect aggregation sites in past years.

Analysis of grizzly bear use of confirmed sites in 2016 resulted in an additional observation of actively feeding grizzly bears on one possible site, which resulted in this site being classified as confirmed. In addition, there was one observation of an actively feeding grizzly bear at a previously undocumented site and therefore, one new possible site was added in 2016. Thus, there were 31 confirmed sites and 14 possible sites for 2016.

Overall insect aggregation site use by grizzly bears in 2016 (n = 217) was very similar to 2015 (n = 222), but below peak years 2012 – 2014 (Table 6). The number of grizzly bears observed on sites and the percentage of confirmed sites with documented use by grizzly bears varies from year to year, suggesting that some years have higher moth activity than others (Figure 2), which may be due to variable snow conditions or the number of moths migrating from the plains. In 1993, a year with unusually high snowpack, the percentage of confirmed sites used by bears (Figure 2) and the number of observations recorded at insect sites (Table 6) were very low.

The slight decrease in use of insect aggregation sites by grizzly bears in 2016 is also apparent when bears observed only during regularly-conducted observation flights are included (Figure 3). Because effort, as measured by hours flown, in the bear management units containing all known insect aggregation sites has remained consistent since 1997, the change in the number of grizzly bears using insect aggregation sites suggests this decrease was not due to change in observation effort (Figure 3). The increase in reported observations of grizzly bears using insect aggregation sites from ground-based observers and our increased use of GPS collars with satellite technology has resulted in the need to censor these locations to prevent a bias in comparisons with previous years. Therefore, the number of aerial telemetry locations and observations from Table 6 reflect this change and may differ from previous annual reports.

The IGBST maintains an annual list of unique females observed with cubs. Since 1986, 1,111 initial sightings of unique females with cubs have been recorded, of which 315 (28.4%) have occurred at (<500 m, n = 293) or near (<1,500 m, n = 22) insect aggregation sites (Table 7). In 2016, 13 of the 50 (26.0%) initial sightings of unique females with cubs were observed at insect aggregation sites; comparable to the mean of 26.9% for the previous five years (2011–2015, Table 7).

Survey flights at or near (<1,500 m) insect aggregation sites contribute to the count of unique females with cubs; however, it is typically low, with a 10-year mean of 13.5 initial sightings/year since 2007 (Table 7). If these sightings are excluded, a similar trend in the annual number of

unique sightings of females with cubs is still evident (Figure 4), suggesting that other factors besides observation effort at insect aggregation sites are responsible for the increase in sightings of grizzly bear females with cubs.

A lone grizzly bear observed during an observation flight

Table 6. Number of confirmed insect aggregation sites in the Greater Yellowstone Ecosystem, the number used by bears, and the total number of aerial telemetry relocations and ground or aerial observations of bears recorded at sites, 1986–2016.

Year	Number of confirmed moth sites[a]	Number of sites used[b]	Number of aerial telemetry relocations	Number of ground or aerial observations
1986	4	2	7	5
1987	5	3	3	17
1988	5	3	11	30
1989	9	7	9	41
1990	14	11	9	77
1991	16	12	12	169
1992	17	11	6	107
1993	18	3	1	2
1994	18	9	1	30
1995	20	11	7	38
1996	21	14	21	67
1997	22	15	17	83
1998	25	21	10	182
1999	25	14	26	156
2000	25	13	48	95
2001	26	18	23	127
2002	27	20	30	251
2003	27	20	9	163
2004	27	16	2	134
2005	29	19	16	195
2006	29	16	14	146
2007	29	19	19	160
2008	29	22	16	179
2009	31	23	8	170
2010	31	18	3	132
2011	31	19	9	162
2012	31	22	16	252
2013	31	22	25	294
2014	31	24	11	343
2015	31	21	13	209
2016	31	19	14	203
Total			416	4219

[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] A site was considered used if ≥1 location or observation was documented within the site during July through September of that year.

Table 7. Number of initial sightings of unique females with cubs that occurred on or near insect aggregation sites, number of sites where such sightings were documented, and the mean number of sightings per site in the Greater Yellowstone Ecosystem, 1986–2016.

Year	Unique females with cubs[a]	Number of moth sites with an initial sighting[b]	Initial sightings			
			Within 500 m[b]		Within 1,500 m[c]	
			n	%	*n*	%
1986	25	0	0	0	0	0
1987	13	0	0	0	0	0
1988	19	1	2	10.5	2	10.5
1989	16	1	1	6.3	1	6.3
1990	25	4	4	16	5	20
1991	24	7	13	54.2	14	58.3
1992	25	5	7	28	9	36
1993	20	1	1	5	1	5
1994	20	3	5	25	5	25
1995	17	2	2	11.8	2	11.8
1996	33	7	7	21.2	8	24.2
1997	31	8	11	35.5	11	35.5
1998	35	10	13	37.1	13	37.1
1999	33	3	6	18.2	7	21.2
2000	37	6	9	24.3	10	27
2001	42	7	13	31	13	31
2002	52	11	18	34.6	18	34.6
2003	38	11	20	52.6	20	52.6
2004	49	11	17	34.7	17	34.7
2005	31	5	7	22.6	8	25.8
2006	47	11	15	31.9	16	34
2007	50	10	17	34	17	34
2008	44	7	11	25	14	31.8
2009	42	4	6	14.3	7	16.7
2010	51	7	9	17.6	9	17.6
2011	39	6	7	17.9	7	17.9
2012	49	6	13	26.5	13	26.5
2013	58	8	14	24.1	15	25.9
2014	50	11	21	42	23	46
2015	46	7	11	23.9	13	28.3
2016	50	7	13	26	17	34
Total	1,111		293		315	
Mean	35.8	6.0	9.5	24.2	10.2	25.8

[a] Initial sightings of unique females with cubs; see Table 5.

[b] Insect aggregation site is defined as a 500-m distance around a cluster of observations of bears actively feeding.

[c] This distance is 3 times what is defined as an insect aggregation site for this analysis because some observations may be of bears traveling to and from insect aggregation sites.

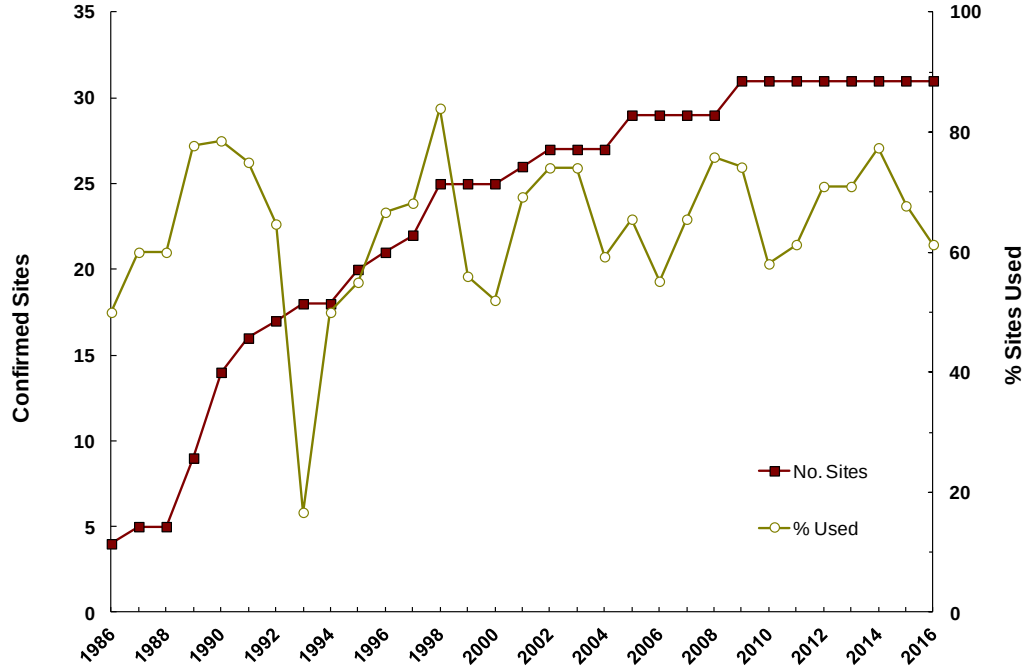


Figure 2. Annual number of confirmed insect aggregation sites and percent of those sites at which either telemetry relocations of marked bears or visual observations of unmarked bears were recorded, Greater Yellowstone Ecosystem, 1986–2016.

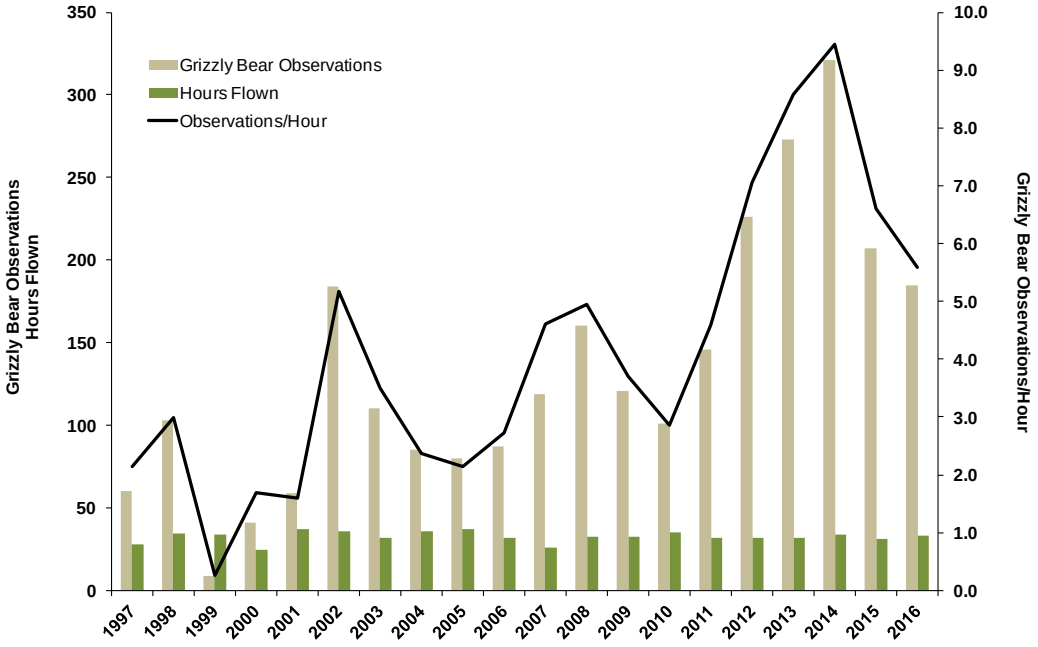


Figure 3. Number of grizzly bears observed (tan bars) on insect aggregation sites during observation flights only, hours flown (green bars) for these bear management units (BMU), and grizzly bear observations per hour (black line) during observation flights of BMUs containing all known insect aggregation sites, Greater Yellowstone Ecosystem, 1997–2016.

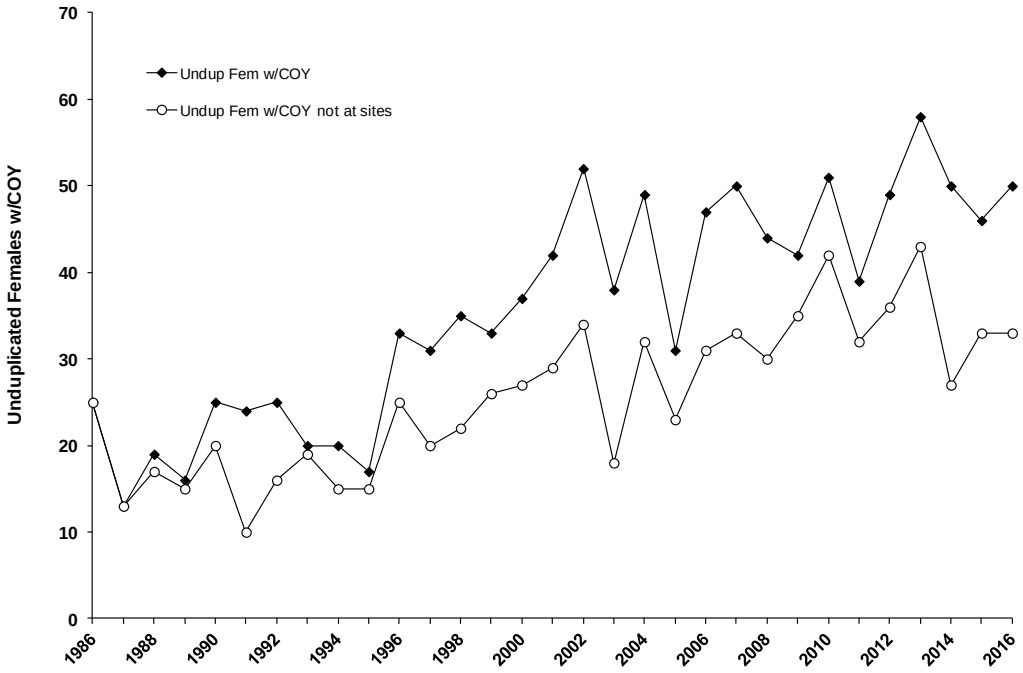
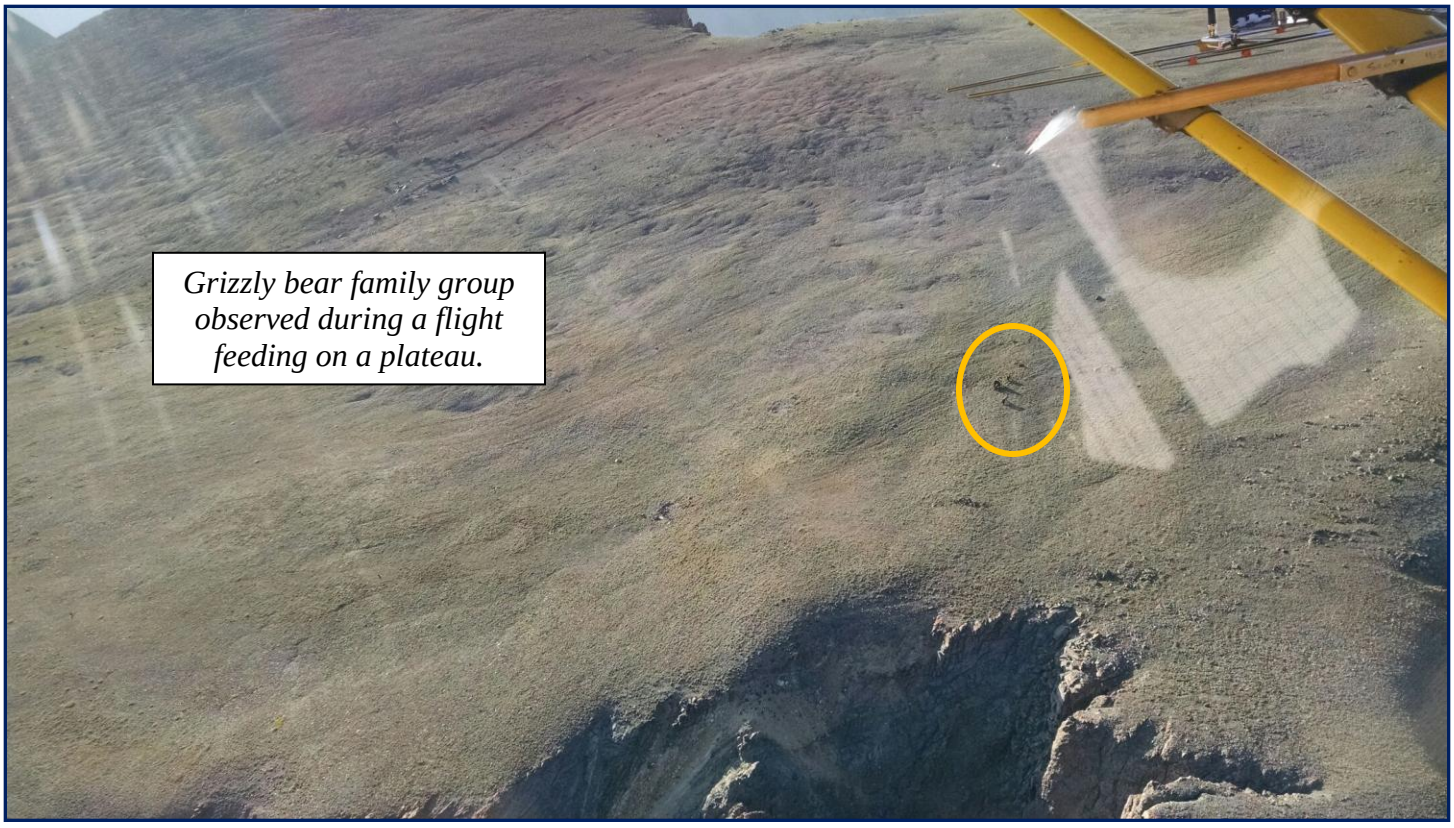


Figure 4. The total number of unique females with cubs observed annually in the Greater Yellowstone Ecosystem and the number of unique females with cubs not found within 1,500 m of known insect aggregation sites, 1986–2016.



PUBLICATIONS AND UPDATES

Personnel with the Department's Large Carnivore Section have been authors and/or collaborators of multiple peer-reviewed research papers and popular articles on grizzly bear ecology in recent years. Some of these abstracts were included in the 2015 Grizzly Bear JCR, however were technically published during this year's reporting period and are therefore included here. These publications are examples of relevant publications for the GYE grizzly bear population and are essential in demonstrating the recovery of the population. In addition, based on techniques developed by Bjornlie et al. (2014) to calculate grizzly bear distribution, we are providing an updated distribution for grizzly bears in the GYE through 2016.

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/web2011/wildlife-1000674.aspx.

Additional information regarding other publications, annual reports, and peer reviewed literature for the Yellowstone population of grizzly bears is summarized on the United States Geological Service web site at http://www.nrmsc.usgs.gov/products/IGBST.

Multiple estimates of effective population size for monitoring a long-lived vertebrate: An application to Yellowstone grizzly bears

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ABSTRACT Effective population size (N_e) is a key parameter for monitoring the genetic health of threatened populations because it reflects a population's evolutionary potential and risk of extinction due to genetic stochasticity. However, its application to wildlife monitoring has been limited because it is difficult to measure in natural populations. The isolated and well-studied population of grizzly bears (*Ursus arctos*) in the Greater Yellowstone Ecosystem provides a rare opportunity to examine the usefulness of different N_e estimators for monitoring. We genotyped 729 Yellowstone grizzly bears using 20 microsatellites and applied three single-sample estimators to examine contemporary trends in generation interval (GI), effective number of breeders (N_b) and N_e during 1982–2007. We also used multisample methods to estimate variance (N_{eV}) and inbreeding N_e (N_{eI}). Single-sample estimates revealed positive trajectories, with over a fourfold increase in N_e (≈100 to 450) and near doubling of the GI (≈8 to 14) from the 1980s to 2000s. N_{eV} (240–319) and N_{eI} (256) were comparable with the harmonic mean single-sample N_e (213) over the time period. Reanalysing historical data, we found N_{eV} increased from ≈80 in the 1910s–1960s to ≈280 in the contemporary population. The estimated ratio of effective to total census size (N_e/N_c) was stable and high (0.42–0.66) compared to previous brown bear studies. These results support independent demographic evidence for Yellowstone grizzly bear population growth since the 1980s. They further demonstrate how genetic monitoring of N_e can complement demographic-based monitoring of N_c and vital rates, providing a valuable tool for wildlife managers.

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Detecting grizzly bear use of ungulate carcasses using global positioning system telemetry and activity data

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ABSTRACT Global positioning system (GPS) wildlife collars have revolutionized wildlife research. Studies of predation by free-ranging carnivores have particularly benefited from the application of location clustering algorithms to determine when and where predation events occur. These studies have changed our understanding of large carnivore behavior, but the gains have concentrated on obligate carnivores. Facultative carnivores, such as grizzly/brown bears (*Ursus arctos*), exhibit a variety of behaviors that can lead to the formation of GPS clusters. We combined clustering techniques with field site investigations of grizzly bear GPS locations (n = 732 site investigations; 2004–2011) to produce 174 GPS clusters where documented behavior was partitioned into five classes (large-biomass carcass, small-biomass carcass, old carcass, non-carcass activity, and resting). We used multinomial logistic regression to predict the probability of clusters belonging to each class. Two cross-validation methods—leaving out individual clusters, or leaving out individual bears—showed that correct prediction of bear visitation to large-biomass carcasses was 78–88 %, whereas the false-positive rate was 18–24 %. As a case study, we applied our predictive model to a GPS data set of 266 bear-years in the Greater Yellowstone Ecosystem (2002–2011) and examined trends in carcass visitation during fall hyperphagia (September–October). We identified 1997 spatial GPS clusters, of which 347 were predicted to be large-biomass carcasses. We used the clustered data to develop a carcass visitation index, which varied annually, but more than doubled during the study period. Our study demonstrates the effectiveness and utility of identifying GPS clusters associated with carcass visitation by a facultative carnivore.

Oecologia, Volume 181, Issue 3: pages 695-708

Methods to estimate distribution and range extent of grizzly bears in the Greater Yellowstone Ecosystem.

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ABSTRACT The distribution of the Greater Yellowstone Ecosystem grizzly bear (*Ursus arctos*) population has expanded into areas unoccupied since the early 20th century. Up-to-date information on the area and extent of this distribution is crucial for federal, state, and tribal wildlife and land managers to make informed decisions regarding grizzly bear management. The most recent estimate of grizzly bear distribution (2004) utilized fixed-kernel density estimators to describe distribution. This method was complex and computationally time consuming and excluded observations of unmarked bears. Our objective was to develop a technique to estimate grizzly bear distribution that would allow for the use of all verified grizzly bear location data, as well as provide the simplicity to be updated more frequently. We placed all verified grizzly bear locations from all sources from 1990 to 2004 and 1990 to 2010 onto a 3-km × 3-km grid and used zonal analysis and ordinary kriging to develop a predicted surface of grizzly bear distribution. We compared the area and extent of the 2004 kriging surface with the previous 2004 effort and evaluated changes in grizzly bear distribution from 2004 to 2010. The 2004 kriging surface was 2.4% smaller than the previous fixed-kernel estimate, but more closely represented the data. Grizzly bear distribution increased 38.3% from 2004 to 2010, with most expansion in the northern and southern regions of the range. This technique can be used to provide a current estimate of grizzly bear distribution for management and conservation applications.

Wildlife Society Bulletin. 38:182–187; (doi:10.1002/wsb.368).

UPDATE: Using data through 2016 with the technique developed by Bjornlie and others (2014), the grizzly bear distribution has been updated and represents an additional 29% increase from data used through 2010 (Figure 5.) The LCS will continue to update current grizzly bear distribution every two years using this technique and results reported in subsequent Job Completion Reports and on the Grizzly Bear Management homepage of the Department's website.

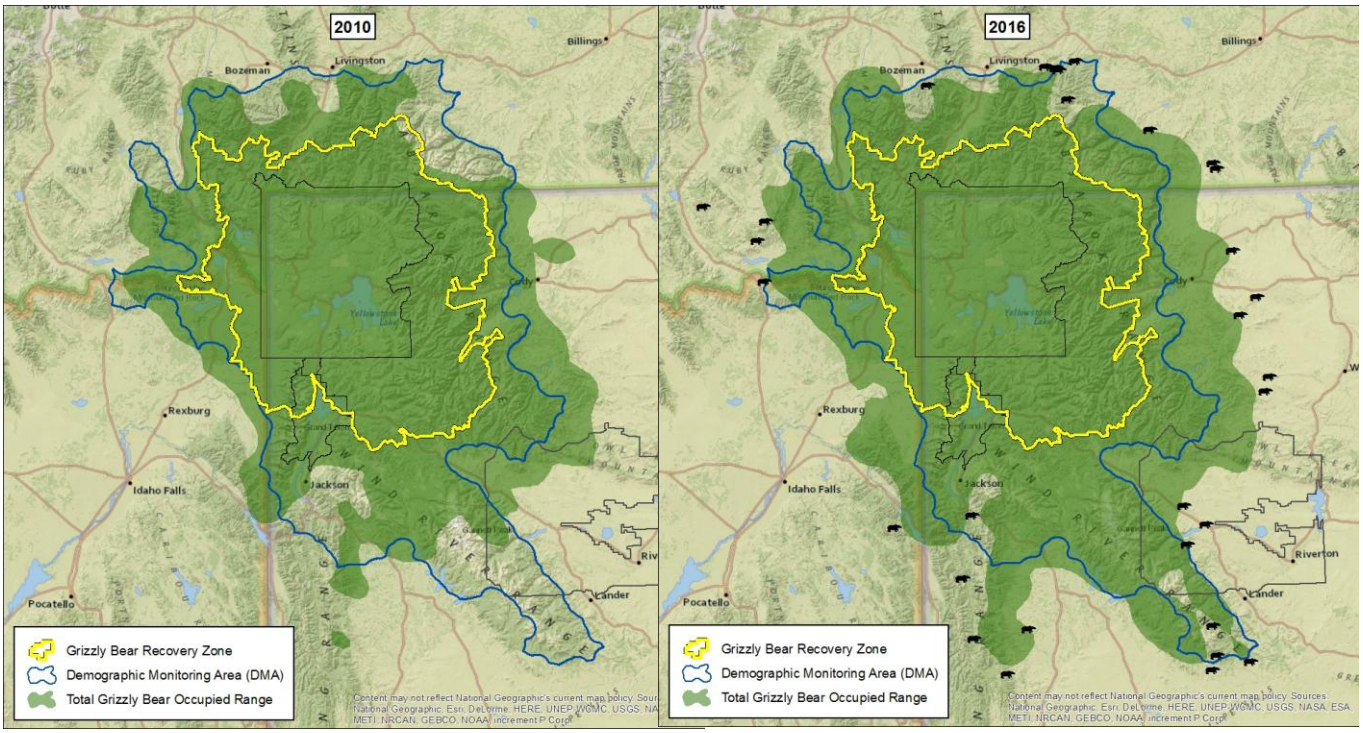


Figure 5. Maps depicting increase in grizzly bear distribution from 2010 through 2016 (29% increase) throughout the Greater Yellowstone Ecosystem. In Wyoming, note expansion in distribution beyond the Demographic Monitoring Area (DMA) and expansion into the Wyoming Range and Wind River Mountains. (For the 2016 map, the bear symbols denote verified locations of transient individuals not considered part of calculated grizzly bear range extent.)

A trap set for a grizzly bear that had depredated livestock demonstrates some of the landscapes where this occurs outside the DMA.

ENDANGERED SPECIES

SECTION 6 FUNDING

PROGRAM NARRATIVE STATEMENT PROPOSAL

WYOMING
E-1-99

Title:	Grizzly Bear Recovery and Conservation
Total Cost:	$100,000 ($75,000 USFWS and $25,000 WGFD match) - This includes temporary personnel, salaries, supplies, travel, surveys, and education efforts.
Time Period:	July 1, 2017 – June 30, 2018
Project Leader:	Daniel Thompson, Large Carnivore Section Supervisor 260 Buena Vista Dr., Lander, WY 82520 Dustin Lasseter, Bear Wise Community Coordinator 2820 State Hwy, 120, Cody, WY 82414
Location:	The program area encompasses all areas within the state of Wyoming in the Yellowstone Ecosystem outside of Yellowstone and Grand Teton National Parks. Additional activities may be completed within Yellowstone and Grand Teton National Parks in conjunction with the National Parks. Coordination also occurs between the WGFD and appropriate National Forests, Bureau of Land Management, U.S. Fish and Wildlife Service, and state lands as required.
Need:	The Department's grizzly bear program involves monitoring and management projects designed to determine various population characteristics and habitat use of grizzly bears in the Wyoming of the Yellowstone Ecosystem and to manage grizzly bear/livestock and grizzly bear/human interactions. Management programs are directed towards monitoring the grizzly bear population trend through observation flights that define the distribution of grizzly bears within bear management units (BMUs), document females with cubs of the year, and detailed monitoring of radio-collared individuals to assess important movement, seasonal habitat use, food selection, and survival estimates. Due to the long-lived, wide-ranging characteristics of grizzly bears, adequate information is needed for sound management decisions. Additional data will be needed to show trends in grizzly bear activities associated with road construction, timber management, mineral development, and cattle grazing in the southern BMUs, especially in areas outside the recovery area which are presently occupied by grizzly bears. The state currently funds seasonal trap personnel; however, additional funds are requested for additional person to assist in trapping grizzly bears and conducting surveys to document distribution and expansion of the population into the Wyoming Range and the southern portions of the Wind River Range. The state will fund the necessary training, supplies, travel, vehicles, and other

	associated equipment for these positions. Priority conflict efforts include responding to all bear conflict complaints. All known mortalities are investigated in cooperation with the U.S. Fish and Wildlife Service-Law Enforcement. Bears involved in conflicts will be captured, relocated, or removed as required. Grizzly bear/human conflict management will continue to be a high priority during recovery and management of the Yellowstone area grizzly bear population. Conflict management is essential to reducing human caused bear mortalities and maintaining public support of recovery efforts. Section 6 funds are needed to assist with local public awareness of bear safety and conflict prevention issues. In addition the Department has been instrumental in developing a carcass management program that removes significant threats of grizzly bear conflicts by taking livestock carcasses out of occupied grizzly bear range. Section 6 funding has previously been used to offset some of the costs for radio collars and aerial surveys, including telemetry flights to determine grizzly bear locations. Without section 6 funding, manpower, population and habitat data collection, and response rates to manage nuisance grizzly bears would be decreased. Previous allocations of Section 6 funds have not adequately covered the costs of the above items, which may hinder data collection to assure that monitoring is completed as described in the Yellowstone Grizzly Bear Conservation Strategy (CS). Additional funds are required to assure that aerial relocation schedules can be maintained and that we can deal with an increasing distribution of grizzly bears and grizzly bear conflicts on the landscape. Information and Educational efforts are essential to the recovery of grizzly bears in the Greater Yellowstone Ecosystem in order to maintain and attempt to build public tolerance for grizzly bears, especially in areas of expansion. Monies obtained from Section 6 funding will also be used for these I&E purposes as well as proactive awareness programs to reduce the potential for serious human/grizzly bear conflicts. The Department has implemented a Bear Wise Wyoming program that serves as a proactive outreach program to educate the public and provide information and experience in order to decrease the potential for conflicts between grizzly bears and humans. These efforts are necessary for the long term perpetuity of maintaining grizzly bears on the landscape and for building public tolerance of the species where bears are potentially causing conflicts
Objectives:	1) Assist the Interagency Grizzly Bear Study Team (IGBST) in determining food habits, habitat use, distribution, population trend, allowable mortality thresholds, and other important parameters for grizzly bears within the southern BMUs, 2) Provide comparative data to that already gathered by the IGBST, Idaho, and Montana, 3) Manage bear/human interaction, bear/livestock interaction and mortality data specific for each BMU to aid state and federal managers in minimizing human caused mortalities and grizzly bear conflicts. 4) Continue to provide important information and educational efforts to assist

	with bear conservation and safety issues, distribute information to hunters and other publics on bear safety, support a section on "Hunting in Bear Country" in statewide Hunter Education efforts, and continue to conduct numerous workshops on how to live safely in areas occupied by bears.
Approach:	1) Trapping and Handling Bears will be captured using Aldrich foot snares and trailer mounted box traps. Each animal will be ear tagged, lip tattooed for later identification, and fitted with a radio-collar. All collars are modified to fall off within 2 years using cotton spacers. Research-trapping efforts for grizzly bears are to be conducted on the Shoshone (SNF) and Bridger Teton (BTNF) National Forests, as well as BLM and private lands, as required. Trapping schedules are developed jointly with the IGBST to assure adequate coverage outside the National Parks so that sampling and home range analysis corresponds to known grizzly bear distribution. 2) Telemetry and Home Range Analysis Bear locations will be determined using fixed wing aircraft, along with intensive sampling from the ground. The home ranges of collared animals will be calculated using the Harmonic Mean method. 3) Grizzly Bear/Livestock Interactions Grizzly Bear/livestock interactions will be managed as per the "Interagency Grizzly Bear Guidelines" and appropriate state and Federal laws and regulations. 4) Annual Data Collection Locations of radio-collared grizzly bears will be monitored with aerial flights. Cattle carcasses in the study area will also be investigated to determine cause of death. Detailed biological and physiological data will be gathered on each bear captured. 5) Grizzly Bear/Human Interactions The Department will continue to evaluate all bear/human interactions and take appropriate management actions in accordance with "Interagency Grizzly Bear Guidelines". 6) Multi-Agency Effort The CS has objectives for data collection to assure that the population status and other indices to recovery can be annually assessed for this population. This requires that several agencies work cooperatively to meet these goals. As a result, the states of Idaho, Montana, and Wyoming along with several federal agencies, share in the data collection and analysis of that data. All of the affected agencies, both state and federal, have signed the CS and have committed to collecting the information necessary to manage this population into the future.
Expected Results:	A primary goal of this program is to capture and radio-collar grizzly bears to provide an even distribution of marked grizzly bears and to enhance annual life history data of grizzly bears occupying new regions of the Yellowstone

	Ecosystem. Without this data, survival rates by age and sex will be compromised as data will only be available from a portion of the ecosystem. Observation flights are a key component of the annual data collection scheme. Section 6 funding would assure that adequate coverage of all occupied habitat is surveyed. New techniques may be investigated as warranted to test timing and frequency of these flights as well as testing the efficacy of new techniques such as the use of aerial imagery. Results would assist in providing a more accurate estimate of females with cubs of the year that is used to establish the population estimate. These funds will assure that data collection is consistent across the entire ecosystem, which is required to accurately assess the status of several population parameters. These funds will also assure that conflicts between grizzly bears and humans will be managed in a timely and consistent process. The number of conflicts continues to increase in Wyoming's portion of the ecosystem. Section 6 funds would be used to make sure personnel can effectively and efficiently respond to conflict situations in a timely and safe fashion. With additional funding, the Department's Information and Education efforts can be increased to assure that larger segments of the public are contacted to increase their awareness of how to recreate and live in occupied grizzly bear habitat.

GRIZZLY BEAR CONFLICT MANAGEMENT

Introduction

Human-grizzly bear interactions and conflicts in Wyoming are typically a result of grizzly bears seeking unnatural foods in association with people and property, close encounters with humans, or when grizzly bears kill livestock. The number and location of human-bear conflicts is influenced by unsecured unnatural attractants (e.g. human foods and garbage), natural food distribution and abundance, grizzly bear numbers and distribution, and human and livestock use patterns on the landscape.

The management technique of capturing grizzly bears in areas where they may come into conflict with people and relocating them to remote locations is a common practice throughout the world. Relocating bears achieves several social and conservation functions: (a) reduces the chance of property damage, livestock damage, or human interactions in areas where the potential for conflict is high; (b) reduces the potential for grizzly bears to become food conditioned and/or human habituated which often results in destructive and/or dangerous behaviors; (c) allows grizzly bears the opportunity to forage on natural foods and remain wary of people; and (d) could prevent removing grizzly bears from the population which may be beneficial in meeting population management objectives.

The Department relocates and removes black and grizzly bears as part of routine management operations. The decision to relocate or remove a bear is made after considering a number of variables including 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, and population management objectives. Grizzly bears are relocated in accordance with state and federal law, regulation, and policy.

In 2005 the Wyoming Legislature created Wyoming Statute §23-1-1001 as follows:

> (a) Upon relocating a grizzly bear or upon receiving notification that a grizzly bear is being relocated, the department shall provide notification to the county 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;
>
> (b) The notice and press release shall provide the following information:
>
> (i) The date of the grizzly bear relocation;
> (ii) The number of grizzly bears relocated; and
> (iii) The location of the grizzly bear relocation, as provided by commission rule and regulation;
>
> (c) 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.

Subsequently, the Wyoming Game and Fish Commission promulgated Chapter 58 to further direct the implementation of W.S. §23-1-1001 as follows:

> **Section 1. Authority.** This regulation is promulgated by authority of W.S. §23-1-1001.
>
> **Section 2. Definitions.** Definitions shall be as set forth in Title 23, Wyoming Statutes, Commission regulations, and the Commission also adopts the following definitions:
>
> (a) "County Sheriff" means the County Sheriff's Office in the county where a grizzly bear is relocated.

(b) "Location of the grizzly bear relocation" means the proper name of the drainage in which a grizzly bear is relocated and the estimated number of miles from the relocation site to the nearest municipality, topographical feature or geographic location.

(c) "Provide a press release" means the Department shall provide to the County Sheriff and the media in the county in which a grizzly bear is relocated, a press release including the location of the grizzly bear relocation, number of grizzly bears relocated, date of the relocation and the reason the grizzly bear was relocated.

Section 3. Notification of relocation. Upon relocating a grizzly bear or upon receiving notification that a grizzly bear is being relocated, the Department shall notify the County Sheriff of the date, number of grizzly bears relocated, the location of the grizzly bear relocation and the reason of the relocation via direct telephone conversation, written or electronic correspondence, or personal contact within five (5) days of the date of the relocation. The Department shall provide a press release to the County Sheriff and the media in the county where a grizzly bear is relocated of the date, number of grizzly bears relocated, the location of the grizzly bear relocation and the reason of the relocation within five (5) days of the date of relocation of any grizzly bear.

WYOMING GAME AND FISH COMMISSION

By: _____
Mike Healy, President

Dated: January 22, 2014

CONFLICT MANAGEMENT – CAPTURES, HANDLING AND RELOCATION

During 2016, the Department captured 39 grizzly bears in 40 capture events in an attempt to prevent or resolve conflicts (Figure 6). Most captures were lone grizzly bears of all age classes, but 2 family groups (both females with 3 cubs-of-the-year), and one pair of sibling 2-year olds were also captured. Twenty-six (65%) of the 40 capture events were in Park County, 8 (20%) occurred in Sublette County, 4 (10%) in Fremont County, and 2 (5%) in Hot Springs County (Table 8).

Of the 40 capture events, 17 captures were a result of bears killing livestock (primarily cattle), 9 bears were captured for obtaining garbage, and 9 were captured for obtaining pet, livestock food, or damaging fruit trees. Two bears were non-target captures released on site, and 3 were orphaned cubs-of-the-year captured and removed for human safety/ethical reasons, and physical condition of the cubs. All relocated grizzly bears were released on U.S. Forest Service lands in or adjacent to the Primary Conservation Area (PCA) (Figure 7). Of the 16 relocation events, 9 (56%) bears were released in Park County, and 7 (44%) were released in Teton County.

Twenty-two of the 40 capture events resulted in the removal of grizzly bears from the population (Table 8). These bears were removed due to a history of previous conflicts, a known history of close association with humans, or they were deemed unsuitable for release into the wild (e.g. orphaned cubs, poor physical condition, or human safety concern). Removals occur after deliberation with the U.S. Fish and Wildlife Service and ultimate decisions take into account multiple factors unique to each conflict situation.

All independent grizzly bears greater than 2-years-old that were relocated were fitted with a radio-tracking collar to evaluate their movements after release and into the future. Attempts to obtain locations on marked grizzly bears through aerial telemetry were made approximately every 10-14 days as part of standard monitoring techniques throughout the ecosystem. As per Wyoming Statute, within five days of releasing a grizzly bear, the County Sheriff was notified by e-mail and a press release was distributed to all local media contacts in the county where the grizzly bear was released. The media release contained information on the location of the grizzly bear release, the number of grizzly bears relocated, the date of the relocation, and the reason the grizzly bear was relocated.

As the grizzly bear population expands more unique situations and conflict opportunities arise.

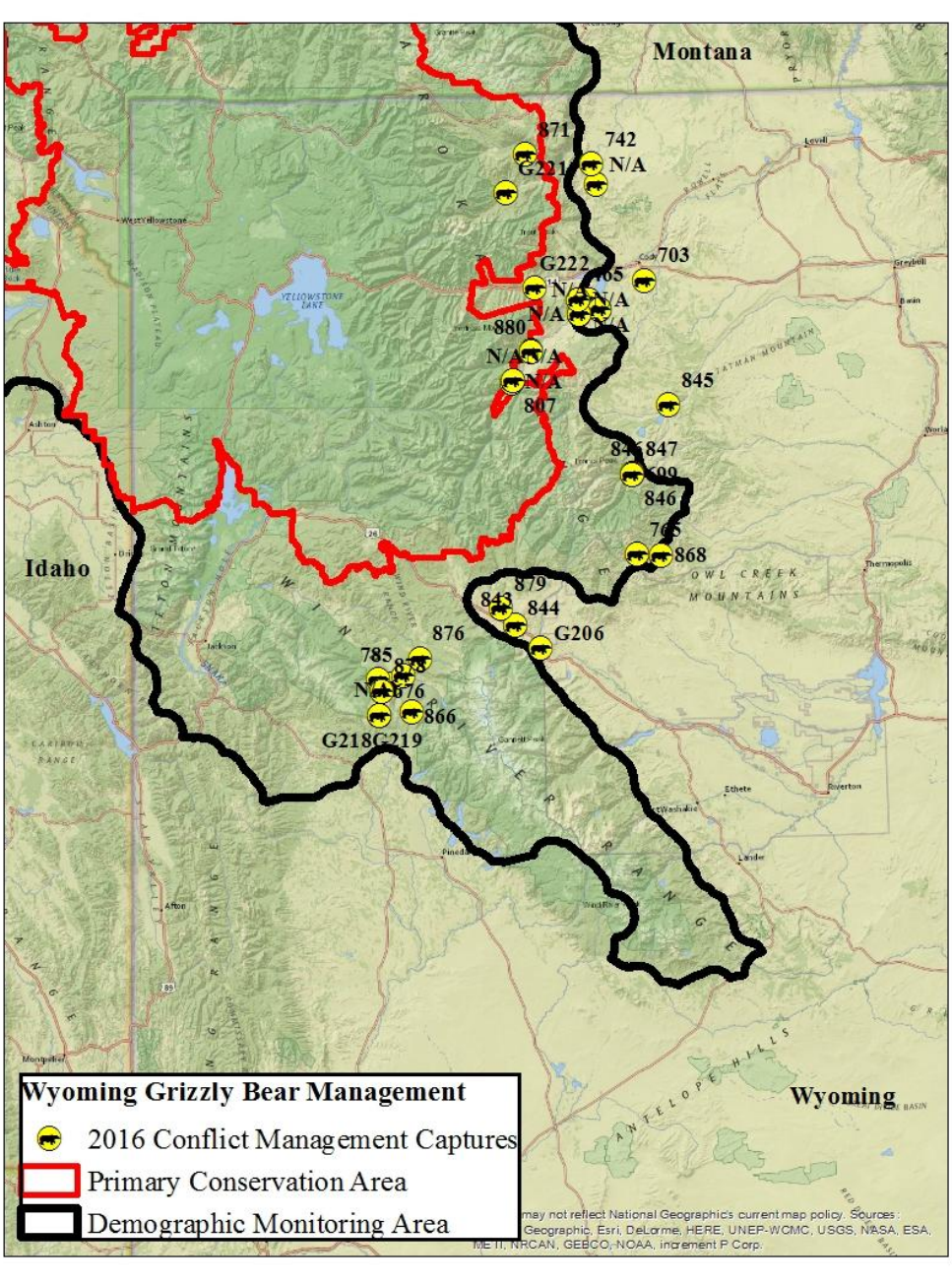


Figure 6. Management capture locations (n = 40) for grizzly bears captured, relocated, released, or removed in 2016. Grizzly bears with "G" in front of their number were ear-marked but not fitted with radio collars upon release typically because they were too young to be collared. Grizzly bears identified with "NA" were grizzly bears removed from the population without being given an identification number. PCA is the grizzly bear Primary Conservation Area as defined in the 2007 Grizzly Bear Conservation Strategy. DMA is the grizzly bear Demographic Monitoring Area as defined in "Interagency Grizzly Bear Study Team. 2012. Updating and Evaluating Approaches to estimate population size and sustainable mortality limits for grizzly bears in the Greater Yellowstone Ecosystem. Interagency Grizzly Bear Study Team, U.S. Geological Survey, Northern Rocky Mountain Science Center, Bozeman, MT, USA.

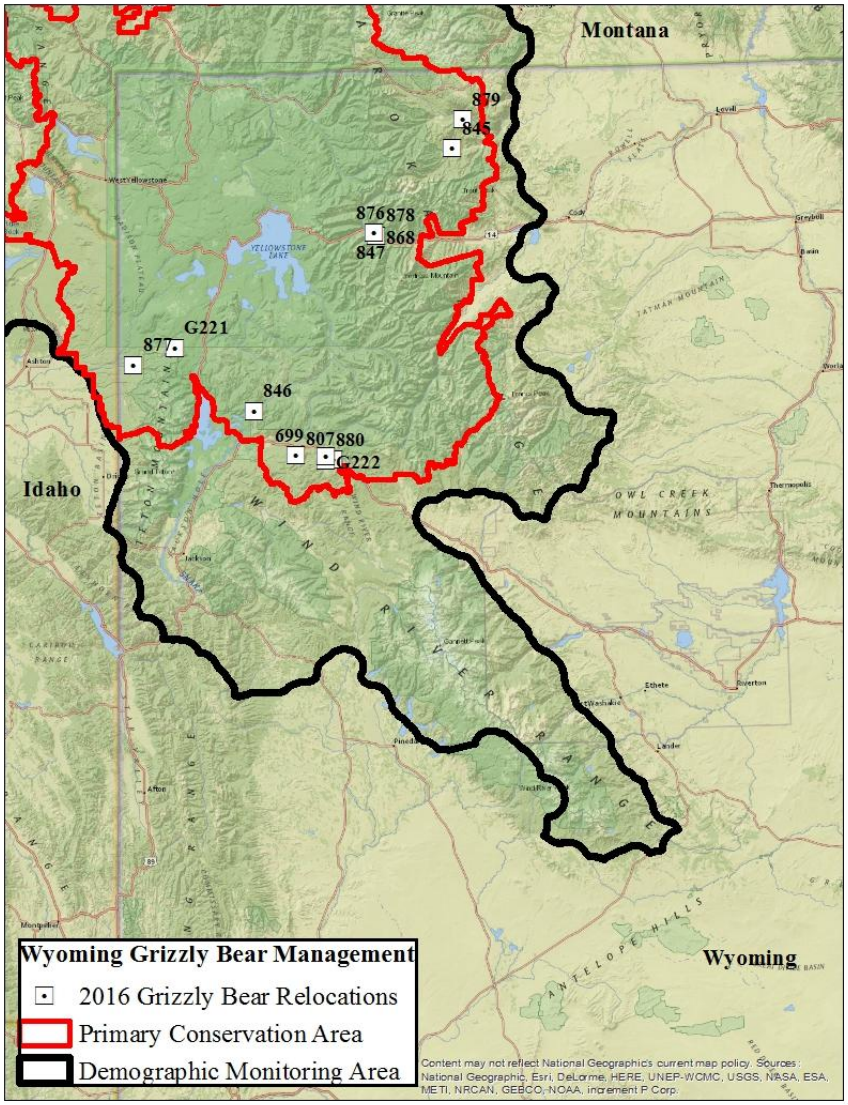


Figure 7. Release locations (n = 16, 2 management capture bears were released on site) for grizzly bears captured, relocated, or released on site in conflict management efforts 2016. Grizzly bears with "G" in front of their number were ear-marked but not fitted with radio collars upon release typically because they were too young to be collared. PCA is the grizzly bear Primary Conservation Area as defined in the 2016 Grizzly Bear Conservation Strategy. The DMA is the grizzly bear Demographic Monitoring Area as defined in "Interagency Grizzly Bear Study Team. 2012. Updating and Evaluating Approaches to estimate population size and sustainable mortality limits for grizzly bears in the Greater Yellowstone Ecosystem." Interagency Grizzly Bear Study Team, U.S. Geological Survey, Northern Rocky Mountain Science Center, Bozeman, MT, USA.

Table 8. Capture date, grizzly bear identification number (ID), capture county, relocation site, release county, and reason for capture for all 2016 grizzly bear conflict management captures (n = 40) in Wyoming. Grizzly bears identified with "NA" were grizzly bears removed from the population without being given an identification number.

Date	ID	Capture county	Relocation site	Release county	Reason for capture
4/16/2016	839	Park			Removed for chronic cattle depredation
4/27/2016	845	Park	Trail Creek-WGFD WHMA	Park	Relocated for frequenting a developed area
5/5/2016	846	Park	Pacific Creek-Bridger-Teton Forest	Teton	Relocated for property damage and food reward of fish food
5/6/2016	NA	Park			Removed for chronic cattle depredation.
5/12/2016	G206	Fremont			Removed for repeated conflicts and property damage
5/19/2016	699	Park	Flagstaff Creek-Bridger-Teton Forest	Teton	Non-target capture
5/22/2016	846	Park			Removed for repeated property damage
5/22/2016	847	Park	Five Mile Creek-Shoshone Forest	Park	Non-target capture, no conflict, relocated after injured by bear 846 in snare
6/25/2016	742	Park			Removed for chronic cattle depredation
7/8/2016	807	Park	Lost Lake Road-Bridger-Teton Forest	Teton	Relocated for chicken depredation
7/10/2016	843	Fremont			Removed for chronic food rewards in developed area
7/10/2016	844	Fremont			Removed for chronic food rewards in developed area
7/19/2016	866	Sublette	On Site-Bridger-Teton Forest		Non-target at cattle depredation
7/23/2016	868	Hot springs	Mormon Creek-Shoshone Forest	Park	Relocated for cattle depredation.
8/6/2016	785	Sublette			Removed for chronic cattle depredation
8/7/2016	871	Park	On Site-Shoshone Forest		Non-target for cattle depredation
8/15/2016	765	Hot springs			Removed for chronic cattle depredation
8/29/2016	676	Sublette	Five Mile-Shoshone Forest	Park	Relocated for sheep depredations with dependent young (3 coy)
8/29/2016	G218	Sublette	Five Mile-Shoshone Forest	Park	Relocated with mother 676 and siblings for sheep depredations

Table 8. Continued.

Date	ID	Capture county	Relocation site	Release county	Reason for capture
8/29/2016	G219	Sublette	Five Mile-Shoshone Forest	Park	Relocated with mother 676 and siblings for sheep depredations
8/29/2016	NA	Sublette			Captured With Mother 676 And Siblings For Sheep Depredations – Accidental Mortality
9/1/2016	876	Sublette	Five Mile-Shoshone Forest	Park	Relocated For Cattle Depredation.
9/7/2016	877	Park	Boone Creek-Targhee Forest	Teton	Relocated For Apple Tree Damage And Frequenting Developed Areas
9/9/2016	878	Sublette	Mormon Creek-Shoshone Forest	Park	Relocated For Cattle Depredations
9/13/2016	879	Fremont	Deadman Creek-Shoshone Forest	Park	Relocated For Frequenting Ranch Buildings Adjacent To Town Of Dubois
9/15/2016	880	Park	Blackrock Creek-Bridger-Teton Forest	Teton	Relocated For Frequenting Developed Areas.
9/18/2016	G221	Park	Grassy Lake-JDR Parkway	Teton	Relocated For Frequenting A Guest Ranch
9/29/2016	369	Park			Removed For Chronic Food Rewards In Developed Area
9/29/2016	829	Park			Removed For Chronic Food Rewards In Developed Area
9/30/2016	703	Park			Removed For Frequenting Landfill
10/3/2016	G222	Park	Holmes Cave-Bridger-Teton Forest	Teton	Relocated For Frequenting Developed Areas And Damaging Apple Trees
10/7/2016	NA	Park			Removed For Cattle Depredation And Frequenting Developed Areas
10/7/2016	NA	Park			Removed For Cattle Depredation And Frequenting Developed Areas
10/7/2016	NA	Park			Removed For Cattle Depredation And Frequenting Developed Areas

Table 8.
Continued.

Date	ID	Capture county	Relocation site	Release county	Reason for capture
10/8/2016	NA	Park			Removed For Cattle Depredation And Frequenting Developed Areas
10/9/2016	NA	Park			Removed For Getting Garbage And In Poor Condition
10/15/2016	465	Park			Removed For Damaging Chicken Coops And Killing 3 Goats.
10/21/2016	NA	Park			Orphaned Cub Euthanized
10/21/2016	NA	Park			Orphaned Cub Euthanized
10/21/2016	NA	Park			Orphaned Cub Euthanized

CONFLICT MANAGEMENT – CONFLICT VERIFICATION AND REPORTING

Department personnel investigated and recorded 223 human-grizzly bear conflicts in 2016 (Table 9, Figure 8). As a result of numerous and diligent education and conflict prevention efforts, the general pattern of conflicts is relatively steady within currently occupied habitat (Figure 3). However, as occupied grizzly bear range has expanded, conflicts continue to occur in areas further from the Recovery Zone/Primary Conservation Area and outside the Demographic Monitoring Area (DMA), often on private lands. Grizzly bears are increasingly coming into conflict with people in areas where grizzly bears have not been present in recent history. Although the joint efforts of the Department, U.S. Forest Service, non-governmental organizations, and particularly the public, have resulted in reducing conflicts through education and attractant storage in many areas, numbers of grizzly bear conflicts in Wyoming were very high this year. Bears frequented lower elevations and developed areas regularly during the non-denning period. Grizzly bear-cattle depredation was the most frequent type of conflict documented in 2016. The annual variation in livestock depredation incidents is not easily explained. Although most human-bear conflicts are correlated with natural food abundance, the number of cattle and sheep killed annually do not follow the same pattern. As grizzly bears expand further into human-dominated landscapes outside the DMA the potential for conflict is between bears and humans increases, potentially resulting in negative outcomes for both grizzly bears and people. The Department continues to explore options to reduce grizzly bear-livestock conflicts.

The majority of conflicts in Wyoming occurred on public lands outside of the Recovery Zone/Primary Conservation Area (Figures 9 and 10). The increasing distribution of grizzly bears is reflected in the annual documentation of conflicts further from the Recovery Zone/Primary Conservation Area and expansion 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 will be a function of human values and grizzly bear population effects in those areas.

Table 9. Type and number of human-grizzly bear conflicts in Wyoming, 2016.

Conflict Type	Number	Percent (%)
Cattle	122	54.7
Garbage	31	13.9
Pet-Livestock-Birdfeed	19	8.5
Property Damage	16	7.2
Fruit Trees	8	3.5
Animal Death	7	3.1
Sheep	5	2.2
Human Injury	4	1.8
Aggression Toward Humans	4	1.8
Poultry	2	0.9
Properly Stored Game	2	0.9
Unsecured Attractant	1	0.4
Pet/Guard Animal	1	0.4
Other	1	0.4
Total	223	100.0

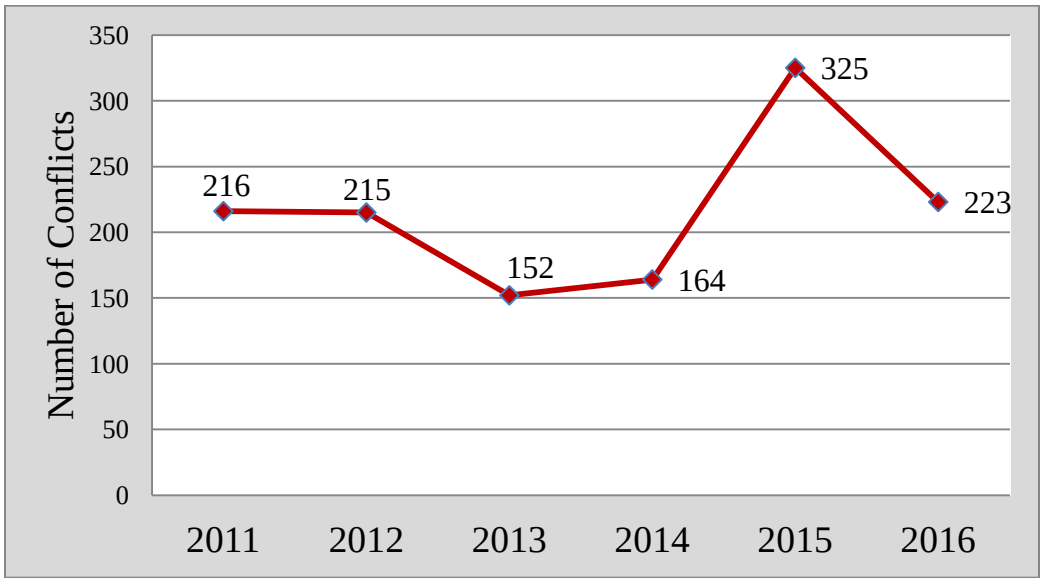


Figure 8. Number of human-grizzly bear conflicts documented in Wyoming, 2011 - 2016.

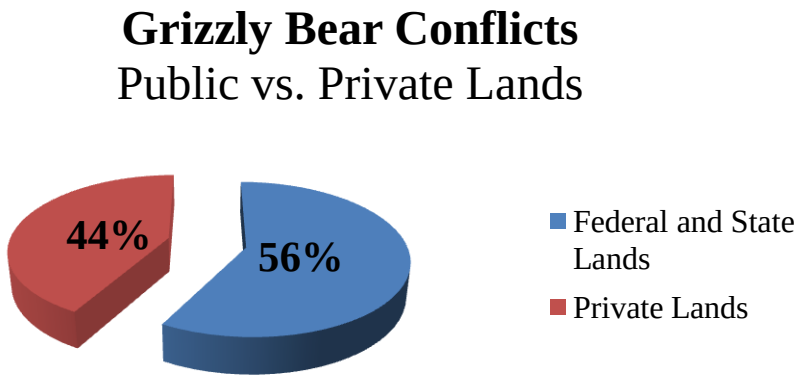


Figure 9. Number of Human-Grizzly Bear Conflicts on Private and Public Lands in Wyoming, 2016.

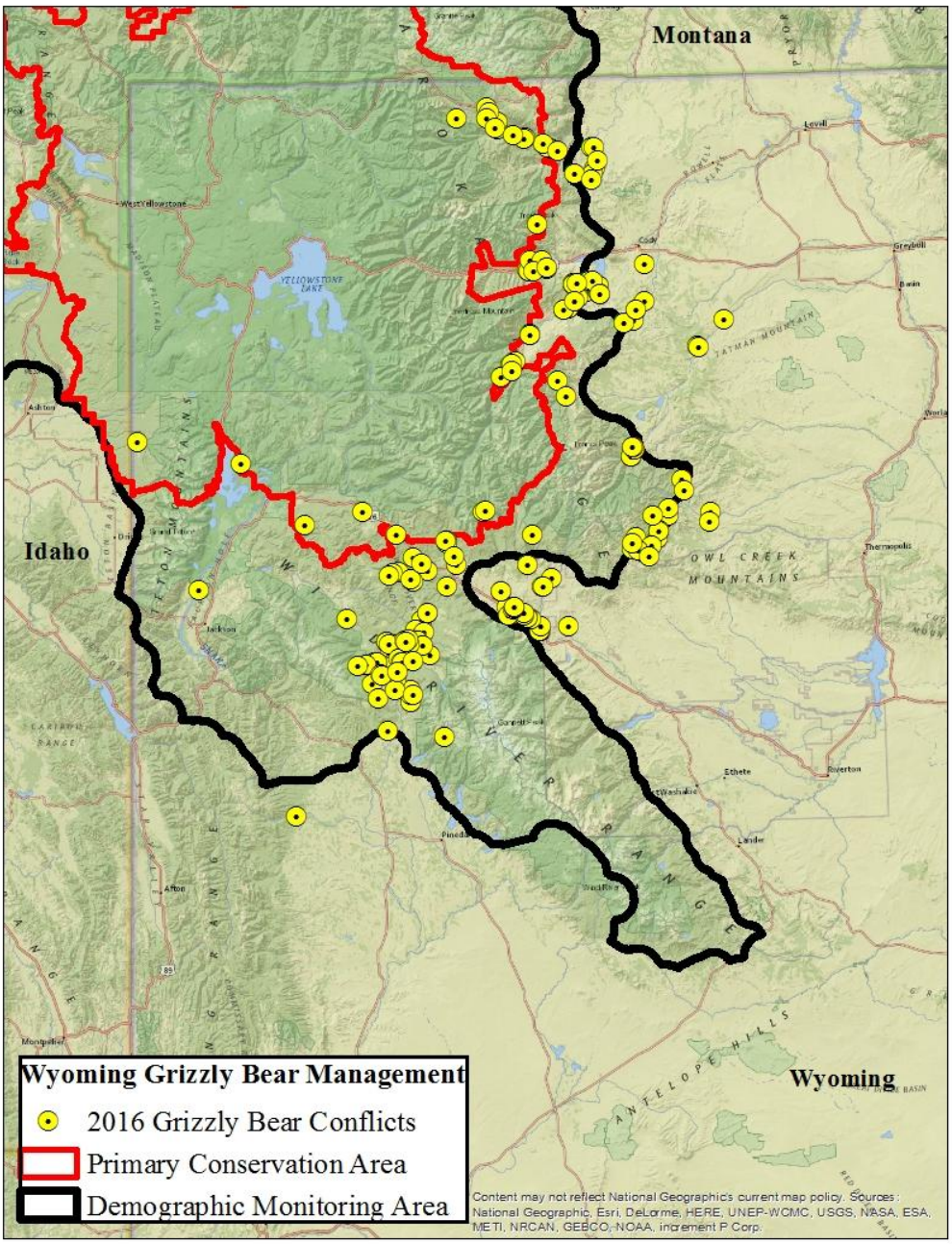


Figure 10. Location of human-grizzly bear conflicts in Wyoming outside of National Parks (*n* = 223) in relation to the Primary Conservation Area and the Demographic Monitoring Area, Wyoming, 2016.

MONITORING AND CONFLICT MANAGEMENT – GRIZZLY BEAR MORTALITIES

Within Wyoming, outside of the National Parks and Wind River Reservation, there were 19 known or probable human-caused grizzly bear mortalities within the DMA. Management removals accounted for 6 of these mortalities in 2016. Of the six grizzly bears removed in management actions, five were removed due to livestock depredations and one due to property damage or human food rewards and exhibiting unnaturally bold behavior in close proximity to humans. In addition to the management removals, one grizzly bear died from capture myopathy during a capture involving sheep depredation. We are documenting an increasing trend of mortalities outside the DMA, which is congruent with the notions of how suitable habitat is defined and conservation within a DMA.

Most grizzly bear-human conflicts in Wyoming were a result of domestic livestock depredations and food rewards from humans in the form of garbage or pet and livestock feed. Long-term trends in the number of conflicts is likely a result of grizzly bears increasing in numbers and distribution and expanding into areas used by humans, including livestock production, on public and private lands. As the GYE grizzly bear population continues to grow and distribution expands , grizzly bears encounter food sources such as livestock and livestock feed, garbage, and pet food resulting in increased property damage and threats to human safety. Conflict prevention measures such as attractant storage, deterrence, and education remain a high priority for the Department.

In general, there is an inverse relationship between social tolerance and biological suitability for grizzly bear occupancy in areas further from the original recovery zone due to human 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 with education, securing of attractants, relocation or removal of individual grizzly bears, or a combination of methods used for long term conflict resolution.

Electric fencing being installed where grizzly bears were obtaining grain in a regularly used outbuilding.

2016 BEAR WISE WYOMING UPDATE

Introduction

The Bear Wise Wyoming Program is a proactive initiative that seeks to minimize human-bear (black and grizzly bear) 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 project seeks to raise awareness and proactively influence local waste management infrastructures with the specific intent of preventing conflicts from recurring. Strategies used to meet the campaign's objectives are: 1) minimize accessibility of unnatural attractants to bears in developed areas; 2) employ a public outreach and education campaign to reduce knowledge gaps 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 2016. Past accomplishments are reported in the 2006 - 2015 IGBST annual reports and in the 2011-2015 WGFD Annual Job Completion Reports.

Background

In 2004, an IGBST subcommittee conducted an analysis of causes and spatial distribution of grizzly bear mortalities and conflicts in 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 3 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 (Servheen et al. 2004).

To address objective 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 GYA. 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 11 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.

Wapiti Project Update

The Wapiti 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 2016 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 Park County Commissioners, Wyoming Outdoorsmen, and the Memorial Bear Fund. The program provides livestock producers and owners with an alternative to the use of on-site carcass dumps, which are a significant bear attractant and indirectly contribute to numerous human-bear conflicts. Since June 2008, 852 domestic livestock carcasses have been removed from private lands.

- Recommendations concerning the proper storage of garbage and other attractants are provided to the Park County Planning and Zoning Commission for new developments within the greater Cody area. The Coordinator reviews proposed developments on a case-by-case basis, attends monthly meetings, and contacts applicants directly to discuss conflict prevention measures. To date, these comments have been adopted as either formal recommendations or as a condition of approval for 21 new developments within Park County.

- This year with grants from the Wyoming Outdoorsmen, Bow Hunters of Wyoming and Yellowstone Country Bear Hunters Association (YCBHA), the Department was able to purchase 100 cans of bear spray to be distributed to sportsmen. The bear spray was handed out at the Cody Wyoming Game and Fish Check Station and all cans were distributed in under an hour. Sportsmen where asked to voluntarily fill out a short survey to gather a better understanding how the Bear Wise Program can better meet constituent needs.

Dusty Lasseter hands out surveys to evaluate the Bear Wise program and bear awareness in the community during the bear spray giveaway.

- The Wyoming Game and Fish partnership with the North Fork Bear Wise Group (NFBWG) continues to grow. The group is comprised of six local Wapiti citizens that meet monthly in order to articulate community needs and assist in the development of educational and outreach initiatives. The group met once a month for six month (during active bear season) and were instrumental in coming up with ideas on how to reduce human-bear conflicts.

- Educational black bear/grizzly bear identification materials were distributed to individuals and to local sporting goods stores in the Cody, Pinedale, and Lander areas and mailed to black bear hunters who registered bait sites with the Department in areas surrounding the GYA.

- Numerous informational presentations were given that focused on human-bear conflict prevention to audiences including the Park, Fremont, Hot Springs, and Big Horn County public school systems, homeowners associations, Boy Scouts, 4-H members, DANO, Paint Rock Hunter Management Program, guest ranches, and college students. Frequent one-on-one contacts were made during the 2016 conflict season in areas where the occurrence of human-bear conflicts has historically been high.

- A "Working Safely in Bear Country" workshop was conducted for the Park County Weed and Pest District, Bureau of Land Management, Rocky Mountain Power, and Bighorn National Forest employees.

- A booth containing information on bear identification, attractant storage, hunting and recreating safely in bear country, and the proper use of bear spray was staffed at the Lander Winter Fair, Cody Arbor Day, Cody RV Show, Dubois Museum Days, Powell Outdoor Safety Day, and Wyoming Outdoorsmen Banquet.

- By utilizing the bear trailer, booths, workshops, and giving 50 presentations upon request the Bear Wise Program directly reached approximately 4,200 people in Northwest Wyoming. Although, the level of interaction differed from person to person it certain that the added awareness to bears lessened conflicts.

- The Department gave two interpretative hikes up the Elk Fork River on the Shoshone National Forest to discuss the ecology, management and conservation of the Yellowstone grizzly bear for the annual Cody Chambers sponsored Spring Into Yellowstone. These tours took approximately five hours and a good deal of grizzly bear sign was identified on the tour.

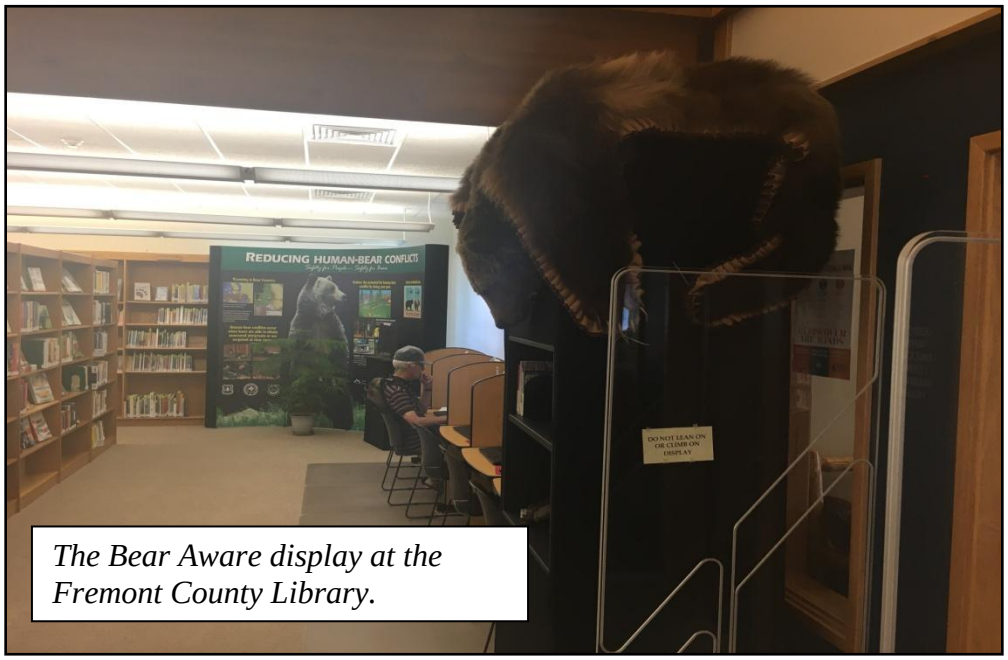
- A public service announcement (PSA) was recorded by Department personnel on "Staying Safe in Bear Country" and broadcast over the radio in the spring and fall of 2016 on the Bighorn Basin Radio Network.

- In the Cody Region, LCS personnel erected 19 temporary electric fences around bee apiaries to minimize conflicts. There were also several electric fences temporarily placed around apple orchards to deter bears.

Walking the perimeter of an electric fence around a bee apiary approximately 15 miles outside of the grizzly bear Demographic Monitoring Area.

- In the spring, LCS personnel put on 13 “Living in Large Carnivore Country” workshops across Wyoming. The objective of these workshops is to reach out to the public and give them the opportunity to learn how to live with bears, mountain lions, and wolves. In 2016 we gave presentations and hands on demonstrations to 267 attendees.

- A seasonal mailing containing human-bear conflict prevention information and the availability of conflict prevention resources was delivered to residents in targeted areas west of Cody.



The Bear Aware display at the Fremont County Library.

- A traveling Bear Aware educational display was developed and produced for use in public libraries across northwest Wyoming. The display focuses on the prevention of human-bear conflicts and features graphics, an interactive touch screen monitor, short video segments, a grizzly bear hide and skull, and educational materials that are available for check out. The display was featured at the Fremont County Library in Dubois for five months

- The Wyoming Department of Transportation donated 20 used paint barrels. These paint barrels are 55 gallons and with a locking lid can be used to secure attractants like livestock feed. These barrels will be given to landowners next year in order to give them the means to correctly store attractants.

- YCBHA received a grant to put in eight bear boxes for campsites in occupied bear habitat. The bear boxes were put on Wyoming Game and Fish Commission lands to prevent human-bear conflicts and provide campers with the means to securely store attractants. Department personnel volunteered time in kind to properly place the bear boxes.

Members of YCBHA and Department employees installing bear boxes outside of Dubois.

- All hunters that successfully drew an elk, deer, or antelope license were also provided with information about staying safe while hunting in bear country. The conflict prevention material was approximately 100,000 pieces that went out to hunters.

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 2016 are as follows:

- The Department hosted multiple educational presentations, for example: a "Living in Lion, Bear, and Wolf Country" workshop in Pinedale. Approximately 35 people attended the workshop. Bear safety presentations were given to the Boy Scouts of America at "Camp Newfork". Hunting in Bear Country presentations were given to hunter safety classes throughout the Region.

- A bear safety presentation was given to cowboys and sheepherders of two different grazing associations in the Region.

Bear spray education in Pinedale.

- A bear safety presentation was given to staff members of the Sublette County Chamber of Commerce and Sublette County Visitor's Center.

- A bear safety presentation was given to the Pinedale and Big Piney Ranger Districts of the United States Forest Service and the Pinedale office of the Bureau of Land Management.

- A bear safety presentation was given to Sublette County Weed and pest workers and volunteers.

- The Department hosted a bear safety booth at Pinedale's Rendezvous Days Celebration, contacting hundreds of participants over a three day period. Pinedale's Rendezvous Days attracts approximately 10,000 people over the four day event and Department employees contact an estimated 1,000 constituents.

- The Department participated in the first annual "Wind River Mountain Festival" in Pinedale. Over 2000 people attended the festival. There was great interest in bear safety information presented throughout the festival.

- A bear safety presentation was given to Tronox employees in Green River.

- A large carnivore safety presentation was given to Tip Top Search and Rescue volunteers in Pinedale.

Objectives for 2017 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 Department is also working to assist the U.S. Forest Service with providing bear proof storage and meat poles at targeted areas in the Region.

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 Hole Project 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 2016, 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.

- A bear education trailer was purchased in August 2010 with funding contributions from the Department, Grand Teton National Park, Bridger Teton National Forest and Jackson Hole Wildlife Foundation. Two bear mounts (one grizzly bear and one black bear) have been placed in the trailer along with other educational materials. The bear mounts were donated to the Department through a partnership with the United States Taxidermist Association and the Center for Wildlife Information. The trailer was displayed and staffed at various events and locations including Teton National Park, Jackson Elk Fest, Fourth of July Parade and the National Elk Refuge Visitor Center.

- Public service announcements were broadcast on 4 local radio stations in Jackson for a total of six weeks throughout the spring, summer, and fall of 2016. The announcements focused on storing attractants so they are unavailable to bears and hunting safely in bear country.

- Numerous educational talks were presented to various groups including homeowner's associations, guest ranches, youth camps, Jackson residents, tourists, school groups and Teton County employees.

- Door flyers with detailed information about attractant storage and bear conflict avoidance were distributed in Teton County residential areas where high levels of bear/human conflicts were occurring.

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

- Worked with the residents at a north Jackson sub-division and a property management company to pick apples from 70 crab apple trees that were a significant bear attractant.

"Red Shirts in the Classroom" – talking with Jackson students about bear awareness.

- Refrigerator magnets featuring tips about proper attractant management were distributed to Teton Village homeowners, Aspens Property Management and Jackson Hole Mountain Resort lodging.

- Numerous personal contacts were made with private residents in Teton County. This has proven to be a useful way to establish working relationships with residents and maintain an exchange of information about bear activity in the area.

- A booth containing information on bear identification, attractant storage, hunting and recreating safely in bear country, and the proper use of bear spray was staffed at the Jackson Hole Antler Auction and Kids Fishing Day.

- Assisted hunting outfitters and with the installation and maintenance of electric fence systems around their field camps and located in the Bridger-Teton National Forest.

- Assisted Teton County Transfer Station staff with the installation and maintenance of an electric fence enclosure around their dead animal pit.

- Assisted an apiary owner with the installation and maintenance of an electric fence around his bee hives.

- Assisted the Fish Division with the installation of two electric fences around their field camps at Brooks Lake.

- Signage detailing information on hunting safely in bear country, bear identification, recent bear activity, and proper attractant storage were placed at U.S. Forest Service (USFS) trailheads and in private residential areas throughout Teton County.

- Consultations were conducted at multiple businesses and residences where recommendations were made regarding sanitation infrastructure and compliance with the Bear Conflict Mitigation and Prevention Land Development Regulations (LDR).

- Bear Aware educational materials were distributed to campground hosts in the Caribou-Targhee National Forest, hunters, and numerous residents in Teton County.

- Several radio and newspaper interviews were conducted regarding conflict prevention in the Jackson area.

- Educational black bear/grizzly bear identification materials were distributed to black bear hunters who registered bait sites with the Department in the Jackson region.

- Worked with a Jackson sanitation company and the Jackson Hole Wildlife Foundation on placing new bear resistant garbage cans at Teton Village homes.

Objectives for the Bear Wise Jackson Hole Program in 2017 will be 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 LDR. In addition, more work will be done to identify areas within the

city limits of Jackson and Star Valley communities where better attractant management and sanitation infrastructure is needed.

The 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 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 will be more effective in gaining support and building enthusiasm for Bear Wise Jackson Hole, directing resources to priority areas, and reaching all demographics.

ADDITIONAL INFORMATION AND EDUCATION EFFORTS

In addition to the standard duties performed by the LCS through the Bear Wise Wyoming Program, multiple avenues of outreach and education occur throughout Wyoming and across the world-wide-web**.**

In working with Department personnel in Cheyenne, there has been a great deal of effort to update and incorporate messages regarding grizzly bear ecology, management and safety into the Department website. The grizzly bear management webpage continues to be maintained and updated on a regular basis to provide timely information to the public regarding grizzly bear management activities conducted by the Department. Webpage content includes various interagency annual reports and updates and links to other grizzly bear recovery websites. Beginning May 2016, weekly updates of ongoing management activities related to depredations, research, trapping and monitoring, and information and education were posted to the department's website. A total of 14 weekly updates were posted from June 4, 2016 through October 7, 2016, as well as various reports and publications pertinent to grizzly bear ecology and management in Wyoming. In addition, personnel issued multiple educational news releases throughout the year informing readers and listeners of bear safety, behavior, conflict avoidance, food storage and natural food availability. For information specific to the Department's grizzly bear management program; including links to publications, reports, updates, and plan visit: https://wgfd.wyo.gov/web2011/wildlife-1000674.aspx

Hunter Education is a vital component toward the mission of the Department. Every hunter education class in Wyoming is required to discuss how to hunt safely in bear country. To assist instructors, the Department has 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.

Publications

The primary link to other publications, annual reports, and peer reviewed literature for the Yellowstone population of grizzly bears is summarized on the United States Geological Service web site at http://www.nrmsc.usgs.gov/products/IGBST.

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/web2011/wildlife-1000674.aspx

For additional information about the Wyoming Bear Wise Program contact:

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