BIOLOGICAL OPINION

for the

Effects to the Grizzly Bear
from the Upper Green River Area Rangeland Project
Sublette County, Wyoming

USFWS Reference Number: 06E13000-2019-F-0012

Prepared by: U.S. Fish and Wildlife Service
Wyoming Ecological Services Field Office
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FOR Tyler A. Abbott, Field Supervisor

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EXECUTIVE SUMMARY

The Pinedale Ranger District of the Bridger-Teton National Forest (Forest) prepared a final environmental impact statement (FEIS) to evaluate and authorize continued livestock grazing on the Badger Creek, Beaver-Twin, Noble Pastures, Roaring Fork, Wagon Creek, and the Upper Green River Allotments (Allotments). The preferred alternative in the FEIS (i.e., the Proposed Action), uses livestock management strategies designed to maintain or improve resource conditions. The proposed action also includes a variety of Conservation Measures designed to avoid and minimize adverse effects to the threatened grizzly bear (*Ursus arctos horribilis*). In this biological opinion (BO), the U.S. Fish and Wildlife Service (Service) concludes that the anticipated adverse effects resulting from the issuance of grazing permits by the Forest for the Upper Green River Rangeland Project (the proposed action) for a period of 10 years (2019 through 2028) will not jeopardize the continued existence of the grizzly bear. The Service reached this conclusion after reviewing the rangewide status of the species, the environmental baseline within the action area, and evaluating the effects of the proposed action and cumulative effects. The grizzly bear population within the Greater Yellowstone Ecosystem (GYE) has exceeded recovery goals and continues to expand into new locations, including into the Allotments. The recovery and continued population expansion has occurred concurrent with the Forest implementing many of the actions described in the FEIS. This means historical activities, which are comparable to the proposed action, have had little to no discernible effect on the population's trend toward recovery, and we do not expect continuation of these activities to reverse the trend.

Based on population trends and the number of removals over the last nine years, the incidental take statement (ITS) exempts a total of 72 grizzly bear mortalities over the 10-year timeframe of the proposed action. Because we expect the amount of incidental take (IT) will vary from year to year, the ITS exempts the amount of IT that is likely to occur over 10 years; however, we provide for review within consecutive 3-year periods, rather than set an expectation on a yearly basis. The 3-year rolling average addresses year-to-year variability and establishes a shorter interval to evaluate IT than over the total 10 years of the BO. We believe more frequent check-ins are appropriate to evaluate the accuracy of our estimates and, if necessary, to consider whether additional conservation actions are advisable. However, the total number of removals is not to exceed 72 bears. Although we anticipate some level of take of grizzly bears primarily due to management removal within the allotments, it is our opinion that the proposed action will not appreciably reduce the likelihood of survival and recovery of grizzly bears.

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BIOLOGICAL OPINION

PURPOSE AND ORGANIZATION

In accordance with the requirements of the ESA and its implementing regulations, the formal consultation process culminates in the Service's issuance of a biological opinion that sets forth the basis for a determination as to whether the proposed federal action is likely to jeopardize the continued existence of listed species or destroy or adversely modify critical habitat, as appropriate. The regulatory definitions of jeopardy and destruction or adverse modification are provided at 50 CFR 402.02, and the description of the formal consultation process is provided at 50 CFR 402.14. If a proposed federal action is not likely to jeopardize a listed species but is likely to cause incidental take of the species, then the Service identifies that take and exempts it from the take prohibitions under section 9 of the ESA through an Incidental Take Statement.

In accordance with policy and regulation, the jeopardy analysis in this BO relies on four components:

- *Status of the Species* - to evaluate the range-wide condition of the grizzly bear, the factors responsible for that condition, and its survival and recovery needs;
- *Environmental Baseline* - to evaluate the condition of the grizzly bear in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species;
- *Effects of the Action* - to determine the direct and indirect impacts of the proposed federal action and the effects of any interrelated or interdependent activities on; and
- *Cumulative Effects* - to evaluate the effects of future, non-federal activities in the action area on the grizzly bear.

The jeopardy determination is made by evaluating the effects of the proposed federal action in the context of the current status of the species, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild.

DESCRIPTION OF THE PROPOSED ACTION

As defined in the Endangered Species Act (ESA) Section 7 regulations (50 CFR 402.02), "action" means "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas." The "action area" is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action."

The Pinedale Ranger District of the Bridger-Teton National Forest (Forest) proposes to authorize continued livestock grazing on the Badger Creek, Beaver-Twin, Noble Pastures, Roaring Fork, Wagon Creek, and the Upper Green River Allotments. Under the preferred alternative analyzed in the FEIS, livestock grazing will continue to be authorized on all six allotments, using livestock management strategies designed to sustain resource conditions where desired conditions are being met and improve resource conditions where a gap between existing conditions and desired conditions has been identified. The purpose of the Proposed Action is to continue to authorize livestock grazing in a manner that will maintain or improve resource conditions. The Bridger-Teton Land and Resource Management Plan (Forest Plan, U.S. Forest Service 1990) provides direction to support community prosperity in part through livestock grazing in a manner that avoids unacceptable effects from livestock use on range, soils, water, wildlife, and recreation values or experiences. The Forest will issue grazing permits for the Upper Green River Rangeland Project for a period of 10 years (Table 1) (Figure 1). The grazing permit will authorize livestock grazing of 46,148 animal unit months (AUM) for cattle.

In addition to the conservation measures described below, the FEIS contained a number of commitments by the Forest. Recognizing the details of these commitments may change over time as communication protocols are updated or management plans are revised, we have included these commitments from the FEIS in Appendix A.

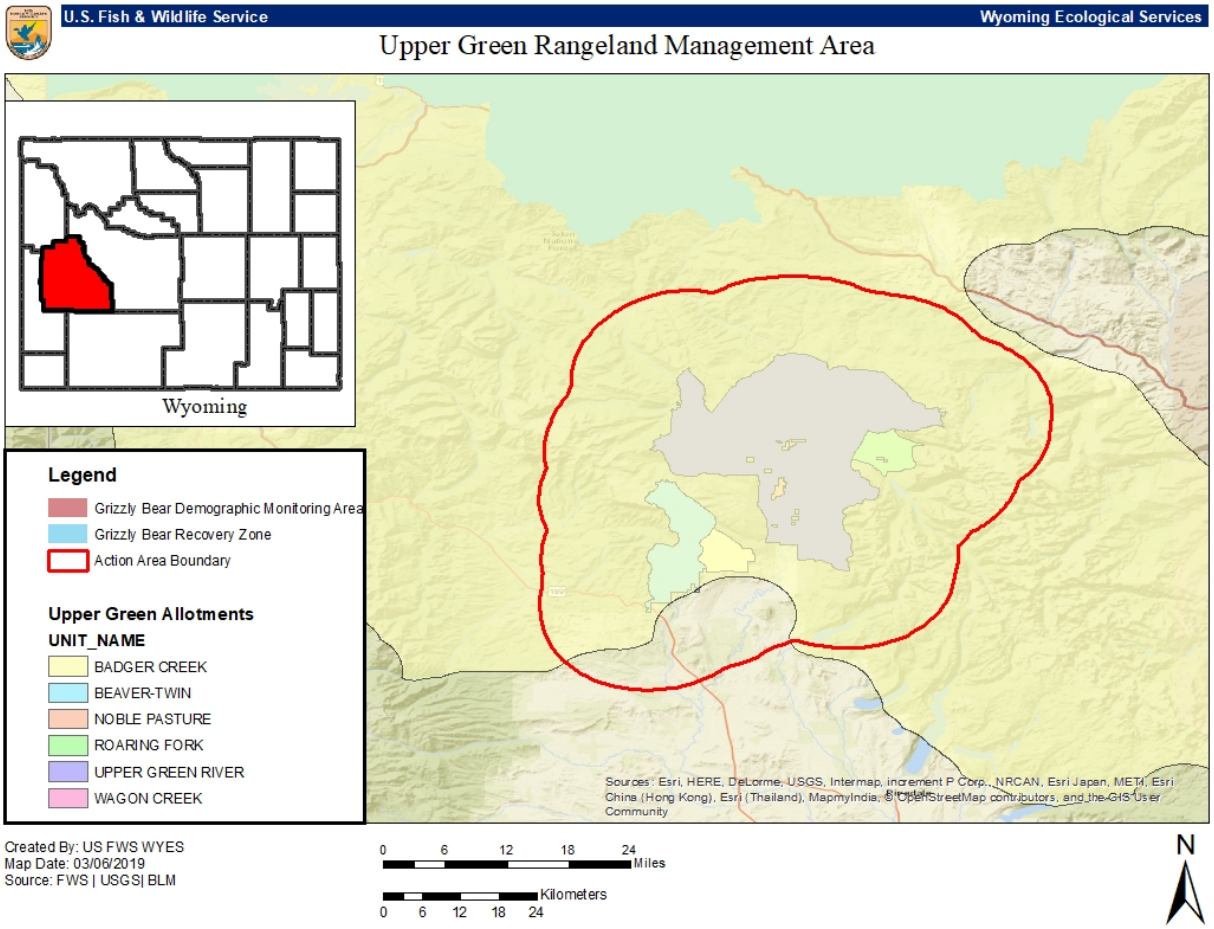

Figure 1. The Upper Green River Area Rangeland Allotments and Action Area in Relation to the Grizzly Bear Recovery Zone and the Grizzly Bear Demographic Monitoring Area

Table 1. Upper Green Rangeland Project Allotments and Pastures

Allotment Name/Number	Livestock Number	Livestock Kind	Season of Use	AUMs	Rotation Type
Badger Creek	157	Cattle	7/01-9/30	622	1 pasture season long
Beaver Creek-Twin Creeks	700	Cattle	7/15-10/15	2,772	1 pasture season long
Noble Pastures	314	Cattle	6/14-9/20	342-350	2 herds, 4 pasture rotation, pastures grazed 2-3 times over. Season-long in Pasture 4. Livestock enter and exit allotment in Pasture 3.
	110	Cattle	6/14-9/20	347 Avg.	
	47	Horse	6/14-9/20	4	
Roaring Fork	170	Cattle	06/16-10/15	898	1 pasture season long
Upper Green River-Mud Lake/Fish Creek rotation	2,780	Cattle	6/16-10/15	14,678	Three pasture deferred rotation
Upper Green River-Mosquito Lake rotation	1,530	Cattle	6/16-10/15	9,504	Pastures four pastures rest rotation
Upper Green River-Tosi Creek/Tepee Creek rotation	1,000	Cattle	6/16-10/15	5,280	Three pasture deferred rotation
Upper Green River-Kinky Creek pasture	27	Cattle	6/16-10/15	130	
Upper Green River-Gypsum Creek rotation	1,985	Cattle	6/16-10/15	10,480	2 pasture deferred rotation
Upper Green River-Distributed among pastures	16	Cattle	6/16-10/15	76	Rotated with cattle
Upper Green River-Bottom Pasture and Livestock Driveway*	7,901 (livestock driveway) 5,746 (River Bottom Pasture) 20	Cattle	6/12-10/15	904	Herded in along the livestock driveway in the spring, and drift out on the River Bottom Pasture during the fall
Wagon Creek	26	Cattle	07/15-10/15	103	Season-long
	8,772 cattle and 47 horses			46,148	

*These numbers are not included in the total permitted number of livestock because livestock use the River Bottom Pasture and the livestock driveway to enter and exit allotments. The permitted number of livestock in the River Bottom Pasture and the livestock driveway is already calculated in the permitted numbers for the applicable allotments.

Conservation Measures

Conservation measures are consistent with the standards, guidelines, management emphasis for the desired future conditions identified in the Forest Plan and, therefore, are part of the proposed action. The commitments made by the action agency are to contribute to the recovery of the grizzly bear. The FEIS grizzly bear management objective is to minimize the livestock related grizzly bear mortalities. The conservation measures and commitment to grizzly bear recovery identified in the FEIS provide for a balance between livestock grazing management and minimizing grizzly bear conflicts with livestock, in addition, minimizing grizzly bear/human safety concerns.

To help prevent conflicts with grizzly bears in the Upper Green Project Area, the Forest will require implementation of the grizzly bear conservation measures listed below. By reducing the availability of anthropogenic food; decreasing the number of sick, injured, isolated livestock in the allotments; and by removing livestock carcasses, livestock-grizzly bear conflicts will decrease, lowering the number of management removals within the action area.

(1) Bear Sanitation Guidelines will be followed for all camps associated with livestock operations as described and defined in Food Storage Order 04-03-330. Where outdoor toilets are available in Range Camps, keep doors closed and make toilets as "bear proof" as possible.
(2) Riders are required to watch all livestock closely for sick, injured, or stray animals.
(3) Forest Service employees designated by the Pinedale District Ranger will monitor allotments on a regular basis.
(4) On Cattle Allotments: a) all carcasses **located within 0.5 mile** of Green River Lakes Road, Union Pass Rd, FS 605, 660, 663B and 663C, GRL and Whiskey Campgrounds, private cabins, Kendall and Fish Creek guard station, permitted cow camps, permitted outfitter camps, Waterdog Lakes, and North Beaver and Tosi trailheads will be removed if possible or moved so that the carcass is at least **0.5 mile away** from the above described facilities, trailheads or roads; b) all carcasses in locations not described in 1 above that pose a health or safety hazard to the public or to the environment will be removed if possible or moved so that the carcass is at least **0.25 mile from** live streams, springs, lakes, riparian areas, system roads and trails, developed recreation areas, dispersed camping sites, and picnic sites; and c) all sick or injured animals will be removed or treated. In the event that compliance with this measure is not physically possible, an exception may be granted per the discretion of the Pinedale District Ranger and/or his designated representative. In the event that rider safety is deemed an issue, an exception may be allowed as described in CM #5 below.
(5) Exceptions to requirements for removing or moving carcasses described in **CM #4** may be granted by the Pinedale District Ranger and/or his/her designated representative if human rider or herder safety is of concern. Rider or herder safety concerns include the possible presence of a grizzly bear in the immediate vicinity of carcasses, and carcasses being located in hazardous terrain such that attempting to move or remove may not be possible or unsafe. In such cases, a USFS employee or the WGFD bear specialist will be notified immediately of the hazard location and need for exception.

(6) The Forest will recommend that all permittees and their representatives (herders, riders, or other employees) carry bear spray while working within allotments. Additional recommendations are that spray canisters be holstered or otherwise carried so that they are available for use in the event of encounters with bears; storing spray canisters in back packs, saddle bags, and vehicles are acceptable methods of storage during non-working time periods. Only brands of Bear Spray certified by the Interagency Grizzly Bear Committee are recommended.
(7) Continue to identify and implement opportunities that reduce the potential for grizzly bear conflicts. The Forest has investigated and explored additional means of reducing grizzly bear-livestock conflicts, which included assessments of: a) cattle herding; and, b) where appropriate, and when permittees are willing participants, study sites may be developed within allotments to "test" new management actions.
(8) Through the permitting process and at annual meetings, the USFS will make grazing permittees aware of their responsibilities under the Endangered Species Act (ESA) in regards to laws and regulations concerning the taking of grizzly bears (Interagency Grizzly Bear Guidelines).
(9) Continue to work in cooperation with the Service, the Wyoming Game and Fish Department, and the Interagency Grizzly Bear Study Team to identify and collect information related to the habitat use, survival, reproduction, and depredation tendencies of grizzly bears inhabiting Livestock Grazing Allotments on Northern Portions of the Pinedale Ranger District.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. Noise may be caused by the sounds of livestock, herders, riders, dogs, etc. and will extend beyond the boundaries of the grazing allotments. The spatial extent of livestock scent and noise on adjacent lands is highly variable and depends on topographic and weather conditions, the ability of species (e.g., humans or grizzly bears) to detect scents, and the condition of livestock (live or dead). The distance grizzly bears would detect livestock grazing-related odors and noise outside of the allotment is unknown, because grizzly bears are suspected to have a keen sense of smell (Craighead 1976), much greater than that of humans. Craighead (1976) documented grizzly bear movements of approximately l8 miles to feed on a carcass but did not explain how or when the carcass was detected or how researchers attributed the bears' movement to carcass presence. Detectability appears to be site specific. Another grizzly took 60 hours to locate a carcass 1.7 miles away when wind conditions were unfavorable (Craighead 1976). These studies of wild prey carcasses suggest that grizzly bear movement towards the scent of such carcasses is highly variable, and depends on the individual bear, the prey item, weather and topographic conditions, or other factors such as available food resources. Craighead and Mitchell (1982) reported that many grizzly bears moved distances of 5 to 12 km (3.1 to 7.5 miles) to carcasses in Yellowstone National Park, and one adult male moved 30 km (18.6 mi). The smell emanating from carcasses is different from live animals, both of which occur on the allotment.

For purposes of defining the action area, we selected a distance of 7.5 mile beyond the perimeter of the collective allotment boundaries based on the maximum distance many of the bears

traveled to carcasses in Craighead and Mitchell's (1982) study. We believe this is the most reasonable representation of action area (the area where "land, water, or air" that is likely to be affected is land where grazing and associated actions would occur) based on best available science.

In addition to the Allotments, the action area also includes areas on the Bridger-Teton National Forest where grazing habitat is suitable and where there are other grazing allotments not covered by this consultation; private and state lands adjacent to the southern portion of the Allotments; and private land located inside the Allotments boundary. The northern boundary of the Allotments are near the Continental Divide, which separates the Bridger-Teton and Shoshone National Forests. All of the action area is considered occupied by grizzly bears.

The Allotments are located approximately 30 miles northwest of Pinedale, Wyoming. The allotments encompasses approximately 170,641 acres, and the action area (the Allotments plus the 7.5-mile margin) encompasses 711,627 acres. The Upper Green Allotments are often divided into multiple pastures (see Table 1), although many allotments are a single pasture. The action area includes the entire boundary for the Allotments, which are located within Sublette County, Wyoming, within Townships 37 through 42 North, Ranges 108 through 111, including all of the sections within this area.

STATUS OF THE SPECIES/CRITICAL HABITAT

Please note that the literature, the 1993 Recovery Plan, and other documents such as the 2016 Conservation Strategy use two different ecosystem terms related to grizzly bears in northwestern Wyoming, southwestern Montana, and southeastern Idaho: Greater Yellowstone Ecosystem (GYE) and Yellowstone Grizzly Bear Ecosystem (YGBE). These terms all describe the Yellowstone ecosystem and for this BO, we regard them as more or less synonymous because the geographic scale at which any distinctions occur does not affect project analyses or potential impacts.

The Interagency Grizzly Bear Study Team within the Recovery Zone (RZ) and/or the Demographic Monitoring Area (DMA) and beyond the DMA has gathered information about the expansion of the grizzly bear population within the GYE. As noted by the map on Figure 1, the action area is outside of the RZ and inside the DMA. The information gathered in the RZ and the DMA (for example grizzly bear food sources, habitat use, and home range size) is being applied to habitats used by grizzly bears both inside and outside of these areas, since it is the best scientific data we have concerning how grizzly bears use the landscape.

Species/Critical Habitat Description

Grizzly bears are among the largest terrestrial mammals in North America. South of the United States - Canada border, adult females range from 250 to 350 pounds and adult males range from 400 to 600 pounds. Grizzly bears are relatively long-lived, living 25 years or longer in the wild. Grizzly bears are omnivorous, opportunistic feeders that require foods rich in protein or carbohydrates in excess of maintenance requirements in order to survive seasonal pre-and post-denning requirements. Grizzly bears are homeo-hypothermic hibernators, meaning their body temperature drops no more than nine degrees Fahrenheit (five degrees Centigrade) during winter when deep snow, low food availability, and low ambient air temperatures appear to make winter sleep essential to grizzly bears' survival (Craighead and Craighead 1972a, 1972b). Grizzly bears excavate dens and require environments well covered with a blanket of snow for up to five months, generally beginning in fall (September to November) and extending until spring (March to April) (Craighead and Craighead 1972b; Pearson 1972).

Critical habitat has not been designated or proposed for the grizzly bear; therefore, none will be affected by this proposed action.

Life History

Grizzly bears are large animals with great metabolic demands requiring extensive home ranges. The search for energy-rich food appears to be a driving force in grizzly bear behavior, habitat selection, and intra/inter-specific interactions. Grizzly bears historically used a wide variety of habitats across the North America, from open to forested, temperate through alpine and arctic habitats, once occurring as far south as Mexico.

The grizzly bear is an opportunistic omnivore that uses a wide variety of plant and animal food sources. The literature provides comprehensive information on food items that grizzly bears consume. A recent synthesis of this information summarized that they consume up to 234 different foods, 75 of which are eaten on a regular basis, with the higher caloric foods being army cutworm moths, various ungulate species such as elk and moose, cutthroat trout, and whitebark pine seeds (IGBST 2013). Combined food habit studies from the GYE show that grizzly bears not only display dietary plasticity among individuals and in different portions of the ecosystem, but also across seasonal, annual, and decadal time periods (IGBST 2013).

New research shows that meat constitutes approximately the same percentage of annual grizzly bear diets in the NCDE (38 and 56 percent for females and males, respectively) and the GYE (44 percent of all GYE grizzly bears) (82 FR 30518, June 30, 2018). Meat in the grizzly bear's diet varies by season and available forage. Ungulates are an especially important food source for bears in the spring and fall (Knight et al. 1984), and use of carcasses in throughout the DMA is well documented (Podruzny and Gunther 2001, IGBST Annual Reports multiple).

Army cutworm moths are an important food source for some bears in the GYE (Mattson et al. 1991). Army cutworm moths congregate in remote, high altitude alpine talus areas and feed on alpine flowers. These moths provide important dietary fat in the fall, when grizzly bears are preparing for hibernation, and are also positively correlated with bear reproductive success (Bjornlie and Haroldson 2001). During times of great moth abundance, White et al. (1999, as cited in Robison et al. 2006) estimated a grizzly bear may eat up to 40,000 moths per day and more than one million per month, representing 47 percent of its annual caloric budget. Army cutworm moth congregation sites are in remote areas and, therefore, potentially reduce human-bear conflicts by isolating the bears. Spawning cutthroat trout in streams surrounding Yellowstone Lake have been an important food source for grizzly bears with home ranges encompassing that area (Mattson and Reinhart 1995).

Whitebark pine seeds are an important fall source of food to some bears when seeds are available (as a masting species, whitebark pines only produce good crops every 2 to 3 years). In years of poor whitebark pine seed production, grizzly bears shifted their diets and consumed more meat. We have information suggesting that whitebark pine has been reduced in the GYE, since 2002 and, therefore, may not be as major a food source as previously concluded. When certain food resources are in decline, daily movement, fall movement, and home ranges did not change between 2000 and 2011 suggesting that grizzly bears find alternative foods within their home range as whitebark pine seeds became less available (82 FR 30538, June 30, 2017).

Grizzly bears eat a variety of vegetative foods. Grizzly bears have been documented to consume over 260 species of foods in the GYE, representing four of the five kingdoms of life (82 FR 30538, June 30, 2017). The consumption of meat and whitebark pine by GYE grizzly bears individually may not be exceptional, the combination of food sources in the GYE, including army cutworm moths, whitebark pine, cutthroat trout, and ungulates (bison, elk, moose, and deer) comprises a unique ecological setting because we are unaware of any other grizzly bear population that utilizes this combination of foods. In addition to the unique combination of food sources available in the GYE, there is a gradient of foraging strategies across the ecosystem with

bears in different parts of the GYE having access to different combinations of these food sources and individualistic traits of grizzly bears (82 FR 30518, June 30, 2017).

Grizzly bears generally construct dens in areas far from human disturbance at elevations of approximately 2,000 to 3,050 meters (6,500 to 10,000 feet). Grizzly bears den from mid-October to mid-March, with entrance and emergence dates affected by the gender and reproductive status of the bear. Direct disturbance of denning bears does not necessarily result in den abandonment or any detectable consequences to grizzly bears (82 FR 30576, June 30, 2017). In addition, bears tend to den in remote areas with characteristics that are not conducive to most human winter activities, and denning areas are well distributed on the forests (82 FR 30576, June 30, 2017).

Adult grizzly bears are normally solitary, except for females with cubs or during short breeding relationships. They will tolerate other grizzly bears at closer distances when food sources are concentrated and siblings may associate for several years following weaning (Jonkel and Cowan 1971; Craighead 1976; Egbert and Stokes 1976; Glenn et al. 1976; Herrero 1978). Home range estimates for the GYE are 81 square miles for females and 309 square miles for males (Bjornlie et al. 2014). Overlap of home ranges is common. In recent years female grizzly bears' home range size has been constrained due to intra-specific interactions as a result of increasing population densities in the GYE. This may be a result of competition for available space and avoidance behavior during foraging activities as individuals saturate quality habitats. Males may have greater opportunities to accommodate effects of increasing densities and resource variation without adjusting home-range area. In addition, subadult males often disperse great distances and can potentially find low-density areas in which to establish (Bjornlie et al. 2014). Grizzly bears have one of the lowest reproductive rates among terrestrial mammals in North America, resulting primarily from the late age at first reproduction, small average litter size, and the long interval between litters. Mating occurs from late May through mid-July.

Females in estrus will accept more than one adult male (Hornocker 1962), and can produce cubs from different males the same year (Craighead et al. 1995). Age of first reproduction and litter size may be nutritionally related (Herrero 1978; Russell et al. 1978). Average age at first reproduction in the lower 48 states for females is 5.5 years and litter size averages two, but ranges from one to four cubs that stay with the mother up to two years. Males may reach physiological reproductive age at 4.5 years, but may not be behaviorally reproductive due to other dominant males preventing mating.

Habitat fragmentation is significant to large carnivores requiring wide vegetative and topographic habitat diversity (Servheen 1986). Loss and fragmentation of habitat is particularly relevant to the survival of grizzly bears. Large expanses of unfragmented habitat are important for feeding, breeding, sheltering, traveling and other essential behavioral patterns. Grizzly bears occur at low densities, have low reproductive rates, exhibit individualistic behavior, use riparian habitats, which are also used extensively by people; thus, grizzly bear populations are susceptible to human influences. Grizzly bears may avoid key habitats due to human generated disturbances, become habituated, or food conditioned, which may ultimately lead to the animal being destroyed. Historically, as human settlements, developments, and roads increased in

grizzly bear habitat, grizzly bear populations became fragmented. As fragmented population segments become smaller and/or isolated, they are more vulnerable to extinction, especially when human-caused mortality pressures continue. Linkage zones, or zones of habitat connectivity within or between populations of animals, foster the genetic and demographic health of the species. The increase in numbers and range extent for the GYE and NCDE grizzly bear populations has reached a potential for gene flow that has a greater likelihood now than it had been for many decades. Model predictions indicate male grizzly bear movement between the ecosystems could involve a variety of routes, supported by verified observations of grizzly bears outside of occupied range. Landscape features concentrated paths into corridors (e.g., anthropogenic influences), bears typically followed neighboring mountain ranges. There are many possible paths for dispersal between the two ecosystems, however successful immigration events are likely to remain rare given the current distance between the two populations. However, if the GYE and NCDE populations continue to expand, this distance will decrease and the success of immigration will increase (Peck et al 2017).

Population Dynamics, Status and Distribution

The grizzly bear originally inhabited a variety of habitats from the Great Plains to the mountains of western North America, from central Mexico to the Arctic Ocean. With the advent of Euroamerican colonization in the early nineteenth century, grizzly bear numbers were reduced from over 50,000 to less than 1,000 in North America south of the Canadian border. Today, the grizzly bear occupies less than two percent of its former range south of Canada (USFWS 1993). In the conterminous 48 States, only five remaining areas have either remnant or self-perpetuating populations.

The grizzly bear was listed as a threatened species under the ESA in the lower 48 states on July 28, 1975 (40 FR 31736). The Service identified the following as factors establishing the need to list: (1) present or threatened destruction, modification, or curtailment of habitat or range; (2) overutilization for commercial, sporting, scientific, or educational purposes; and (3) other manmade factors affecting its continued existence. The two primary challenges in grizzly bear conservation are the reduction of human-caused mortality and the conservation of remaining habitat (USFWS 1993).

The grizzly bear recovery plan (Recovery Plan) was first completed on January 1982, revised in 1993 (USFWS 1993), in 2007 the Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area supplemented the 1993 Grizzly Bear Recovery Plan, and in 2017 Grizzly Bear Recovery Plan Supplement: Revised Demographic Recovery Criteria for the Yellowstone Ecosystem. The 1993 revised Recovery Plan delineated grizzly bear recovery zones in six mountainous ecosystems in the U.S. The Recovery Plan details recovery objectives and strategies for the grizzly bear recovery zones in the ecosystems where grizzly bear populations still persist, or had recently persisted. Four of the recovery zones are the Northern Continental Divide (NCDE), Yellowstone Grizzly Bear (YGBE), Cabinet-Yaak (CYE) and Selkirk (SE) Ecosystems (Table 2 and Figure 2). The Recovery Plan also includes recovery strategies for the North Cascades Ecosystem in Washington, that contains no confirmed grizzly bears in the United States and an estimated 6 individuals in the adjacent British Columbia portion of the

North Cascades; and for the Selway-Bitterroot ecosystem of Idaho and Montana, where there is currently not a population but where suitable grizzly bear habitat still occurs.

Grizzly bear recovery zones (RZ) were established to include areas large enough and of sufficient habitat quality to support a recovered bear population in each zone. According to the 1993 Recovery Plan, a recovery zone is defined as that area in each grizzly bear ecosystem within which the population and habitat criteria for achievement of recovery will be measured. However, the GYE RZ recovery criteria have since been updated to include criteria applicable to the entire GYE, such as population estimates and mortality thresholds.

Table 2. Estimated grizzly bear population size (individuals) and population growth rate by Recovery Zone or Ecosystem (Kasworm et al 2018a, Kasworm et al 2018b, Mace and Chilton-Radant unpublished data 2017, USFWS 2011a, IGBST 2017)**.**

Recovery Zone or Ecosystem	**Estimated Population Size**	**Trend (% change annually)**
Northern Continental Divide RZ	1029 (in 2017)	+3%
Cabinet-Yaak RZ	50-60 (in 2017)	+2.1%
Selkirk RZ	80* (in 2017)	+1.9%
North Cascades RZ	<20 (in 2016)	unknown
Bitterroot RZ	0 (in 2007)	n/a
Greater Yellowstone Area Ecosystem	718 (in 2017)	+0 to 2%

*Estimate includes U.S. and Canada

Grizzly bears preferentially use large areas with a low density of roads and low levels of human activity. Secure habitat is an important component for minimizing habitat degradation and fragmentation, and is defined in the GYE as areas larger than 4 hectares (ha) (10 acres) in size and greater than 500 meters (m) from an open road (Interagency Conservation Strategy Team 2007). The average amount of secure habitat in each recovery zone ranges from 53 percent in the Selkirk's to 86 percent in the GYE (USFWS 2011b).

Northern Continental Divide (NCDE)

Grizzly bears are well distributed throughout the NCDE Recovery Zone and their range has expanded outside of the recovery zone boundary to the east, west and south (NCDE Subcommittee 2018). As of 2014, grizzly bear occupied range was estimated at 55,200 square kilometers (sq. km) (21,312 sq. mi) (Costello et al. 2016.). The estimate of average annual population growth was re-calculated in 2016 with a resulting rate of 2.3 percent per year across the time period from 2004 to 2014 (Costello et al. 2016). As of 2017, approximately 1,029 grizzly bears occupied the NCDE. The NCDE population of grizzly bears is contiguous with grizzly bears in Canada, resulting in high genetic diversity (NCDE Subcommittee 2018). Grizzly bears are well distributed throughout the NCDE Primary Conservation Area and Zone 1 although density is higher inside the Primary Conservation Area (see Kendall et al. 2009; Mace and Roberts 2011, NCDE Subcommittee 2018).

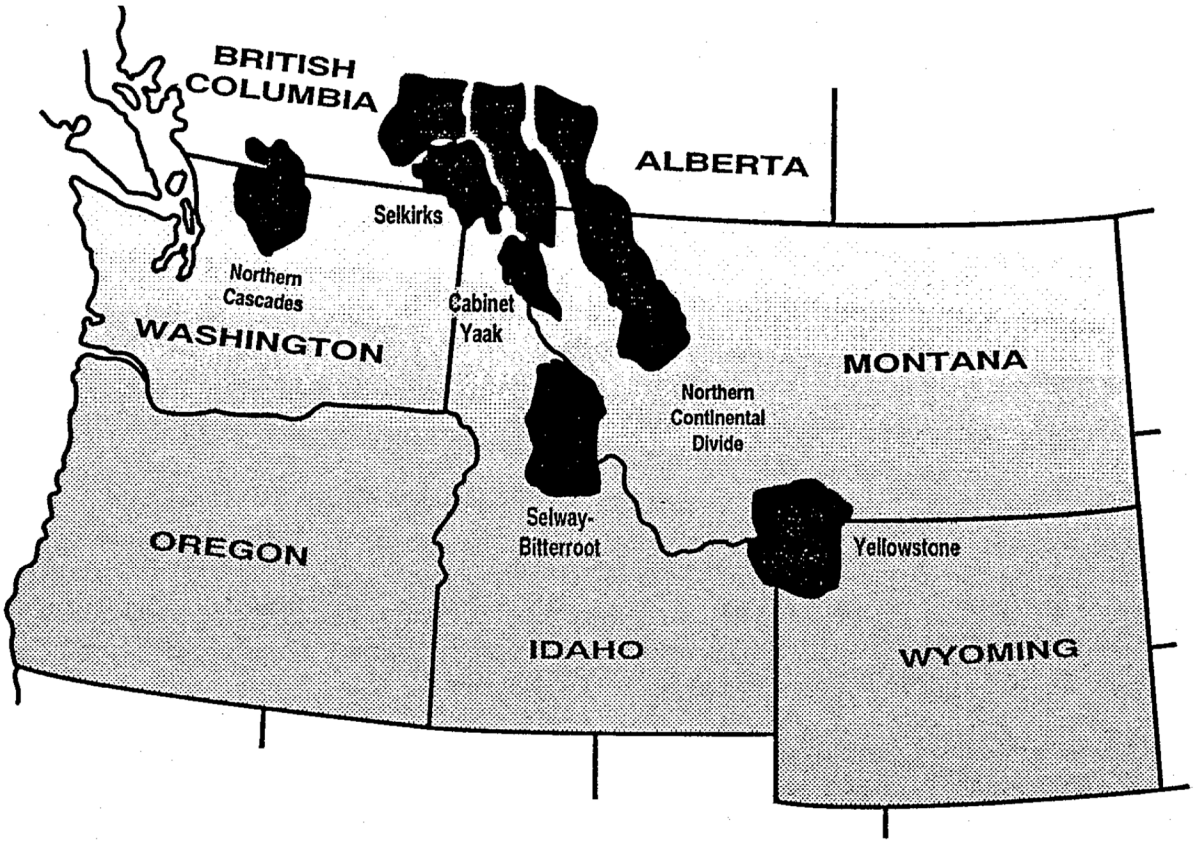

Figure 2. Grizzly bear ecosystems (recovery zones) in the conterminous 48 states from the 1993 Grizzly Bear Recovery Plan.

Cabinet-Yaak (CYE)
The CYE Recovery Zone is estimated to contain at least 50 to 60 grizzly bears (Kasworm et al. 2018a). The population is estimated to be growing at a rate of 2.1 percent annually.

Selkirks (SE)
The estimated population size is 70 to 80 grizzly bears in the SE RZ in the U.S. and Canada (Kasworm et al 2018b). It is estimated that the population of grizzly bears in the SE is slowly increasing at a rate of 1.8 percent annually (USFWS unpublished data).

North Cascades (NCE)
The population status of the grizzly bear in the North Cascades Ecosystem is unknown; however it is highly unlikely that the NCE contains a viable grizzly bear population (DOI 2017). Only four detections of grizzly bears have been confirmed in the greater NCE in the past 10 years, all of which occurred in British Columbia and may comprise of only 2 individuals (IGBC NCE Subcommittee 2016).

Greater Yellowstone Ecosystem (GYE)
The 23,828 sq. km (9,209-sq. mi or 5,438,000 acres) GYE RZ includes portions of Wyoming, Montana, and Idaho and portions of five National Forests (Beaverhead-Deerlodge, Bridger-

Teton, Custer, Gallatin, Shoshone, and Caribou-Targhee), Yellowstone and Grand Teton National Parks, John D. Rockefeller, Jr. Memorial Parkway, Bureau of Land Management, and adjacent private and state lands.

The range of grizzly bears in the entire GYE has increased, as evidenced by the 48 percent increase in occupied habitat between the 1970s and early 2000s, and it is still expanding (Pyare et al. 2004, Schwartz et al. 2002, IGBST 2013). The known area occupied by grizzly bears in the entire GYE is 16,024,482 acres (IGBST 2017). From 2000 to 2017, occupied range increased by 51 percent in the GYE (IGBST 2017).

Male grizzly bears disperse farther and have larger home ranges than female bears; thus, making up the majority of the grizzly bears on the periphery of the range in the ecosystem. Observations on the north side of the GYE are likely from a bear, or bears, originating from the Northern Continental Divide population. Bears continue to disperse all around the GYE (Figure 3). These outliers do not necessarily constitute occupied range, but they reveal the leading edges of expansion as dispersing grizzly bears search for new areas (Bjornlie et al 2017).

The GYE represents the southern-most extent of the current grizzly bear range in the U.S. and has been the primary focus of grizzly bear recovery efforts to date. Range expansion and population increases, including into southern portions of the GYE have occurred concurrently with the Forest implementing many of the actions described in the proposed action, and with other federal and non-federal actions described in the baseline below. This means that historical activities comparable to the proposed action have had little to no discernible effect on population trajectory of the GYE grizzly bear population.

Best available science suggests the GYE grizzly bear population is stable to slightly increasing. In 2017, the estimated population size of grizzly bears in the GYE was 718 (95 percent confidence interval = 640 to 796) (see Conservation section for details) (IGBST 2017). The population estimate is based on surveys conducted in the DMA, therefore, bears occurring outside of the DMA are not counted towards population estimates. Current analysis indicates that this grizzly bear population grew an average of 4.2 to 7.6 percent annually from 1983 to 2001. The population's rate of growth slowed to 0 to 2.2 percent during 2002 to 2011, likely because density dependent functions related to the increase in grizzly bear density in the GYE (IGBST 2012, IGBST 2013, IGBST 2017). In 2005, the USFWS, the Interagency Grizzly Bear Committee (IGBC), and its Yellowstone Ecosystem Subcommittee (YES) established that the population had recovered and moved toward delisting.

The Service proposed to establish a Distinct Population Segment of the grizzly bear for the GYE and surrounding lands and concurrently delist it from the ESA on November 17, 2005 (70 FR 69854; USFWS 2005). The final rule to delist the grizzly bear was published on March 28, 2007, and became effective April 30, 2007 (72 FR 14866; USFWS 2007). An order was issued by the Federal District Court in Missoula on September 21, 2009, which enjoined and vacated the delisting of the GYE grizzly population. The District Court decision was appealed on two primary issues: (1) adequacy of regulatory mechanisms after delisting (i.e., the Conservation Strategy) and, (2) the potential threat of whitebark pine decline on the GYE grizzly bear

population. The 9th Circuit Court of Appeals rendered a decision in November 2011 and reversed the District Court decision regarding the adequacy of protections provided under the Conservation Strategy but upheld the District Court decision that the Service had not sufficiently articulated that whitebark pine decline was not a threat to the GYE grizzly population. In response to this, the Interagency Grizzly Bear Committee and Yellowstone Ecosystem Subcommittee tasked the IGBST to provide information and further research relevant to whether grizzly bears find alternative foods to whitebark pine seeds, literature to support this finding, and whether impacts can occur to individual bears without causing the overall population to decline (IGBST 2013). Home range size of grizzly bears did not increase during the period of whitebark pine decline and was not related to proportion of whitebark pine in bear home ranges (Bjornlie et al. 2014b). Whitebark pine has been reduced in the GYE since 2002, and therefore may not be as major a food source as previously concluded. Grizzly bears opportunistically feed on more than 260 species of food to supplement their diets. The ability of grizzly bears in the GYE to utilize this variety of food sources provides a significant conservation value (82 FR 30519, June 30, 2017), when a food source such as whitebark pine is reduced in their availability to grizzly bears.

The Service again proposed to remove the GYE population from protections of the ESA, in 2016, (82 FR 30502; June 30, 2018). On June 30, 2017, the U.S. Fish and Wildlife Service issued a Final Rule delisting the GYE population of grizzly bears (83 FR 18737 18743; April 30, 2018). However, on September 24, 2018, the Federal District Court for Montana issued an order in Crow Indian Tribe, *et al*. v. the United States of America *et al*., CV 17-89-M-DLC (D. Mt.), vacating the June 30, 2017, delisting of the grizzly bear in the GYE. In compliance with this order, the GYE grizzly population is again listed as a threatened species under the ESA.

Human-grizzly bear interactions have been increasing in the GYE due, in part, to increasing human use and development, increasing bear numbers, and bears expanding their range of occupancy, thereby increasing the chances of adverse encounters. Mortalities resulting from human-grizzly bear interactions comprise approximately 64 percent of known grizzly bear mortalities (see IGBST annual reports and mortality database). Table 3 summarizes the 658 known and probable grizzly bear mortalities from 1997 to 2017 in the GYE (IGBST 2017).

Conservation

In an effort to facilitate consistency in the management of grizzly bear habitat within and across ecosystems, the Interagency Grizzly Bear Guidelines were developed by the Interagency Grizzly Bear Committee (IGBC) (51 FR 42863, November 26, 1986) for use by land managers. The IGBC developed specific land management guidelines for use in each of the five ecosystems including the GYE.

The low survival of adult females was identified as the single most important factor in causing the decline in the Yellowstone population prior to the mid-1980's (Knight and Eberhardt 1985). The current Recovery Plan Supplement (USFWS 2017) outlines demographic goals to objectively measure and monitor the recovery of the Yellowstone grizzly bear population. Demographic recovery criteria outlined for the Yellowstone recovery zone include:

(1) Demographic goal of maintaining a minimum population size of 500 grizzly bears and at least 48 females with cubs-of-the-year (COY) within the Demographic Monitoring Area, as indicated by methods established in published, peer-reviewed scientific literature and calculated by the Interagency Grizzly Bear Study Team (IGBST) using the most updated Application Protocol, as posted on their website. If the estimate of total population size drops below 500 in any year or below 48 females with cubs-of-the-year in 3 consecutive years, this criterion will not be met. The 48 females with cubs-of-the-year metric is a model-averaged number of documented unique females with cubs-of-the-year;

(2) Sixteen of 18 bear management units within the Recovery Zone must be occupied by females with young, with no two adjacent bear management units unoccupied, during a 6-year sum of observations. This criterion is important as it ensures that reproductive females occupy the majority of the Recovery Zone and are not concentrated in one portion of the ecosystem. If less than 16 of 18 bear management units are occupied by females with young for 3 successive 6-year sums of observations this criterion will not be met;

(3) Maintain the population within the DMA around the 2002–2014 model-averaged Chao2 population estimate (average = 674; 95% CI = 600–747; 90% CI = 612–735) by maintaining annual mortality limits for independent females, independent males, and dependent young. These adjustable mortality rates were calculated as those necessary to manage the population to the model-averaged Chao2 population estimate of 674 bears, which occurred during the time period that the population had a relatively flat population trajectory. If mortality limits are exceeded for any sex/age class for three consecutive years and any annual population estimate falls below 612 (the lower bound of the 90% confidence interval), the IGBST will produce a Biology and Monitoring Review to inform the appropriate management response. If any annual population estimate falls below 600 (the lower bound of the 95% confidence interval), this criterion will not be met and there will be no discretionary mortality, except as necessary for human safety.

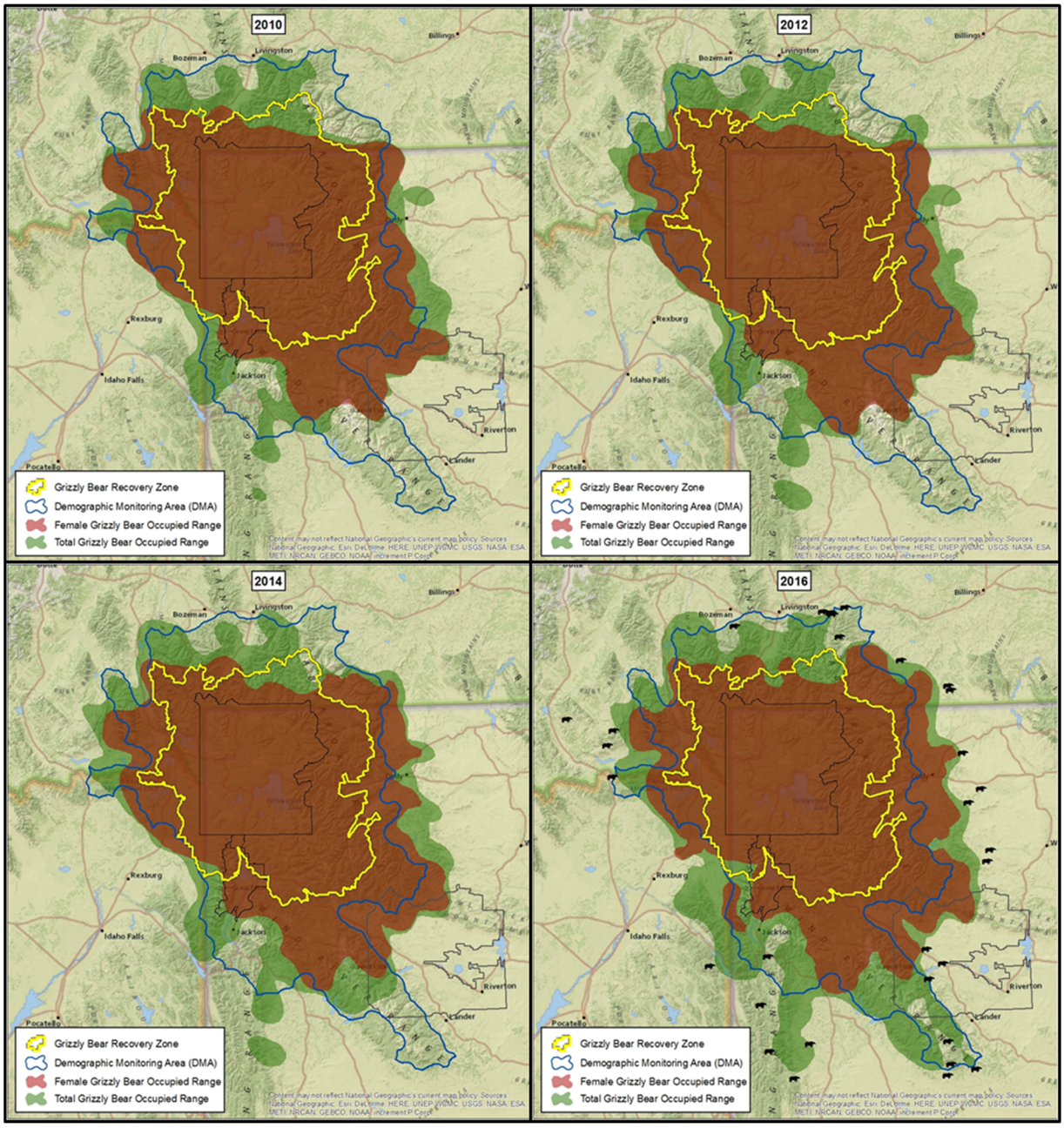

Figure 3. Expansion of the grizzly bear occupied range and range occupied by breeding females from 2010 to 2016. The bear symbols indicate grizzly bear observations outside of the 2016 occupied range (Bjornlie et al. 2017).

Table 3: Known and probable grizzly bear mortalities of independent age males and females in the GYE, 1997-2017.

Cause of Mortality	Number of Bear Mortalities	Percent of Total Mortality
Natural injury or deformity	21	3.2
Predation	35	5.3
Malnutrition	3	0.5
Old age	6	0.9
Poached/malicious	24	3.6
Hunting related defense of life and property	120	18.2
Backcountry camp illegal	3	0.5
Defense of life and property	133	20.2
Management removal due to human fatality/injury/aggressive behavior	14	2.1
Sheep related illegal	1	0.2
Sheep depredation management removal	10	1.5
Cattle depredation management removal	74	11.2
Management capture mortality	3	0.5
Research capture mortality	6	0.9
Road kill	41	6.2
Hunting related illegal	9	1.4
Horse depredation management removal	1	0.2
Specific undetermined	131	19.9
Poisoning	1	0.21
Non-hunting backcountry defensive of life	22	3.3
Total	658	100%

Front-country: Areas less than 250 meters (273 yards) from roads or developments. Back Country is defined as areas with no vehicle access, no facilities, and no development. (Data taken from IGBST reports from 1997 through 2017)

The population components are discussed below. Habitat monitoring includes documenting use of four foods throughout the GYE (ungulates, cutthroat trout spawning numbers, army cutworm moth sites, and whitebark pine cone production). The habitat monitoring information as well as, procedures to accomplish all of these tasks are described the Final 2016 Conservation Strategy (YES 2016) and the IGBST's annual reports (see website: https://www.usgs.gov/science/interagency-grizzly-bear-study-team?qt-science_center_objects=0#qt-science_center_objects).

Monitoring unduplicated females with COY and estimating total population size

Demographic Monitoring Area Estimate: Within the DMA, there were 180 verified sightings of females with COY and of those, from which 58 unduplicated females with COY were differentiated in 2017. Using the Chao2 estimator, sighting frequencies for these families produce a model averaged estimate of 57 unduplicated females with COY (IBGST 2017). We

realize this is a conservative estimate due to constraints of the estimation process as noted by Schwartz et al 2008.
Population estimates based on females with COY, known fate modeling, and sex/age survival rates and ratios continue to exceed the recovery criterion of 500 bears in the entire GYE as established by the revised Demographic Recovery Criteria supplement (USFWS 2017).

Monitoring distribution of females with young of all ages

The Recovery Zone is divided into smaller areas called Bear Management Units (BMUs) for the purpose of habitat evaluation and monitoring. BMUs were designed to:

- Assess the effects of existing and proposed activities on grizzly bear habitat without having the effects diluted by consideration of too large an area;
- Address unique habitat characteristics and bear activity and use patterns;
- Identify contiguous complexes of habitat meeting year-long needs of the grizzly bear; and
- Establish priorities for areas where land use management needs would require cumulative effects assessments.

The target is to have at least 16 of 18 BMUs within the RZ occupied at least 1 year in every 6, and no two adjacent BMUs can be unoccupied over any 6-year period. In 2017, 17 of 18 BMUs had verified observations of female grizzly bears with young, all 18 BMUs contained verified observations of females with young at least once every six years since 2001 (IGBST 2017).

Monitoring all sources of mortality for independent females and males within the entire GYE

The long-term survival of the Yellowstone grizzly bear population over the next 100 to 200 years is contingent upon minimizing average annual mortality within the total population and especially that of adult females (Knight and Eberhardt 1984, 1985). In 2017, there were 59 documented mortalities within the DMA, 42 were attributed to human causes. Among independent-age bears of known sex, 12 known and probable female mortalities within the DMA were documented during 2017 (8.4 percent of the total estimated mortality for independent-age females of the 2017 segment of the population). Twenty known and probable mortalities for independent-age males occurred within the DMA (estimated total mortality for independent aged males was 13.2 percent of the 2017 estimate for this segment of the population). Twelve known and probable human-caused losses of dependent young in the DMA during 2017 (estimated human-caused mortality for dependent young was 5.5 percent within the DMA) (IGBST 2017).

The IGBST evaluates the sustainability of annual grizzly bear mortalities that occur within the DMA boundaries and estimates limits, or thresholds, derived from the model-averaged estimate for females with COY (see IGBST 2005 and 2006 annual reports for procedures). The Demographic Recovery Criteria supplement states that mortality thresholds are not to be exceeded in more than 3 consecutive years. If mortality limits are exceeded for any sex/age class for three consecutive years and any annual population estimate falls below 612, the IGBST will produce a Biology and Monitoring Review to inform the appropriate management response. If any annual population estimate falls below 600, this criterion will not be met and there will be no

discretionary mortality, except as necessary for human safety (USFWS 2017). Given the 2017 estimated population size of 718 the mortality threshold for independent females and dependent young (i.e., COY and yearlings) is 9 percent and 20 percent for independent males (USFWS 2017). None of the mortality thresholds for independent females, independent males, or dependent young were exceeded in 2017 (IGBST 2017).

These data and previous IGBST annual reporting data for the entire GYE indicate that the population continues to meet and/or exceed established Demographic Recovery Criteria. Mortality limits are carefully monitored and controlled and mortalities are generally within established thresholds. Recent levels of mortality in the GYE have been sustainable and there has not been an observed decline in survival of independent-aged bears through 2011 (IGBST 2014c). The population is stable to slightly increasing and continues to expand, increasingly into areas considered less suitable for the long-term viability of grizzly bears.

Recovery goals for the GYE grizzly bear population have been achieved despite long-term, on-going human related activities throughout the GYE. Per the current demographic monitoring protocol, the current (2017) population estimate of approximately 718 grizzly bears in the DMA is likely an underestimate because the method of population estimation has been demonstrated to be conservative as the density of bears increases (Schwartz et al. 2008, vanManen 2017) and it does not account for bears outside the DMA boundary. Reproductive females are distributed across the demographic monitoring area. In addition, grizzly bear mortalities in the GYA DMA have remained within existing sustainable mortality thresholds.

The long-term conservation of grizzly bears in the GYE continues to depend largely on managing human-grizzly bear conflicts Efforts focused on education, proper food storage and disposal of bear attractants, infrastructure management, and compliance and enforcement of permit requirements will aid in minimizing risk to both bears and people and is part of the overall management strategy for grizzly bears in the GYE.

Threats

Human activities resulting in food-conditioned behavior, conflicts and subsequent mortality and displacement were the main reasons the grizzly bear was listed as threatened (USFWS 2016). To address population declines, the IGBST was created in 1973, to collect, manage, analyze, and distribute science-based information regarding habitat and demographic parameters upon which to base management and recovery. In 1983, the IGBC was created to coordinate management efforts across multiple federal lands and different states within the various ecosystems ultimately working to achieve recovery of the grizzly bear in the lower 48 States. Its objective was to change land management practices on federal lands that supported grizzly bear populations at the time of listing to provide security and maintain or improve habitat conditions for the grizzly bear. Since 1986, National Forest and National Park plans have incorporated the Interagency Grizzly Bear Guidelines to manage grizzly bear habitat in the Yellowstone RZ (82 FR 30520, June 30, 2017).

Outside the RZ within the DMA grizzly bear management plans in Idaho, Montana and Wyoming recognize the importance of areas that provide security for grizzly bears in suitable habitat outside the RZ within the DPS boundaries. Secure habitats on federal lands limit average road densities to 1.6 kilometers/2.6 square kilometers (1 mile/square mile) or less (82 FR 30525, June 30, 2017). The 2007 Recovery Plan Supplement with habitat-based recovery criteria, which was incorporated into the 2016 Conservation Strategy, identified and provided the framework for managing the RZ and the adjacent areas of the DMA, where occupancy of the grizzly bear was anticipated to continue into the foreseeable future (82 FR 30521, June 30, 2017). Implementation of these guidelines has led to the successful rebound of the GYE grizzly bear population, allowing it to significantly increase in size and distribution since the listing in 1975 (82 FR, June 30, 2017, 30520).

Human-grizzly bear interactions and conflicts have been increasing in the GYE due, in part, to increasing bear numbers, increasing human use and development, and an increase in tourists visiting the GYE and the surrounding National Forests, thereby increasing the chances of adverse encounters. The most important issues to control on the landscape are levels of human activities. Although conflicts with livestock have the potential to result in mortality for grizzly bears, the 2016 Conservation Strategy's specific total mortality limits will preclude population-level impacts. The 2016 Conservation Strategy directs the IGBST to monitor and spatially map all grizzly bear mortalities (both inside and outside the RZ and DMA), causes of death, and the source of the problem, and alter management to maintain a recovered population (82 FR 30526, June 30, 2017). Due to the U.S. Forest Service's commitment to manage National Forest lands in the GYE to maintain a recovered population, we do not expect livestock allotments or developed sites in suitable habitat outside of the RZ to be a threat to the GYE grizzly bear population in the foreseeable future (82 FR 30525, June 30, 2017).

Isolation from human activities is extremely important for bear survival, as grizzly bears can habituate to humans and/or become conditioned to anthropogenic foods quickly, subsequently leading to conflict bears. Conflict bears often must be relocated or lethally removed from the population. The frequency of human-grizzly bear conflicts is inversely associated with the abundance of natural bear foods (Gunther et al. 2004). A year of drought and poor food production can compel grizzly bears to search widely for food. Such wide ranging movements can bring grizzly bears into closer contact with humans, increasing human-bear conflicts and resultant management actions. While human-grizzly bear conflicts at developed sites on public lands do occur, the most frequent reason for management removals are conflicts on private lands. Existing Forest food storage regulations for these areas will continue to minimize the potential for human-grizzly bear conflicts through food storage requirements, outreach, and education (82 FR 30525, June 30, 2017).

Whitebark pine seeds have provided an important food source for some grizzly bears. White pine blister rust and mountain pine beetles, which have had severe, negative consequences on whitebark pine in portions of the northern Rocky Mountains, occur in the GYE and have resulted in substantial whitebark pine mortality. However, even where whitebark pine is available, it is not consistently used every year due to the stochastic nature of masting events. Also, whitebark pine is, and has historically been, absent from the home range or diet of a sizeable portion of the

GYE grizzly bear population. A recent food synthesis report indicated that various study findings do not indicate a strong dependence among GYE grizzly bears on whitebark pine seeds (IGBST 2013).
With the decline of whitebark pine in the GYE, grizzly bears over the past decade have exhibited reduced selection for whitebark pine habitat, and corresponding increased consumption of meat (IGBST 2013). Bear movements and home range size did not change with the change in diet, and recent analyses suggest that grizzly bear body condition and fecundity rates have not changed with the changing diet (IGBST 2013).

Once an important food source for those grizzly bears adjacent to Yellowstone Lake and its tributaries the population of Yellowstone cutthroat trout has crashed to less than 10 percent of pre-1990 numbers. Due to the introduction of lake trout (which are less available to bears due to their deeper water habits) drought, and whirling disease caused by an exotic parasite (Fortin et al 2013). The estimated biomass of cutthroat trout consumed by grizzly bears declined 70 percent and 95 percent, respectively, in the decade between 1997 through 2000 and 2007 through 2009 (Fortin et al 2013). Data from 2012 indicate numbers of spawning cutthroat trout continue to be low in most of the Yellowstone Lake tributary streams, and in North Shore and West Thumb streams, and their numbers have decreased significantly since 1989. Removal of lake trout from Yellowstone Lake continues, and in 2017, 396,950 were caught and removed. Population modeling suggests that increased removal efforts may have halted lake trout population growth and continued catch at these rates may begin reducing the population (Gunther et al. 2013).

Grizzly bears consume elk and bison as winter-killed carrion in the early spring, kill calves opportunistically consume hunter-killed carcasses or gut piles, and prey upon adults weakened during the fall breeding season. Decreasing winter severity and length as a result of climate change could reduce spring carrion availability. A reduction of winter-killed ungulates may be buffered by an increase of availability of meat to adult grizzly bears during the active season as a result of grizzly bear usually prevailing in usurping wolf-killed ungulate carcasses (82 FR 30537, June 30, 2017). Army cutworm moths, which also provide important food for some bears in some high elevation areas, could be affected by pesticide use in agricultural areas. Some years have higher moth activity than others, and 2012 was a record year for the number of grizzly bear observations or telemetry relocations at moth sites, including females with COY (Bjornlie and Haroldson 2013).

Changing climate conditions have the potential to impact some grizzly bear food sources in the GYE. Climate change may result in possible shifts in grizzly bear habitat use in response to declines or increases in food resources. As mentioned, food habit studies from the GYE show that grizzly bears display dietary plasticity and consume a wide variety of foods (IGBST 2013). While the extent and rate to which food sources will be impacted is difficult to foresee with any level of confidence, there is general consensus that grizzly bears are flexible enough in their dietary needs that they will not be impacted directly by ecological constraints such as shifts in food distributions and abundance (Servheen and Cross 2010, IGBST 2013). Other than potential impacts to food resources, the mountainous regions characterized by the Middle Rockies Ecoregion (includes the GYE) generally possess the habitat components necessary for grizzly bear persistence despite a changing climate. The effects of climate change may result in changes

to grizzly bear habitat, including the reduction of snowpack levels, which may shorten the denning season, shifts in denning times, and changes in fire regimes (82 FR 30524; June 30, 2017).

Habitat may be compromised, degraded, or lost from management activities, commercial or recreational developments, and other human-related actions, resulting in grizzly bear displacement. They may also experience isolation from fragmentation of available habitat due to construction of major highways that block or restrict movement, and from inadequate provisions for linkages on minor roads and highways. Other sources of human-caused grizzly bear mortalities include malicious killing, defense of human life or property, and accidental death (vehicle strike, electrocution, etc.). Bears are relocated or lethally removed to defend human life or property, usually because bears have become dangerously bold as a result of food conditioning and human conditioned at campsites, lodges, resorts, and private residences, or they become chronic depredators of livestock (Knight and Judd 1983).

The isolated nature of the GYE grizzly bear population was identified as a potential threat when listing occurred in 1975. Declines in genetic diversity are expected in isolated populations (Allendorf et al. 1991; Burgman et al. 1993). For the GYE grizzly bear population, decreases in genetic diversity would occur gradually over decades due to long generational time and relatively large population size (Miller and Waits 2003, Kamath et al 2015). Indicators of fitness in the GYE grizzly bear population demonstrate that the current levels of genetic diversity are capable of supporting healthy reproductive and survival rates, as evidenced by normal litter size, no evidence of disease, high survivorship, an equal sex ratio, normal body size and physical characteristics, and a relatively constant population size within the DMA (van Manen 2016a, in litt.). IGBST will continue monitoring genetic diversity so that a possible reduction in genetic diversity due to geographic isolation will be detected and responded to accordingly.

Special 4(d) Rule Governing Take

Under Section 4(d) of the ESA, the Service may extend to a threatened species those protections provided to an endangered species as deemed necessary and advisable to provide for the conservation of the species. When the grizzly bear was listed as threatened in 1975, we issued a special rule applying all of the ESA's prohibitions except for: 1) self-defense or defense of others; 2) removal of nuisance bears; and 3) scientific research activities not resulting in death or permanent injury (50 CFR 17.40). Regarding nuisance (conflict) bears, grizzly bears "constituting a demonstrable but non-immediate threat to human safety or committing significant depredations to lawfully present livestock, crops, or beehives may be taken…" The rule specifies that bears must be taken in accordance with the current interagency guidelines. These guidelines (IGBC 1986) outline a plan for determining conflict status and controlling conflict grizzly bears based on the nature of the offense and sex/age class of the bear, and consultation and coordination processes between states and the Service. These guidelines apply throughout the ecosystem, and are referenced in discussion to determine management actions on each conflict.

ENVIRONMENTAL BASELINE

Under the provisions of section 7(a)(2), when considering the "effects of the action" on listed species, the Service is required to consider the environmental baseline. The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, state, or private activities, as well as, the cumulative effects of reasonably certain future state or private activities within the action area. Regulations implementing the Act (50 CFR 402.02) define the environmental baseline as, the past and present impacts of all federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in an action area that have already undergone formal or early Section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process.

Status of the Species within the Action Area

Earlier, we defined the action area as the six Allotments plus a buffer of 7.5 miles. We selected a distance of 7.5 miles beyond the perimeter of the collective allotment boundaries; based on the maximum distance many of the bears traveled to carcasses in Craighead and Michell (1982). We describe the environmental baseline (and later analyze the direct and indirect impacts of the action) within the action area, not just the allotment boundaries. Although there is considerable overlap, we will sometimes discuss the Allotments separately from the action area, as specific activities and information in the Allotments are important for the incidental take and jeopardy analyses.

The RZ, or grizzly bear recovery zone as it was initially described (USFWS 1993) was delineated to define an area within which to focus grizzly bear recovery efforts after the species was listed in 1975. Suitable habitat is considered the area capable of supporting a viable grizzly bear population now or in the foreseeable future. Suitable habitat for grizzly bears is defined by three characteristics—(1) being of adequate habitat quality and quantity to support grizzly bear reproduction and survival; (2) contiguity with the current distribution of Yellowstone grizzly bears such that natural recolonization is possible; and (3) having low mortality risk as indicated through reasonable and manageable levels of grizzly bear mortality. Grizzly bear reproduction and survival is a function of both the biological needs of grizzly bears and remoteness from human activities, which minimizes mortality risk for grizzly bears. Mountainous areas provide hiding cover, the topographic variation necessary to ensure a wide variety of seasonal foods, and the steep slopes used for denning (Judd *et al.* 1986; Linnell *et al.* 2000). Suitable habitats are much larger than the RZ, as observed by the changes in grizzly bears occupied range (Figure 3). The DMA was delineated around suitable habitat in order to capture the extent of grizzly bear occupancy over time.

Mortality risk also impacts the biological suitability of habitat for grizzly bears. Some mortality, including human-caused mortality, is unavoidable in a dynamic system where bears inhabit large areas of diverse habitat with overlapping uses i.e. grazing, hunting, recreating, and camping to name a few. These effects range from temporary displacement to actual mortality.

Mattson and Merrill (2002) found that grizzly bear persistence in the contiguous United States between 1920 and 2000 was negatively associated with human and livestock densities. As livestock densities increase in habitat occupied by grizzly bears, depredations follow. Because this is a specialized behavior, targeting the offending bear for relocation or removal is usually effective in reducing livestock depredations (Anderson et al. 2002).

Today, many of the areas grizzly bears have historically occurred are not biologically suitable for grizzly bears, and in some cases the high densities of traditional food sources are no longer available due to land conversion and human occupancy of urban and rural lands. Traditional food sources such as bison and elk have been reduced and replaced with domestic livestock such as cattle, sheep, chickens, goats, pigs and bee hives, which can become anthropogenic sources of prey for grizzly bears (82 FR 30510, June 30, 2017). These areas are defined as unsuitable due to the high risk of mortality resulting from these human-grizzly bear conflicts. These areas of unsuitable habitat do not support grizzly bear reproduction or survival because bears that repeatedly come into conflict with humans or livestock are usually either relocated or removed from these areas.

None of the Allotments or the 7.5-mile buffer overlap with the Grizzly Bear Recovery Area. All of the allotments are within the Demographic Monitoring Area, and all of the habitat within the Allotments is considered grizzly bear occupied habitat (IGBST 2017). While most of the action area is within the DMA, a portion of the 7.5-mile buffer is outside the DMA (Figure 1). For the action area, we selected a distance of 7.5 miles beyond the perimeter of the collective allotment boundaries; this buffer is based on the maximum distance many of the bears traveled to carcasses in Craighead and Mitchell's (1982) study.

In 1996, at least eight different grizzly bears used the northern portion of the Pinedale Ranger District, including the action area, adjacent sheep allotments, and/or nearby cattle allotments. From 1999 to 2009, grizzly numbers increased from the 1996 level (U.S. Forest Service 2010). Location data are available from 21 grizzly bears captured in 2013 or 2014 as part of management actions (typically in response to cattle depredation) or captured for research and monitoring purposes in or near the action area. Twenty bears were fitted with radio collars. Among the 12 bears present in the action area during 2013, five were initially captured at sites outside the action area (and outside the Upper Green River watershed), including the lower Gros Ventre, the Upper Wind, and the North Fork Shoshone River watersheds. Of the four bears with known den locations in the previous year (2012 through 2013), only one occurred within the Upper Green River watershed (Murphy 2016). Of the four individuals whose winter 2013 and 2014 dens were also known, all used sites outside the Upper Green River watershed. Based on these data, it appears few grizzly bears use the Allotments during the winter.

All 12 bears used the action area at least temporarily during the 2013 spring–fall period. Four of these individuals were removed due to depredation on cattle; none were initially captured in the research and monitoring effort. The telemetry data (about 1,300 mixed argos and VHF collar locations) indicated that both conflict and research grizzly bears moved freely in and out of the action area during summer through fall, and made extensive use of adjacent watersheds (Upper Gros Ventre and Upper Wind River watersheds). For example, bear #499 (captured in the

project area due to conflict) denned on the Wind River Reservation approximately 24 miles northeast of the action area and then moved into the action area during the following summer. Sub adult male #752 (research capture) ranged northwest at least 29 air miles to near the east boundary of Grand Teton National Park and into the southern portion of the Buffalo Ranger District, Bridger-Teton National Forest. Adult male #754 (research capture) ranged southward to the Big Bend of the Upper Green River (Dollar Lake) and northwest approximately 9 air miles into the upper portion of the Gros Ventre River drainage, Jackson Ranger District, Bridger-Teton National Forest.

Trapping efforts to radio collar grizzly bears at 10 sites in and near the action area occurred from late June to late July, 2014. Adult male #785 was first captured and monitored for research purposes, relocated for depredation, and denned outside the action area. Bear #729, initially captured for research purposes in the Gros Ventre watershed in 2012, was relocated for livestock depredation in the action area, and dropped his collar outside the project area. Six other grizzly bears were first captured in the action area due to livestock depredation. Five were relocated, and one was released on site and then stayed in the area. Of the five relocated individuals, only one returned to the action area. Bear #731 was captured in the action area during 2012 and released nearby and was removed from the action area for livestock depredation during 2014. Bear 756 was relocated from the action area during 2013 for livestock depredation. He was also removed from the action area during 2014 for cattle depredation. During the 2014 grazing season, WGFD personnel had no contact in the action area with any of the other grizzly bears (i.e., aside from bear #756) that were marked there during the 2013 grazing season and that survived (with or without radio collars) to the 2013 through 2014 denning season. The fates of these bears are unknown. Although they may have used the action area during the 2014 grazing season, none were detected incidentally in the action area via captures, cameras, or other means.

Population size is estimated annually for the entire DMA, the number of grizzly bears using the action area during the grazing season is not known. However, we have seen a trend of increasing livestock conflicts within the action area since 2014, suggesting grizzly bears are still using territories in the action area previously occupied by individuals that were relocated or removed. Conflict data has been recorded since the 1970's. Anderson et al. (2002) documented grizzly bear predation on cattle from 1994 to 1996 on the Buffalo Ranger District (15 miles northwest of the Upper Green), Bridger-Teton National Forest. In the Blackrock study most bears were not killing cattle, three adult males are responsible for 90 percent of confirmed losses. Removal, translocation, and aversive conditioning were used to deter chronic depredators. No depredations were discovered following the absence of the three depredating males in 1996, unlike the previous 2 years when losses continued for 4 to 6 weeks. This finding suggested that removal of chronic depredators could reduce losses (Anderson et al. 2002). Other bears did not become more depredatory, although many were known to consume cattle carrion. Although these data were collected outside of the action area, the information is relevant to what has occurred within the action area in the last 9 years. Further these findings demonstrate that management actions to address chronic depredators reduces losses in the years following the relocation or removal of that individual.

Estimated Population: The GYE rate of population growth slowed over the last decade to approximately 0 to 2 percent; however, spatial estimates of population growth show that the regions of greatest population growth have expanded outward from the core of the ecosystem and beyond the DMA (IGBST 2012). The action area falls within the southern/southeastern most boundary of the DMA, as well as, the current grizzly bear occupied range (Figure 3). Between 2014 and 2016 the population expanded significantly at the periphery, as bears moved into previously unoccupied areas (Figure 3). While the exact rate of growth in the action area is unknown, the rate of growth may be applied to the areas within the DMA, it does not account for the expansion of occupancy outside of the DMA.

The number of grizzly bears in any given location (e.g., action area), fluctuates throughout the season based on food availability and other factors such as hibernation. Therefore, we will use conflicts and related management actions to provide some context for analyzing effects from grazing on the grizzly bear population. Since 2010, the number of conflicts in the action area has increased an average of 9 percent per year (Table 4), and the increase is likely, a result of an increase in bear density from previous years (WGFD personal communication 2018). The periphery of the current distribution, which includes the action area, has continued to expand as seen in the distribution maps through 2016. However, at some point, as habitats become saturated and as the female territories are filled, the population increase within the action area will slow or plateau.

Conflicts/Relocations/Mortalities

From 2010 through 2018 there were 527 confirmed conflicts and 35 grizzly bear management removals within the Allotments boundaries due primarily to livestock grazing (Table 4). Similarly, grizzly bear activity and conflicts have been on the rise within the action area, as the number of grizzly bears has increased and bears have expanded into less suitable habitats. In addition, female bears have established territories within the action area. A majority of the conflicts in the action area occurred in the last 5 years (Table 4). These conflicts occurred throughout the action area (conflicts are not tied to any specific area or allotment/pasture). The conflict and management data indicate an expanding grizzly bear population within the action area concurrent with increasing occupancy and distribution of grizzly bears throughout the GYE (Figure 3). Because more bears are moving into areas with more human and livestock use, we expect even more conflicts and management actions will occur in the future.

Table 4. Cattle/Grizzly Bear Conflicts and Subsequent Removals within the Upper Green Allotments and the entire Action Area, which includes the Allotments.

Management	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Conflicts within the Allotments	36*	38*	49*	46*	68*	85*	56*	72	77
Removals within the Allotments	1	4	3	4	2	6	3	4	8
Conflicts within the Action Area	38*	41*	63*	54*	71*	93*	63*	86	95
Removals within the Action Area	2	4	3	4	2	6	4	4	8
*include cattle and sheep livestock conflicts. Sheep are no longer grazing within Allotments after the 2016 grazing season. (USFS Specialist Report 2016, WGFD personal communication 2018)									

As the population grows, we must consider possible future mortalities in the action area relative to the entire GYE and that mortality thresholds are in place to ensure all mortalities remain within a sustainable level. In relation to mortalities throughout the entire GYE, the management removals in the Allotments have fluctuated from a low of 1.4 to a high as 13.7 percent of the overall GYE population mortality between the years 2010 and 2018 (Table 5). These fluctuations may be caused by changes in grizzly bear numbers in the action area, changes from dispersing males to an increase in females with cubs, changes in natural food sources, or removal of the bears causing conflicts the year before. However, there is no evidence that changes in any mortality factor, including management removals resulting from all causes of mortality in the action area, have contributed to a detectable change in grizzly bear survival in the GYE.

Table 5. Grizzly Bear (GB) Mortalities in the Upper Green Allotments Compared to the Total Mortalities in the GYE Due to Livestock Depredations

	GB Cattle Conflicts in the Upper Green Allotments	Management Removals in Upper Green Allotments	Total GB Mortality for the GYE	Upper Green Allotments Proportion of All Mortality
2010	36	1	69	1.45%
2011	38	4	50	8.00%
2012	49	3	49	6.12%
2013	46	4	29	13.79%
2014	68	2	28	7.14%
2015	85	6	70	8.57%
2016	56	3	58	5.17%
2017	72	4	66	6.06%
2018	77	8	62*	12.90%
Sum	527	35	481	7.28
Average	58.5	3.89	53.44	7.28%

*(preliminary data from WGFD personal communication 2019)

Status of Species Habitat within the Action Area

Grizzly bears continue to expand outward in the GYE, including and beyond the action area. Grizzly bear distribution in the GYE increased 51 percent from 2002 to 2016; with the greatest expansion occurring in the northern and southern regions of the range (the latter includes the action area). The increase in distribution likely reflects bears continuing to expand into previously unoccupied habitats on the edge of their current distribution.

Conflict data show bear activity occurs on all the Allotments (Figure 4). Generally, the habitat in the six Allotments occupy a range in elevation from 7,800 to 10,600 feet above sea level. The Allotments provides abundant and widely distributed food and cover for grizzly bears during the late spring, summer, and fall. Grizzly bears prey upon offspring of elk, moose, mule deer, and pronghorn. When present (June to October), grizzly bear depredated cattle, which can provide carrion to other predators and scavengers. Ants, roots, and tubers of yampa and biscuitroot are other important foods (Interagency Grizzly Bear Study Team 2013). The Green River and the lower reaches of its tributaries flow through open valleys and support well-developed willow riparian communities with abundant herbaceous vegetation (forbs, grasses, sedges) eaten by bears. Seeds of whitebark pine are an important food source for grizzly bears in the Yellowstone Ecosystem (Gunther et al. 2014).

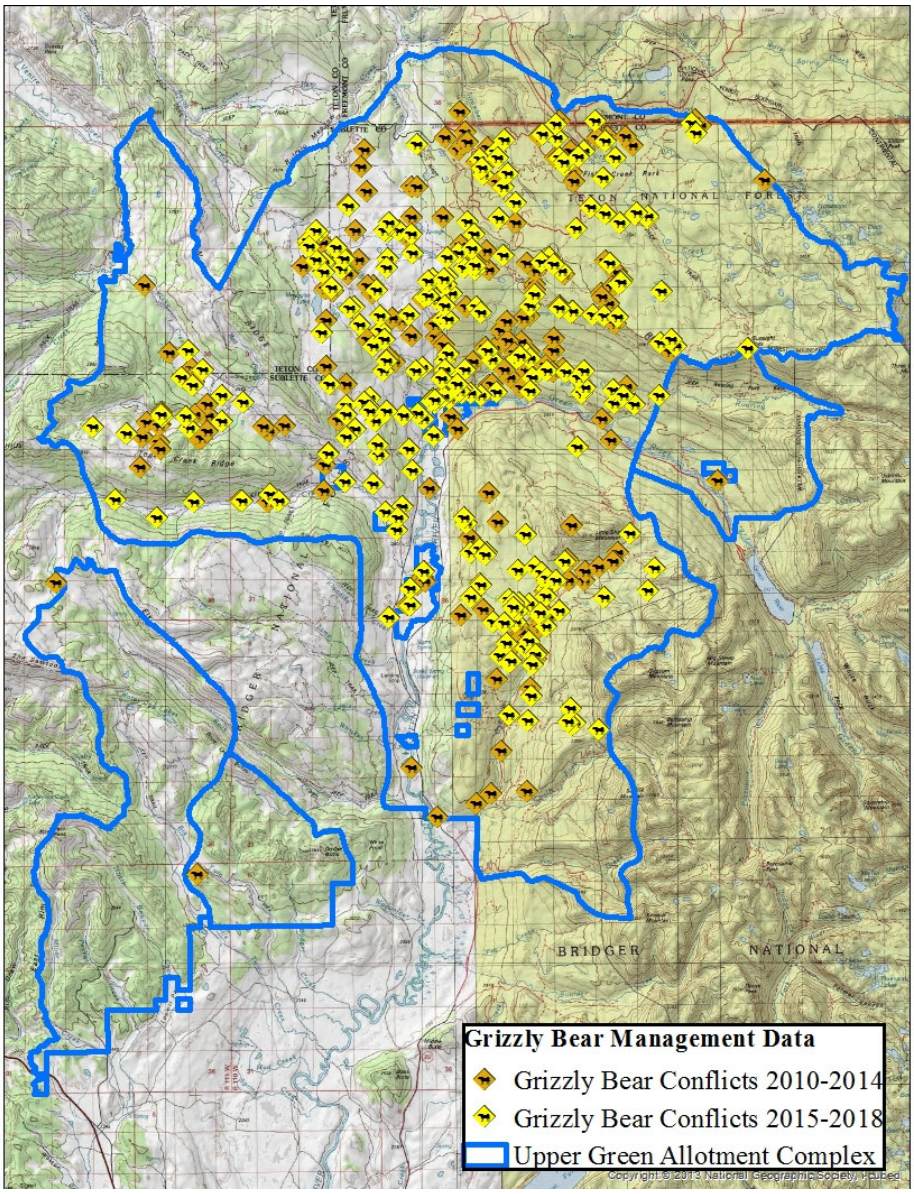

Figure 4. A Comparison of the Distribution and Number of Grizzly bear/cattle conflicts in the Upper Green Allotment Complex between 2010-2014 and 2015 and 2018 (WGFD 2010-2018).

Factors Affecting the Condition of the Grizzly Bear in the Action Area

The permittees of the Allotments under the Upper Green River Cattle Association have implemented the following grazing practices over the years to reduce livestock and grizzly bear conflicts with varying degrees of success. These include:

(1) The permittees conducted conflict reduction workshops in 2016 and 2017 inviting speakers from the USDA Wildlife Services, as well as, private companies that developed wildlife conflict reduction measures in Montana, Wyoming, and Alberta, Canada.
(2) Two, three, and four-pasture grazing deferral systems.
(3) Hire 5 to 6 season long range riders and utilize 5 rider camps on the allotments. Day help is hired as needed.
(4) In 2015, the permittee's moved livestock from the allotments earlier than previous seasons, due to the amount of late season grizzly bear depredations.
(5) In 2016 the permittees herding technique involved herding cattle together in the evening, in large or small bunches, to see if the herd would be protective and deter predation. USDA's Wildlife Services installed trail cams to look for large carnivore patterns of movement. The permittee's saw no effect on predation from bunching cattle in the evening, and did not continue the practice after the summer of 2017.
(6) The use of guard dogs was discussed; however, the Forest, WGFD, and the permittees are concerned about conflicts between recreationists and the guard dogs, due to the Continental Divide Recreation trail running through the allotments and heavy recreational use of the area. The Forest and the permittee have not implemented this option, but they are still exploring the use of guard dogs as a possible conservation measures.
(7) Adaptive rotation of cattle in the Tepee Creek Pasture system was implemented to avoid the larkspur growing season, which can kill cattle. This area has high levels of larkspur in the wilderness, making carcass removal difficult to impossible, due to topography in this Pasture. The permittees now use the Tepee Creek Pasture late in the season, which avoids having cattle die from poisoning.

Wyoming Grizzly Bear Management Plan Conflict Management, 2016

The guidelines outlined in the final 2016 *Conservation Strategy* (YES 2016) along with the guidelines below will be used to manage human conflict both inside and outside of the DMA. Human welfare will receive priority consideration when grizzly bears and people come into conflict. Management actions will be based on a risk assessment that considers the impact to humans, as well as the grizzly bear population and mortality status. WGFD responses to conflict include no action, aversive conditioning, deterrence, exclusion, relocation, and/or removal. Situations involving grizzly bears occupying locations where the potential for conflicts is high (e.g. subdivisions) will be managed proactively to prevent damage and address human safety concerns. All management actions will be documented in the grizzly bear relocation report and annual grizzly bear job completion report published by WGFD. As the grizzly bear population has increased in abundance and distribution, the WGFD has documented a corresponding increase in abundance and distribution of conflicts. The WGFD will continue to stress the importance of conflict resolution and maintain vigilance in response to human/grizzly bear conflicts.

The WGFD's conflict management program will focus on education and preemptive management strategies. Public safety will remain the paramount consideration in all WGFD management decisions related to grizzly bear conflicts. Situations involving grizzly bear conflicts will be handled in a timely and effective manner. Non-lethal control measures will be

exercised whenever appropriate and practical. Location, cause of incident, severity of incident, history of the offending grizzly bear(s), and bear's health, age, and sex will be considered in any decisions about appropriate management actions. Additionally, the WGFD will include the prevention of future conflict as a consideration when developing strategies to deal with individual situations. Appropriate circumstances in which response actions may be taken are described below:

No Action. The WGFD may elect to take no action after the initial investigation if the circumstances do not warrant control or if the opportunity for effective control of the situation is low. Many human-grizzly bear conflicts are one-time events. The activities and circumstances leading to the conflict may not be repeated, thus, a management response becomes unnecessary. In other situations, the location of the grizzly bear involved is unknown, or the location where the next conflict may occur cannot be reliably anticipated.

Aversive Conditioning, Deterrence, and Exclusion. The WGFD may employ various options to prevent or reduce the potential for conflicts and/or depredations (e.g. electric fencing, bear proof structures or containers, scare devices). As circumstances warrant, the WGFD will employ nonlethal methods such as removing the source of the conflict or altering the behavior of the bear(s) that may be contributing to a conflict.

Often the most effective action is to manage the root cause(s) of the conflict. Implementing property protection (bear exclusion) measures or eliminating attractants will often result in grizzly bears abandoning the area and discontinuing undesirable behaviors. Aversive conditioning by actively deterring grizzly bears from a specific site or area will sometimes have the same effect depending on the situation.

Relocation. The WGFD may capture grizzly bears and relocate them away from conflict situations when other options are likely to be ineffective, or where human safety is a concern. Capture and relocation efforts will be initiated in a timely manner when practical. The WGFD will attempt to relocate conflict grizzly bears to locations where the probability of causing additional problems is low. Grizzly bears captured to manage conflicts will not be relocated into unoccupied habitat. All sub-adult and adult grizzly bears to be relocated or released on site will be permanently marked and may be radio-collared when applicable.

Removal**.** Management removals may be employed when other options are not practical or feasible, in particular when bears become food-conditioned, human-habituated, or aggressive toward humans. Grizzly bears displaying these behaviors are a public safety threat and often continue to be involved in property damage incidents. In other circumstances, some grizzly bears may not be suitable for release due to injuries, illness or their physical condition. When the option to lethally remove a bear is exercised, the source of the conflict should also be managed as appropriate. Appropriate actions to address human-grizzly bear conflicts will be identified and implemented in accordance with Department guidelines and protocols. As with other known mortalities, WGFD removals will be reported annually. All mortalities are reported

and posted on the IGBST website: https://www.usgs.gov/science/interagency-grizzly-bear-study-team?qt-science_center_objects=4#qt-science_center_objects.

Relocation may provide time to resolve the problem creating the conflict. While translocation of bears from population sinks may remove them temporarily from situations of high risk of death, the best management strategy remains elimination the sources that attract bears in the first place, thus supporting efforts to minimize food availability through carcass removal (Knight et al. 1988). Blanchard and Knight (1995) believe that transporting grizzly bears should be considered a final action to eliminate a conflict situation, because of low survival and high return rates. However, Blanchard and Knight (1995) also found sub-adult females returned the least of all groups and indicated transporting females must be considered a viable management technique because transports of some individuals have resulted in contributions to the population through successful reproduction.

Habituation to humans and human activities can also lead to conflicts with grizzly bears, which may ultimately lead to their translocation, harm, or death (McLellan 1989). Human presence and activities in grizzly bear occupied habitats may lead to human-bear encounters, often with negative consequences for the bear, as well as the human. In their study of the effects of access on human-caused mortality of Yellowstone grizzly bears, Mattson and Knight (1991) revealed that mortality rates associated with all levels of access (roads, developments, and backcountry) have decreased over time. They point out that most of this observed improvement is due to better management and removal of attractants such as garbage and other anthropogenic foods that have been a major cause of bear deaths in the past; and that these may have been the easiest reductions to achieve.

Habituation, the loss of a bear's natural wariness of humans, results from continued exposure to human presence, activity, noise, etc., without negative consequences. A bear habituates to other bears, humans, or situations when such interaction gives it a return in resources, such as food, that outweighs the cost of the stress that precedes habituation or does not experience a negative consequence as a result. Similarly, bears may habituate to people when such interactions result in access to a source of natural food in the vicinity of human use areas (McArthur-Jope 1980). Increases in human access and subsequent increased human use in grizzly bear habitat can lead to bear habituation to humans, which in turn increases the potential for bear-human conflicts. Food conditioned bears often end up obtaining human food or garbage and learn to associate people with food. If bears become food conditions, they are generally removed from the population. These conflicts could result in the relocation, injury, or death of any given grizzly bear.

The Role of the Action Area in the Survival and Recovery of the Grizzly Bear

Not all bears cause conflict and the WGFD has documented bears with territories in the Allotments that have lived a conflict-free life. Nonetheless, bear conflicts with livestock increased an average of 10 percent each year (personal communication WGFD 2019, Table 6). We believe this trend is likely to continue within the action area. Within the last nine years 37 grizzly bears were lethally removed from the action area due to conflicts with livestock. The

mortalities that have occurred within the DMA count toward annual mortality thresholds, which have been sustainable as discussed in the Conservation section. Decisions to lethally remove bears are made on a case by case basis, based on the individual grizzly bear's previous activities, severity and type of conflict. However, data do not suggest these mortalities are affecting the survival rate of independent-aged bears or population growth at the level of the DMA or ecosystem-wide (IGBST 2017). Despite the conflict history and the 37 management removals in the action area in the last nine years, and long-term, on-going human-related activities throughout the GYE, recovery goals have been achieved for this population.

We reviewed the number of removals since 2010 (Table 4); however, we analyzed the last five years of the nine-year dataset, because we believe it is a better representation of the current grizzly bear population, the conflicts with livestock in the Allotments, and the possible future trends. Over the last 5 years, removals ranged from a low of two to a high of eight, with a 5-year average of 4.6 (Table 6). The number of bears removed in any given year is influenced by many factors such as sex, age, and the history of conflicts for the individual bear, as well as, the ability to trap the bear, which is based on the accessibility (ability to place a trap) and the bear or bears' behavior. In some cases, a bear depredating cattle in one year might not be caught until the following year. Because the number of removals fluctuates from year to year, a 3-year average may be a better predictor of long-term trends. Over the last 5 years there was an 8 percent increase in the overall average (3-year window) removal rate (Table 6). Over the last 5 years the action area had an average of 71.6 conflicts with an average of 10 percent change in conflicts using this same method, though it appears conflicts may have stabilized in recent years, though this could be due to removal of bears causing a substantial number of depredations.

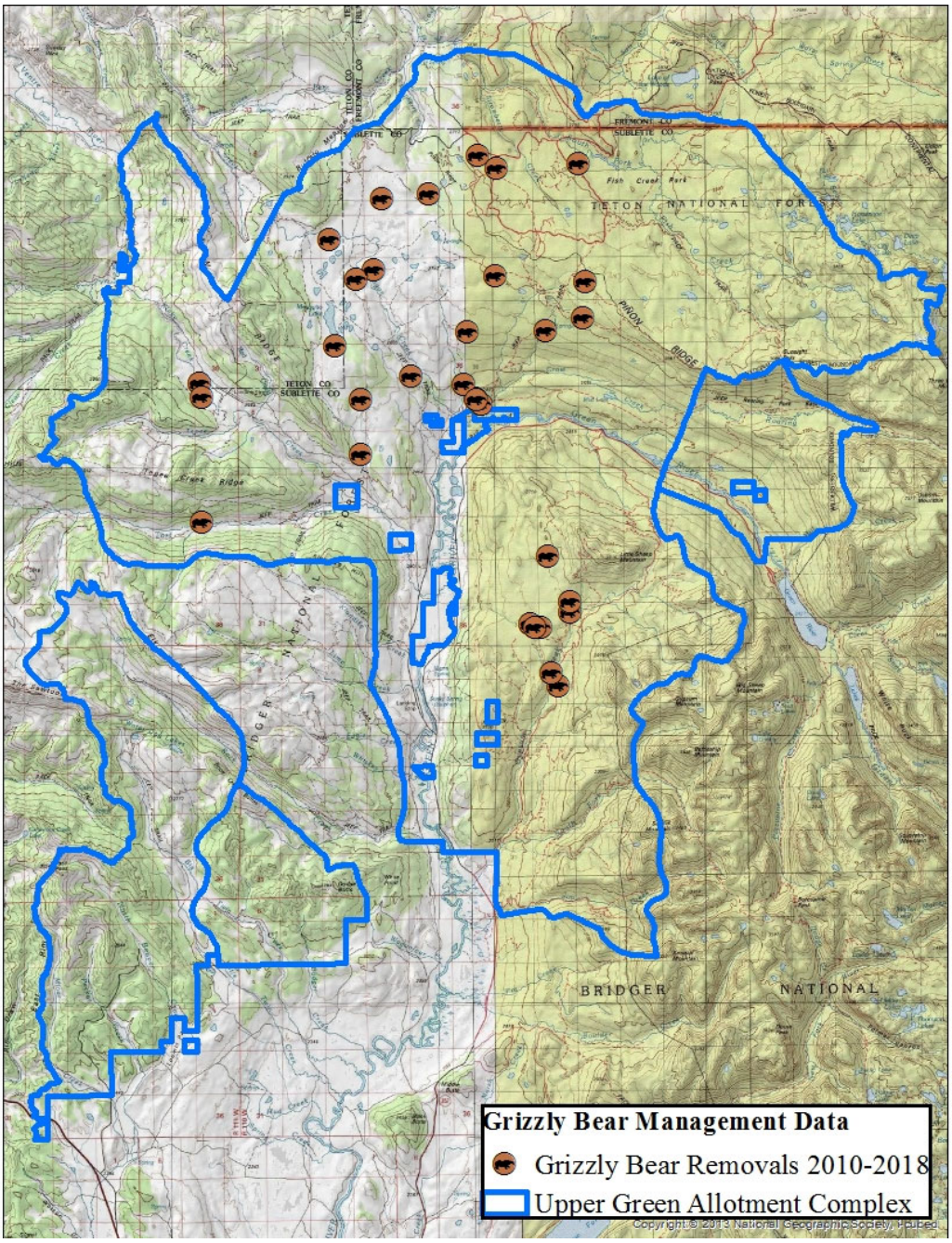

Figure 5. Capture Locations of Grizzly Bears Removed due to Livestock Conflicts within the Upper Green Allotment Complex.

Table 6. Grizzly Bear Removals and Conflicts in the Upper Green Allotments (a 3-year moving average and the percent annual change, based on the last 5 years).

Year	Bear Removals	% Change Removals 3-year window average	Bear/Livestock Conflicts	% Change Conflicts 3- year window average
2014	2	-18	68	23
2015	6	33	85	22
2016	3	-8	56	5
2017	4	18	72	2
2018	8	15	77	-4
Average	4.6	8%	71.6	10%
(WGFD personal communication 2018)				

Previous Consultations

Project history, the effects on grizzly bears, and the level of incidental take have also been considered in the environmental baseline. Below is a list of biological opinions that exempted incidental take within the action area or that overlap the action area. These projects, their affects to the grizzly bears, and the level of incidental take are included in the environmental baseline for this biological opinion. The total incidental take that has occurred through management removals in the action area since 1999 is 37 (35 in the Upper Green Allotments) grizzly bears.

(1) in 2014 a supplement of the 2013 BO (reference WY14F0040, September 3, 2014) included incidental take of a total of 11 grizzly bear mortalities within any consecutive 3-year period;
(2) in 2013 a supplement of the 2010 BO (WY13F0075, March 22, 2013) included incidental take of a total of 11 grizzly bear mortalities within any consecutive 3-year period with no more than 3 of the 11 grizzly bears shall be females;
(3) in 2011in the Shoshone National Forest an Outfitter and Guide Special Use Permits Biological Assessment (ES-61411/WY11F0215), included and incidental take of 1 grizzly bear; (4) in 2011 on the Shoshone National Forest a Livestock Grazing Permit Renewal Biological Assessment (06E1300/WY11F0246), included an incidental take of 1 grizzly bear;
(5) in 2010 an amendment of the 1999 BO (WY10F0225, January 18, 2011) included incidental take in the form of management removal for a total of 6 grizzly bears within any consecutive 3-year period;
(6) in 2002 Livestock Grazing in the Teton Division (TAR/W.19/2850&4715/(TetonDiv.BO)); and
(7) in 1999 Biological Assessment (6-WY-97-F-002, July 16, 1999) included incidental take in the form of management removal of 5 grizzly bears (4 males and 1 female) for livestock grazing on the northern portions of the Pinedale Ranger District.

EFFECTS OF THE ACTION

Direct and Indirect Effects of the Proposed Action

The implementing regulations for section 7 define "effects of the action" as "...the direct and indirect effects of an action on the species together with the effects of other activities that are interrelated or interdependent with that action, which will be added to the environmental baseline..." "Indirect effects" are defined in the regulations as "...those that are caused by the proposed action and are later in time, but still are reasonably certain to occur" (USFWS 1986, p. 19958).

The potential direct and indirect effects to grizzly bears from proposed livestock grazing action are: (1) a change in the quality and quantity of grizzly bear habitat and the availability of food; (2) attraction to the Allotments because of livestock presence; (3) habituation or conditioning of grizzly bears to humans, livestock, or related food sources; (4) displacement of grizzly bears from habitat as a result of humans and other activities associated with livestock grazing; and (5) mortalities due to management actions or self-defense by herders, riders, permittees, or others associated with livestock grazing. However, there have been no incidents on the Forest where a permittee or their designees have injured, or been injured by grizzly bears.

Livestock grazing on Forest-authorized grazing allotments, and the associated human presence and livestock carrion associated with livestock management, could have detrimental effects to the grizzly bear (Knight and Judd 1983). As the grizzly bear population expands and overlaps with Forest authorized grazing allotments, grizzly bears can be expected to continue to have conflicts with livestock. Unacceptably high levels of livestock depredation by grizzly bears may lead to control of grizzly bears, depending upon the specific circumstances.

Grazing of 8,772 cattle (cow/calf pairs) and 47 horses will occur within these Allotments from June 14 through October 15 (livestock are not continuously on all of these allotments during this time period, some of these allotments are on a rest-rotation or a deferred rotation schedule, (see Table 1, for specific dates of livestock presence). Although some of these allotments are on a rest-rotation schedule, grazing in this area still includes some risk of livestock and grizzly bear interaction or conflict, because grizzly bears are present through the summer months. The greatest potential for human/livestock/grizzly bear interactions are during the summer and early fall months. The known conflicts have occurred throughout the Allotments and adjacent habitats. Depredations in the Allotments occur on all sex/age classes of cattle. Permitted livestock grazing on Forest allotments are not associated with private headquarter operations.

Change in the quality and quantity of grizzly bear habitat and the availability of food

As stated in the **Life History** section above, grizzly bears are opportunistic omnivores that use a wide variety of plant and animal food sources. Because grizzly bears across the GYE are able to find adequate food resources and given the habitat conditions present on the Allotments, we assume conditions within the action area also provide adequate natural food resources throughout their active (non-hibernating) period. Natural foods can vary significantly within seasons and

from year to year due to adverse or extreme weather conditions. However, grizzly bears consume a wide variety of vegetation, roots, tubers, and other foods not consumed by domestic ungulates, and exhibit plasticity in their ability to switch between food resources.

While we lack data on exactly what foods grizzly bears and wild ungulate prey are using specific to the area, based on the abundant and widely distributed food and cover available within the Allotments (Specialists Report p.21), we assume a majority of these acres provide foraging opportunities for grizzly bears and their wild prey. Under the proposed action, we would expect competition for forage between livestock, grizzly bears, and wild ungulates, and impacts from depletion of that forage, to be minimal. Although competition may be minimal, adding livestock to the landscape is a habitat modification (potential food source).

Attraction to the Upper Green Allotments because of livestock presence

As the population has grown, grizzly bears have expanded naturally into areas outside of the RZ and DMA into what may be considered more human-dominated landscapes. Grizzly bears are suspected to have a keen sense of smell (Craighead 1976), which likely attracts them to livestock carcasses associated with the proposed action. As mentioned in the Action Area section, grizzly bear movement towards the scent of prey and carcasses is highly variable, and depends on the individual bear, the prey item, weather and topographic conditions, and other factors.

Wherever such prey, including livestock, and carcasses are available within grizzly bear occupied habitat, bears may be drawn to the area. Anderson et al. (2002) noted, "While carcass removal may reduce the concentration of bears in an area, it may not prevent bears from developing depredatory tendencies or repel depredating bears from grazing areas." The presence of livestock carcasses in grizzly bear habitat may alter grizzly bears' behavior by attracting bears away from natural food sources. This change in habitat use and behavior has the potential to make affected grizzly bears more susceptible to conflicts with humans. Livestock carcass availability also will be reduced by implementation of good animal husbandry and herding practices to minimize stray animals and sickness. To address this issue, under the proposed action, all livestock carcasses will be removed as soon as possible (Conservation Measures #2, 4, and 5). These Conservation Measures will reduce the number of carcasses but we recognize that complete carcass removal is not possible.

We recognize that complete cattle carcass removal from the allotments is not possible due to the large and remote areas grazed by livestock on the Allotments and the difficulty in locating all carcasses over such vast areas, or locating them in a timely manner.

Habituation or conditioning of grizzly bears to humans, livestock, or related food sources

In general, when native bear foods are abundant, conflicts due to property damage or the acquisition of anthropogenic foods tend to be infrequent whereas when native bear foods are scarce, the frequency of grizzly bears damaging property and obtaining anthropogenic foods tends to increase during hyperphagia. However, livestock depredations tend to occur independent of food availability (Gunther et al. 2004, Gunther et al. 2012). Because grizzly

bears seem prone to preying on livestock independent of natural food availability, and because of bears' demonstrated ability to learn foraging behavior, we assume that once a grizzly bear has preyed on livestock, it becomes more likely to repeat that behavior. Grizzly bear depredation of livestock has been well documented in the action area.

Grizzly bear depredation of domestic cattle is well documented. Some grizzly bears coexist with livestock and never prey on them (Knight and Judd 1983). Grizzly bear predation on cattle may result in the affected bears seeking out domestic livestock to supplement their diet. This in turn will likely cause an increased potential for bear-human conflicts. Once a bear successfully obtains a food reward at a particular location, the site is usually periodically rechecked for more food (Stokes 1970, Meagher and Phillips 1983, Wilson et al. 2005).

The resulting change in feeding behavior constitutes an adverse effect to individual grizzly bears because of the potential to remove that bear. The adverse effect of feeding on domestic livestock and altered behavioral patterns does not, itself, cause injury to the involved grizzly bear. However, a relatively small percentage of grizzly bears (become chronic depredators) that actively seek livestock as prey. These bears are more likely to be the subject of livestock/bear or human/bear conflicts that may lead to its removal from the wild population through agency control actions.

The risk of cattle/bear conflicts is minimized by implementation of conservation measures that are part of the grazing permit as a term and condition of the permits; this allows the Forest the ability to enforce these stipulations during livestock grazing administration and must be followed to maintain good standing on their permit. These conservation measures seek to minimize contact between bears and livestock carcasses, livestock feed, garbage, anthropogenic food and other attractants to reduce the likelihood of conflict.

The pasture rest rotation strategies and grazing deferral on some of the Allotments is used to minimize the grizzly bears from keying in on livestock presence at the same locations year after year. Livestock carcass removal methods will be at the discretion of the WGFD and/or Forest wildlife biologist and the method that most reduces the chance of attracting grizzly bears will be used. The time and duration of livestock grazing, utilization levels on key plant species in key areas on upland and riparian areas, rest rotations, and permit modifications are also terms and conditions on the grazing permit that may be changed to reduce livestock and grizzly bear conflicts.

Some grizzly bears can become food conditioned to human garbage or livestock feed if cow camps are left unclean, and bears that become food conditioned have a higher probability of being removed by agency personnel. To avoid food conditioning, the Forest will implement the Food Storage Order (Conservation Measure #1), which requires appropriate human food, garbage, and livestock feed storage. Conservation Measures will minimize the potential for human habituation or food conditioning on the Allotments. The Forest is implementing livestock carcass removal conservation measures to limit grizzly bear consumption of livestock carcasses (Conservation Measure #2, 4, and 5). However, exceptions are made due to rider or herder safety concerns related to the possible presence of a grizzly bear in the immediate vicinity of

carcasses, and carcasses being located in hazardous terrain such that attempting to move or remove may not be possible or safe.

Direct mortality due to management actions or self-defense by herders, riders and others

The Allotments permittees have hired 5 to 6 seasonal range riders and utilize 5 rider camps on the Allotments; as a result in increased grizzly bear activity day help and additional range riders are hired as needed. The use of riders is part of Conservation Measure # 2. There have been no self-defense actions taken by range riders or herders to date due to grizzly bear conflicts with cattle.

Mortality due to self-defense actions by herders, riders, and others involved in grazing activities has not occurred in the Allotments to date, however, mortalities due to self-defense of herders or riders could happen in the future. Self-defense by humans engaged in livestock grazing activities where grizzly bears are present will always be a potential. To further minimize self-defense actions, the Forest's Conservation Measures 6 and 8 will continue to ensure grazing-related personnel understand their responsibilities of working in grizzly bear habitat.

Grizzly bears have been expanding their range and while bears have occurred in the area for many years, the number of bears in the area has increased (WGFD personal communication 2018) (Figure 3). Bears that live in or move through the area are likely to encounter livestock that are widely scattered throughout the allotments beginning in June. It has been demonstrated that some of those bears learn to depredate livestock. This process will continue as long as livestock are on the landscape, resulting in future livestock-grizzly bear conflicts, with some bears becoming chronic depredators.

Results from research conducted on the Bridger-Teton National Forest's Blackrock-Spread Creek and Grand Teton National Park's Elk Ranch East grazing allotments during 1994 to 1996 suggested that removal of chronic depredators can reduce livestock losses significantly and may be the key to addressing conflicts with grizzly bears on rangelands (Anderson et al. 2002). They concluded that management removal of depredating grizzly bears may be an effective management tool, as conflicts may temporarily decrease until other bears learn depredating behaviors and the scenario repeats itself. Grizzly bears that are initially found to depredate livestock are relocated to locations where the probability of causing additional problems is low. To date management removals that occur because of livestock depredations, only occur as a result of a grizzly bear chronically depredating livestock.

There have been 37 management removals over the last 9 years within the action area. Given the increasing number of conflicts and management actions in the action area (Table 4), we expect the number of removals will continue to increase during the 10-year period of the proposed action. It is difficult, however, to accurately predict the exact number of management removals, though we expect the number will increase through time as the density of grizzly bears increases in the Allotments. The following approach recognizes both the uncertainty and the expectation for increasing conflicts and the need for management actions. We are not intending to limit the activities necessary to manage grizzly bears in the action area by implementing this approach,

but instead is a reasonable estimate of what we expect could happen over the next decade. If we have underestimated the number of management actions needed, it is likely due to an underestimate of the numbers and distribution of grizzly bears in the action area.

As described in the "Environmental Baseline" section, the number of livestock-bear conflicts and removals has steadily increased since 2010. On average, management removals increased 8 percent annually during the 5-year period between 2014 through 2018. We used the later 5 years of the dataset because we believe it is a better representation of the current grizzly bear population and the future conditions in the Allotments. We believe this trend was due to a growing bear population and the establishment of female home ranges in the action area (WGFD Per. Com. 2018). We expect the population will continue to expand, though the rate of growth may slow within the action area once it reaches saturation and filling all available territories. Absent other data, we have used removal data from the last 5 years (Table 6) to forecast anticipated management removals for the proposed action.

On average 4.6 grizzly bears were removed from the Allotments over the last 5 years. In the last 2 years twelve bears were removed; however, these bears were chronic depredators over the last few years, removal of these bears may reduce the number of conflicts and removals in the next year or two. We do not know exactly how many conflicts or management removals will occur in any given year, but based on the 5-year average, we expect about 5 bears will be removed during the 2019 grazing season. We also expect the rate of removals will continue to increase as the population increases in the action area. As the population becomes saturated, we expect conflicts to plateau as may be the case currently.

We used removal data from the last 5 years to adjust the number of removals upward through time to account for this overall increase, of 8 percent rate per year (Figure 5). The effect of the proposed action, is the lethal removal of a maximum of 72 grizzly bears due to the killing of livestock, over the next 10 years of the grazing permit.

Starting with 5 mortalities in year 1 (rounding the 5-year average of 4.6 to a whole bear) with an average growth rate of 8 percent, we anticipate a total of 72 grizzly bear mortalities at the end of year 10, resulting from removal of grizzly bears depredating livestock within the Allotments (Table 7). We are using a 3-year average to account for yearly variability in these numbers. Assuming the current trend continues for the next 10 years, we expect the conflicts to increase at a rate of 10 percent, though this rate may slow (Table 6). We have calculated the number of removals, in the event that conflicts and removals increase at similar rates as in past years.

Rather than wait until 2028 to determine if the incidental take exceeded has 72 bears, we believe more frequent check-ins are appropriate to evaluate the accuracy of our estimates, and if necessary, to consider whether additional conservation actions are advisable. While Table 7 provides a specific number of removals for each year (rounded to whole bears), we expect the number of management removals will vary from year to year as they have in the past (Table 6). Because we expect the number of removals to be higher in some years and lower in others, it does not make sense to hold the agencies to the specific, annual numbers in Table 7. Instead, we believe that anticipating incidental take for consecutive 3-year periods will allow for more

frequent review without placing an unrealistic expectation on the agencies. Using a 3-year period to evaluate incidental take, we would expect no more than 16 bears will have been removed by the end of the 2021 grazing season. Similarly, by the end of the seventh year, we would expect no more than 28 bears removed during the previous 3 years, and in year 10 (2028) no more than 28 bears removed in the previous three years. These are examples, as every year will have a 3-year average. The total number of removals is not to exceed 72 bears. It is possible fewer bears will be removed at the end of this 10-year period. In fact, we expect this trend to eventually plateau, as grizzly bear expansion into the periphery habitats stabilizes, but we do not know when this may happen.

Table 7. Removals expected over the next 10 years assuming the same 8 percent growth rate observed over the last 5 years and starting with five in 2019.

Year	Annual Removals Assuming 13 Percent Growth	Rounded to the Nearest Whole Bear
1 (2019)	5	5
2 (2020)	5.4	5
3 (2021)	5.83	6
4 (2022)	6.3	6
5 (2023)	6.8	7
6 (2024)	7.35	7
7 (2025)	7.93	8
8 (2026)	8.57	9
9 (2027)	9.25	9
10 (2028)	10	10
Total		72

Trapping, releasing, relocating, and lethally removing bears are considered on a case-by-case basis but follow standard protocols in the Interagency Grizzly Bear Guidelines. When incidental take in the form of management removal occurs, that take is identified with a location and type (e.g., livestock depredation, human food use, etc.). Ultimately, the Service's Grizzly Bear Recovery Coordinator, in close coordination with WGFD (for conflicts in Wyoming), makes the final determination on grizzly bear removals.

To date the number of conflicts has been increasing as the number of bears using the core habitats have reached capacity, and as the population has increased bears have increased their distribution to areas outside of the DMA. This was seen in the Allotments as transient and resident males initially were the main chronic depredators; the overall breeding population of grizzly bears expanded into the Allotments (Figure 3), the number of conflicts increased. In part because the number of bears occupying the Allotments increased, in addition, to an increase in female bears with dependent young. As conflicts continue to increase management removal is a

management tool available for specific, chronic depredation situations, to be used in conjunction with other measures that focus on preventing and minimizing the causes of livestock-grizzly bear conflicts. We do not anticipate these levels of removal to occur every year as a result, of conflicts with livestock, as seen on Tables 4, 5, and 6. The level of removals may lessen over time as depredators are removed from the action area, and as these peripheral habitats meet their saturation points. As mentioned, data demonstrate that management removals of a limited number of grizzly bears on these and other Allotments have not had detrimental impacts on the GYE grizzly bear population.

Summary

The effects of grazing 8,772 cattle and 47 horses on the Upper Green Allotments include changes to grizzly bear habitat and the availability of food; changes in bear behavior, such as habituation to humans or livestock and/or displacement due to human activities; and management removals due to livestock depredation or self-defense. While these effects may occur to varying degrees, they are interconnected. The removal of depredating bears will result in incidental take.

CUMULATIVE EFFECTS

Cumulative effects "…are those effects of future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation." Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The Service is not aware of any future non-federal actions reasonably certain to occur in the action area. Ongoing actions in the action area, such as recreational use, hunting, and livestock grazing on private lands, and their impacts on grizzly bears are discussed in the Environmental Baseline section, above, and are expected to continue.

CONCLUSION

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed federal action in the context of the current status of the species, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the species in the wild. After reviewing the specialists report, the current status of the grizzly bear in the action area, previous sources of information incorporated by reference (see literature cited), and the Forest's commitment to implement their Conservation Measures, and cumulative effects, it is the Service's biological opinion that the effects of livestock grazing on the Allotments in the northern portions of the Bridger-Teton National Forest's Pinedale Ranger District, west of the Wind River Mountain range, as proposed, are not likely to jeopardize the continued existence of the grizzly bear. Although we anticipate some level of take of grizzly bears primarily due to management mortalities within the Allotments, it is our opinion that the proposed action will not appreciably reduce the likelihood of survival and recovery of grizzly bears. No critical habitat has been designated for grizzly bears; therefore, none will be affected. The Service has reached this conclusion by considering the following:

The proposed action will change the grizzly bear population, reproduction, and distribution in the action area by 5 bears in the first year of Project implementation and potentially as many as 10 bears by year 10 of Project implementation. The GYE recovery area that contains the action area is increasing with a rate of growth of 0 to 2 percent, as observed by bears continuing to expanding into new areas outside of the RZ and DMA (Figure 3). The overall population density in the GYE was 718 grizzly bears in 2017. The anticipated level of grizzly bear mortality caused by the proposed action falls within the scope of the demographic recovery criterion to maintain the population within the DMA around the 2002 through 2014 model-averaged Chao2 population estimate, by maintaining annual mortality limits for independent females, independent males, and dependent young (USFWS 2017). The demographic recovery criterion has been met for all age and sex classes since 2004 (82 FR 30502; June 30, 2017). The level of mortality that will occur because of this Project will not appreciably reduce the overall population, reproduction, and distribution of grizzly bears in the GYE recovery area. Therefore, implementation of this Project will not cause jeopardy of the grizzly bear GYE recovery area.

INCIDENTAL TAKE STATEMENT

INTRODUCTION

Section 4(d) and 9 of the ESA, as amended, prohibit the take of listed species of fish or wildlife without a special exemption. The ESA defines take as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. A special rule under the ESA is in effect for grizzly bears in the 48 conterminous states of the United States (50 CFR 17.40(b), Special Rule). Under the terms of the Special Rule, taking is prohibited except as provided in paragraphs 17.40(b)(1)(i)(B) through (F). The exceptions to the take prohibition include the defense of human life and the removal of nuisance bears when the taking conforms to the requirements specified in the regulations.

Although the Special Rule exempts removals of grizzly bears associated with livestock conflicts, there are exceptions to the take prohibition for grizzly bears but the exceptions do not address all sources of incidental take that may result from the proposed federal action. For example, harm is further defined by regulation (50 CFR 17.3) as an act which actually kills or injures wildlife. Such acts may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns such as breeding, feeding or sheltering. Incidental take is defined as "…takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the USFS, Bridger-Teton National Forest so that they become binding conditions of any grant, permit, or Allotment Management Plan issued by the Forest, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the Forest (l) fails to implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of the incidental take, the Forest must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement [50 CFR 402.14(i)(3)].

Amount or Extent of Take Anticipated

Although the intentional act of lethally removing conflict grizzly bears in accordance with the special rule is an exception to the taking prohibition (50 CFR 17.40(b)(1)(i)(C)), the exception does not address incidental take associated with the Forest's decision to permit grazing. As described in the "Effects of the Action" section, the Service anticipates take in the form of harm (injury and death) from removing (killing) grizzly bears as a consequence of livestock grazing and the associated livestock management operation in habitats commonly used by grizzly bears. The likely depredation of some of the permitted livestock represents an impairment of natural

feeding behavior that will in some cases ultimately lead to management actions including the management removal of grizzly bears. In addition, grazing and associated activities have the potential for other adverse effects to grizzly bears (e.g., displacement, habituation, increased exposure to other potential sources of mortalities, etc.) as described in the Biological Opinion's "Effects of the Action." However, the regulations at 402.14 instruct the Service to exempt take "… if such take is reasonably certain to occur." The Service does not believe the other potential adverse effects will meet the definition of incidental take and be reasonably certain to occur. Therefore, we will not identify a specific level of incidental take attributable to these other potential adverse effects.

Conflicts and subsequent management removals are expected to occur throughout the entire period of the 10-year grazing permit for the Allotments, and it is incumbent upon the Service to identify a level of take that is reasonably likely to occur. The Service estimated an amount or extent of incidental take that is based on the best available science and we do not anticipate any other incidental take as a result of the proposed action.

Over the last 5 years, the number of conflicts and management removals has continued to increase on average by 10 percent and 8 percent, respectively. The number of removals has been cyclical: as the depredating individuals have been removed, the number of conflicts in the following years has temporarily decreased until other bears learn depredating behaviors and the scenario repeats itself (Table 6). We believe the increasing trend in conflicts and removals and the cyclical nature of these occurrences is due to an expanding grizzly bear population, which we expect will continue in and around the action area. As a result of an expanding bear population, we believe the action area will continue to experience a regular increase in the number of conflicts and management removals over the next 10 years of the grazing permit. We do not know exactly how many conflicts or removals will occur in any given year, but we used removal data from the last 5 years to inform the next 10 years of anticipated incidental take. An average of 4.6 grizzly bears were removed annually from the Allotments over the last 5 years. Consequently, incidental take was rounded up to 5 bears for the 2019 grazing season. Starting in 2020, incidental take was increased by 8 percent (the same rate as the last 5 years) and then rounded to the nearest whole bear, which results in a total estimated incidental take of 72 grizzly bears over the 10-year grazing permit (Table 7).

This biological opinion exempts 72 grizzly bear removals starting in 2019 and ending in 2028 (10 years) as a consequence of livestock grazing in the Upper Green Allotments. Rather than wait until 2028 to determine if the incidental take exceeded 72 bears, we believe more frequent check-ins are appropriate to evaluate the accuracy of our estimates and, if necessary, to consider whether additional conservation actions are advisable. Using the data from Table 7, we expect no more than 16 bears will have been removed by the end of the 2021 grazing season. Similarly, by the end of the seventh year, we would expect no more than 28 bears removed during the previous 3 years, and in year 10 (2028) no more than 28 bears removed in the previous three years (see Table 8 for two examples. This take is lethal, a decision which ultimately is made by the Service's Grizzly Bear Recovery Coordinator in close coordination with WGFD (for conflicts in Wyoming).

Table 8. Examples of 3-year Periods to Evaluate Incidental Take from 2019 through 2028

Year	Scenario 1	Scenario 2
1 (2019)	5	4
2 (2020)	5	5
3 (2021)	6	6
4 (2022)	6	6
5 (2023)	7	6
6 (2024)	7	8
7 (2025)	8	7
8 (2026)	9	8
9 (2027)	9	11
10 (2028)	10	9
Total	72	69

Effect of the take

In this BO, the Service has determined that this amount or extent of adverse effects meeting the definition for take is not likely to jeopardize the continued existence of the grizzly bear.

REASONABLE AND PRUDENT MEASURES

The reasonable and prudent measures, with their implementing terms and conditions and the reporting criteria, are designed to minimize the impact of incidental take that might otherwise result from the authorized activities under the Livestock Grazing on the northern portions of the Bridger-Teton National Forest's, Pinedale Ranger District, west of the Wind River Mountain Range. If, during the course of the authorized activities, any level of incidental take has exceeded the amount anticipated in the Incidental Take Statement, re-initiation of consultation is required. The Forest must immediately provide information related to the circumstances of the taking and review with the Service the potential for reinitiation of consultation and modification of the incidental take statement.

The Service believes the following reasonable and prudent measure (RPM) is necessary and appropriate to minimize take of grizzly bear.

RPM 1. Minimize livestock/grizzly bear and human/grizzly bear conflicts related to grazing activities on the Allotments.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the ESA, the Forest must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. The terms and conditions (T&C) described below are non-discretionary, and must be undertaken by the Forest so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the Forest (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse.

T&C1. If the amount of grizzly bears that are lethally removed related to grazing activities on the Allotments exceed the 3-year period as described above, the Forest will contact the Service to evaluate the circumstances, re-evaluate our assumptions, and discuss the adequacy of existing mechanisms to minimize take.

T&C2. The Forest will contact the Service if and when the amount of incidental take is reached.

T&C3. The Forest will, in coordination with the Service, annually (or more often as necessary) review the effectiveness of the Forest's Conservation Measures and other management efforts outlined in the 2019 Biological Assessment as they apply to the Allotments and describe the progress of the proposed action, including impacts to the grizzly bear (50 CFR 402.14(l)(3)). This review shall consider adverse effects resulting from Project activities, including grizzly bear and grazing conflicts and resolutions for these Allotments within the Forest, and will be in writing.

Reporting
In order to document the review process and improve understanding of the effectiveness of the Conservation Measures and other measures, the Forest will complete an annual report, using the report template provided in Appendix B, with the following:

- The number, bear gender, and allotment locations of conflicts and incidental take (management removals);
- The Forest's actions to implement and monitor compliance of its Conservation Measures and appropriate grazing regulations as described in the 2016 Specialist Report proposed action related to grazing activities on the Allotments, and the Reasonable and Prudent Measure and implementing Terms and Conditions;
- Description of Conservation Measure violations, such as food storage or improper grazing practices, why these measures were unable to be implemented with a brief description.

This annual report will be submitted to the Service's Wyoming Field Office by April 15 of the subsequent years (e.g., 2019 grazing season report will be due April 15, 2020).

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is reached, such incidental take represents new information requiring re-initiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures and development of additional terms and conditions.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations (CR) are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. Depending on the outcome of future livestock/grizzly bear conflicts in the Allotments, some of the following recommendations may be considered for addition to required Terms & Conditions as appropriate.

CRl. Continue to educate livestock grazing permittees and their employees about their responsibilities related to conservation of grizzly bears, the potential occurrence of grizzly bears on grazing allotments, the risks of working in bear country, the protected status of the grizzly bear, the need for heightened awareness of bears, appropriate personal safety measures, and proper behavior in bear country.

CR2. Where possible, avoid important grizzly habitat components such as riparian areas, travel corridors and drainages, and berry stands for intense livestock use.

CR3. Permittees and the Forest Service will continue to identify and implement opportunities that reduce the potential for grizzly bear conflicts. Permittees may be provided opportunity to move pastures to avoid conflict with grizzly bears.

CR4. Should livestock/grizzly bear conflicts become excessive consider alternative methods to reduce grizzly bear/livestock conflicts, such as, using guard dogs, and using aversive conditioning tools or if conditions warrant switching from cow/calf pairs to yearlings.

REINITIATION NOTICE

This concludes consultation on the action outlined in your October 2018, request for consultation on the effects of the Allotments on grizzly bears. As provided in 50 CFR 402.16, re-initiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending re-initiation.

Thank you for your assistance in the conservation of listed species. If you have any questions or comments on this biological opinion or your responsibilities under the ESA, please contact our office at the letterhead address or phone Lisa Solberg Schwab at (307) 367-5340.

LITERATURE CITED

Anderson, C.R., M.A. Ternent and D.S. Moody. 2002. Grizzly bear-cattle interactions on two grazing allotments in northwest Wyoming. Ursus 13:247-256.

Bader, M. 2000. Spatial needs of grizzly bears in the U.S. Northern Rockies. Alliance for the Wild Rockies special report no. 10. Missoula, Montana. 28pp.

Bjornlie, D. and M. Haroldson. 2001. Grizzly bear use of insect aggregation sites documented from aerial telemetry and observations. Pages 44-51 in C. C. Schwartz and M. A. Haroldson, Eds. Yellowstone grizzly bear investigations: Annual report of the Interagency Grizzly Bear Study Team, 2000. U.S. Geological Survey, Bozeman, Montana.

Bjornlie, D. and M. Haroldson. 2013. Grizzly bear use of insect aggregation sites documented from aerial telemetry and observations. Pages 39-42 in F.T. van Manen, M.A. Haroldson, and K. West, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2012. U.S. Geological Survey, Bozeman, Montana, USA.

Bjornlie, D.D., D.J. Thompson, M.A. Haroldson, C.C. Schartz, K.Z. Gunther, S.L. Cain, D. B. Tylers, K. L. Frey, and B. Aber. 2014. Methods to estimate distribution and range extent of grizzly bears in the Greater Yellowstone Ecosystem. Wildlife Society Bulletin 38:182-187.

Bjornlie, D. D., F.T. Van Manen, M. R. Ebinger, M.A. Haroldson, D.J. Thompson, and C. M Costello. 2014b. Whitebark Pine, Population Density, and Home-Range Size of Grizzly Bears in the Greater Yellowstone Ecosystem. PLoS ONE 9(2): e88160. doi:10.1371/journal.pone.0088160

Bjornlie, D.D., A.M. Bramblett, S. L. Cain, T.H. Coleman, J. K. Fortin-Noreus, K. L. Frey, M. A. Haroldson, P.L. Kamath, E.G. Reinertson, C.T. Robbins, D.J. Thompson, D. B. Tyers, K. R. Wilmot, and T. C. Wyman. 2017. Yellowstone Grizzly Bears: Ecology and Conservation of an Icon of Wildness. Editors P.J. White, K. A. Gunther, and F. T. van Manen. Yellowstone Forever, Yellowstone National Park and U.S. Geological Survey, Northern Rocky Mountain Science Center.

Blanchard, B. M., and R. R. Knight. 1995. Biological consequences of relocating grizzly bears in the Yellowstone ecosystem. Journal of Wildlife Management 59(3):560-565.

Boyce, M.S., B.M. Blanchard, R.R. Knight, C. Servheen, M.R. Vaughan, T.K. Fuller. 2001. Population viability for grizzly bears: a critical review. Monograph Series (International Conference on Bear Research and Management) No.4. International Association for Bear Research and Management. 39 pgs.

Costello, C.M., R.D. Mace, and L. Roberts. 2016. Grizzly bear demographics in the Northern Continental Divide Ecosystem, Montana: research results (2004–2014) and suggested techniques for management of mortality. Montana Department of Fish, Wildlife and Parks. Helena.

Craighead, F.C. and J.A. Mitchell. 1982. Grizzly bear; Ursus arctos. Pages 515-556 in Wild Mammals of North America. The Johns Hopkins University Press.

Craighead, F.C. 1976. Grizzly bear ranges and movement as determined by radio tracking. In Bears: Their Biology and Movement, Vol. 3, A Selection of Papers from the Third International Conference on Bear Research and Management, Binghamton, New York, USA, and Moscow, U.S.S.R. June 1974. IUCN Publications New Series No. 40 (1976), pp.97-109.

Craighead, F.C., Jr., and J.J. Craighead. 1972a. Data on grizzly bear denning activities and behavior obtained by using wildlife telemetry. Pages 94-106 *in* S. Herrero, ed. Bears - their biology and management. IUCN Publ. New Series 23.

Craighead, F.C., Jr., and J.J. Craighead. 1972b. Grizzly bear prehibernation and denning activities as determined by radio-tracking. Wildlife Monographs 32. 35 pp.

Craighead, J.J., J.S. Sumner, and J.A. Mitchell. 1995. The grizzly bears of Yellowstone: their ecology in the Yellowstone ecosystem, 1959-1992. Island Press, Washington, DC. 535 pp.

Department of Interior. 2017. Draft Grizzly Bear Restoration Plan / Environmental Impact Statement, North Cascades Ecosystem. 325 pp

Egbert, A.L. and A.W. Stokes. 1976. The social behavior of brown bears on an Alaskan salmon stream. Pages 41-56 *in* M.R. Pelton, J.W. Lentfer, and G.E. Folk, Jr. eds. Bears — their biology and management. IUCN Publ. New Series 40.

Fortin, J.K., C.C. Schwartz, K.A. Gunther, J. E. Teisberg, M.A. Haroldson, M.A. Evans, C. T. Robbins. 2013. Dietary adjustability of grizzly bears and American black bears in Yellowstone National Park. The Journal of Wildlife Management 77(2): 270-281.

Glenn, L.P., J.W. Letfer, J.B. Faro, and L.H. Miller. 1976. Reproductive biology of female brown bears (Ursus arctos), McNeil River, Alaska. Pages 381-390 *in* M.R. Pelton, J.W. Lentfer, and G.E. Folk, Jr. eds. *in* Bears — their biology and management. IUCN Publ. New Series 40.

Gunther, K.4., E. Reinertson, T.M. Koel, and P.E. Bigelow. 2013. Spawning cutthroat trout. Pages 35-38 in F.T. van Manen, M.A. Haroldson, and K. West, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2012. U.S. Geological Survey, Bozeman, Montana, USA.

Gunther, K.A., B. Aber, M.T. Bruscino, S.L. Cain, K. Frey, M.A. Haroldson and C.C. Schwartz. 2012. Grizzly bear-human conflicts in the Greater Yellowstone Ecosystem. Pages 48-52 in F.T. van Manen, M.A. Haroldson, and K. West, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2011. U.S. Geological Survey, Bozeman, Montana, USA.

Gunther, K.A., M. A. Haroldson, K. Frey, S. L. Cain, J. Copeland, and C. C. Schwartz. 2004. Grizzly bear--human conflicts in the Greater Yellowstone Ecosystem, 1992-2000. Ursus 15(1):10-22.

Gunther, K.4., M.T. Bruscino, S. Cain, J. Copeland, K. Frey, M.A. Haroldson and C.C. Schwartz. 1999. Grizzly bear - human conflicts, confrontations, and management actions in the Yellowstone Ecosystem 1999. Interagency Grizzly Bear Committee Yellowstone Ecosystem Subcommittee Report. Pages 55-108 in C.C. Schwartz and M.A. Haroldson, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 1999. U.S. Geological Survey, Bozeman, Montana. l92pp.

Guo, H., L.D. Jacobson, D.R. Schmidt, R.E. Nicolai, J. Zhu and K.A. Janni. 2005. Development of the OFFSET model for determination of odor-annoyance-free setback distances from animal projection sites: Part II: Model development and evaluations. Transactions of the American Society of Agricultural Engineers, 43(6):2269-2276.

Harding, L. and J.A. Nagy. 1980. Responses of Grizzly Bears to Hydrocarbon Exploration on Richards Island, Northwest Territories, Canada Bears: Their Biology and Management, Vol. 4, A Selection of Papers from the Fourth International Conference on Bear Research and Management, Kalispell, Montana, USA. pp. 277-280.

Haroldson, M. 2013. Occupancy of bear management units by females with young. Page 19 in F. T. van Manen, M. A. Haroldson, and K. West, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2012. U.S. Geological Survey, Bozeman, Montana, USA.

Haroldson, M. and K. Frey. 2015. Estimating sustainability of annual grizzly bear mortalities. Pages 26-30 in F. T. van Manen, M. A. Haroldson, and K. West, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2014. U.S. Geological Survey, Bozeman, Montana, USA.

Haroldson, M. and K. Frey. 2013. Estimating sustainability of annual grizzly bear mortalities. Pages 24-30 in F . T . van Manen, M. A. Haroldson, and K. West, editors. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2012. U.S. Geological Survey, Bozeman, Montana, USA.

Haroldson, M.A., K.A. Gunther, D.P. Reinhart, S.R. Podruzny, C. Cegelski, L. Waits, T. Wyman, and J. Smith. 2005. Changing numbers of spawning cutthroat trout in tributary streams of Yellowstone Lake and estimates of grizzly bears visiting streams from DNA. Ursus 16(2): 167-180.

Haroldson, M. Ternant, K. A. Gunther, and C. C. Schwartz. 2002. Grizzly bear denning chronology and movements in the Greater Yellowstone Ecosystem. Ursus 13:29-37

Herrero, S. 1978. A comparison of some features of the evolution ecology, and behavior of black and grizzly/brown bears. Carnivore 1:7-17.
Hornocker, M.G. 1962. Population characteristics and social and reproductive behavior of the grizzly bear in Yellowstone National Park. M.S. Thesis. University of Montana, Missoula. 94 pp.

Interagency Conservation Strategy Team (ICST). 2007. Final conservation strategy for the grizzly bear in the Greater Yellowstone Area. 86 pp. plus Appendices. Website accessed May 2015. http://www.fws. gov/mountainprairie/species/mammals/grizzly/Final Conservation Strategy.pdf

Interagency Grizzly Bear Committee. 1986. Interagency Grizzly Bear Guidelines. Interagency Grizzly Bear Committee. 100 pp.

Interagency Grizzly Bear Study Team. 2011. Yellowstone grizzly bear investigations: annual report. U.S. Geological Survey, Bozeman, Montana, USA.

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, Montana, USA.

Interagency Grizzly Bear Study Team. 2013. Response of Yellowstone grizzly bears to changes in food resources: a synthesis. Report to the Interagency Grizzly Bear Committee and Yellowstone Ecosystem Subcommittee. Interagency Grizzly Bear Study Team, U.S. Geological Survey, Northern Rocky Mountain Science Center, Bozeman, Montana, USA.

Interagency Grizzly Bear Study Team. 2014a. Unpublished data from IGBST. On file, IGBST, Northern Rocky Mountain Science Center, U.S. Geological Survey, Bozeman, Montana, USA.

Interagency Grizzly Bear Study Team. 2014b. Preliminary population estimates of females with cubs-of-the-year. Yellowstone Ecosystem Subcommittee Meeting. Jackson, WY. Spring 2014.

Interagency Grizzly Bear Study Team. 2014c. Yellowstone grizzly bear investigations. Interagency Grizzly Bear Study Team, U.S. Geological Survey, Northern Rocky Mountain Science Center, Bozeman, Montana, USA.

Interagency Grizzly Bear Study Team. 2017. Yellowstone grizzly bear investigations. Interagency Grizzly Bear Study Team, U.S. Geological Survey, Northern Rocky Mountain Science Center, Bozeman, Montana, USA.

Jacoby, M. A., G. V. Hilderbrand, C. Servheen, C. C. Schwartz, S. M. Arthur, T. A. Hanley, C. T. Robbins, and R. Michener. 1999. Trophic relations of brown and black bears in several western North American ecosystems. Journal of Wildlife Management 63:921- 929.

Johnson, C.J., M.S. Boyce, C.C. Schwartz, and M.A. Haroldson. 2004. Modeling survival: application of the Anderson-Gill model to Yellowstone grizzly bears. Journal of Wildlife Management 68: 966-978.

Jonkel.C. P. Husby, R. Russell, and J. Beecham. 1980. The reintroduction of orphaned grizzly bear cubs into the wild. Bears: Their Biology and Management 4: 369-372.

Jonkel, C.J. and I. M. Cowan. 1971. The black bear in the spruce-fir forest. Wildlife Monograph 27. 57 pp.

Judd, S.L., R.R. Knight, and B.M. Blanchard. 1986. Denning of Grizzly Bears in the Yellowstone National Park Area Bears: Their Biology and Management. Vol. 6 A Selection of Papers from the Sixth International Conference on Bear Research and Management, Grand Canyon, Arizona, USA, pp. 111-117.

Kasworm, W.F., M. F. Proctor, C. Servheen, and D. Paetkau. 2007. Success of grizzly bear population augmentation in northwest Montana. Joumal of Wildlife Management 71:1261-1266.

Kamath, P.L., M.A. Haroldson, G. Luikart, D. Paetau, C. Whitman, and F. T. Van Manen. 2015. Multiple estimates of effective population size of monitoring a long-lived vertebrate: an application to Yellowstone grizzly bears. Molecular Ecology.

Kasworm, W. F., T.G. Radandt, J. E. Teisberg, A. Welander, M. Proctor, and H. Cooley. 2018a. Cabinet-Yaak grizzly bear recovery area 2017 research and monitoring progress report. U.S. Fish and Wildlife Service, Grizzly Bear Recovery Coordinator's Office, Missoula, MT.

Kasworm, W. F., T.G. Radandt, J. E. Teisberg, A. Welander, W. L. Wakkinen, M. Proctor, and H. Cooley. 2018b. Selkirk Mountains grizzly bear recovery area 2017 research and monitoring progress report. U.S. Fish and Wildlife Service, Grizzly Bear Recovery Coordinator's Office, Missoula, MT.

Kendall, K.C., J.B. Stetz, J. Boulanger, A.C. MacLeod, D. Paetkau, and G.C.White. 2009. Demography and genetic structure of a recovering grizzly bear population. Journal of Wildlife Management. 73(1):3-17.

Knight, R.R., B. M. Blanchard, and L.L. Eberhardt. 1995. Appraising status of the Yellowstone grizzly bear population by counting females with cubs-of-the-year. Wildlife Society Bulletin 23:245-248.

Knight, R. R., B. M. Blanchard, and L. L. Eberhardt. 1988. Mortality patterns and population sinks for Yellowstone grizzly bears, 1973-1985. Wildlife Society Bulletin 16:121-125.

Knight, R. R. and L. L. Eberhardt. 1985. Population dynamics of Yellowstone grizzly bears. Ecology 66 (2):323 -33 4.

Knight, R. R. and L. L. Eberhardt. 1984. Projected future abundance of the Yellowstone grizzly bear. Journal of Wildlife Management 48:1434-1438.

Knight, R. R., D. J. Mattson, and B. M. Blanchard. 1984. Movements and habitat use of the Yellowstone grizzly bear. Interagency Grizzly Bear Study Team, Montana State University, Bozeman, Montana.

Knight, R. R. and S. L. Judd. 1983. Grizzly bears that kill livestock. International Conference for Bear Research and Management 5:186-190.

Linnell, J. D. C., J. E. Swenson, R. Anderson, and B. Barnes. 2000. How vulnerable are denning bears to disturbance? Wildlife Society Bulletin 28(2):400-413.

Mace, R. and L. Roberts. 2011. Northern Continental Divide Ecosystem Grizzly Bear Monitoring Team Annual Report, 2009-2010. Montana Fish, Wildlife & Parks, 490 N. Meridian Road, Kalispell, MT 59901. Unpublished data.

Mace, R. D. and T. Chilton-Radandt. 2017. Northern continental Divide Ecosystem Bear Monitoring Tem Annual Report, 2016-2017. Montana Fish, Wildlife and Parks, 490 N. Meridian Road, Kalispell, MT 59901. Unpublished data.

Mattson, D. J., M. G. French, and S. P. French. 2002. Consumption of earthworms by Yellowstone grizzly bears. Ursus 13:105-110.

Mattson, D.J. and T. Merrill. 2002. Extirpations of grizzly bears in the contiguous United States, 1850-2000. Conservation Biology 16(4): 1123-1136.

Mattson, D. J. 2001. Myrmecophagy by Yellowstone grizzly bears. Canadian Journal of Zoology 79:779-793.

Mattson, D. J. and D. P. Reinhart. 1997. Excavation of red squirrel middens by grizzly bears in the whitebark pine zone. Journal of Applied Ecology 34:926-940.

Mattson, D.J., S. Herrero, R.G. Wright, and C.M. Pease. 1996. Science and Management of Rocky Mountain Grizzly Bears. Conservation Biology 10(4):1013-1025.

Mattson, D. J., and D. P. Reinhart 1995. Influences of cutthroat trout (Onchorhynchus clarki) on behavior and reproduction of Yellowstone grizzly bears (Ursus arctos) 1975-1989- Canadian Journal of Zoology 73:2072-2079.

Mattson, D. J., B. M Blanchard, and R. R. Knight. 1991. Food habits of Yellowstone grizzly bears, 1977 -1987. Canadian Journal Zoology 69:1619-1629.

Mattson, D. J., and R. R. Knight. 1991. Effects of access on human-caused mortality of Yellowstone grizzly bears. USDI National Park Service, Interagency Grizzly Bear Study Team Report 19918.

McArthur-Jope, K. L. 1980. Habituation of grizzly bears to people: A hypothesis. International Conference on Bear Research and Management 5:322-321.

Meagher, M and J.R. Phillips. 1983. Restoration of natural populations of grizzly and black bears in Yellowstone National Park. International Conference on Bear Research and Management 5:152-158.

McLellan, B. N. 1989. Relationships between human industrial activity and grizzly bears International Conference on Bear Research and Management 8:57-64.

McLellan B. N. and D. M. Shackleton. 1989. Immediate Reactions of Grizzly Bears to Human Activities Wildlife Society Bulletin 17 (3): 269-274.

McLellen, B.N. and Shackleton, D. M. 1988. A Comparison of Grizzly Bear Harvest Data from Montana and Southeastern British Columbia Wildlife Society Bulletin 16(4): 371-375.

Miller, C.R. and L.P. Waits. 2003. The history of effective population size and genetic diversity in the Yellowstone grizzly (Ursus arctos): Implications for conservation. Proceedings of the National Academy of Sciences 100(7):4334-4339.

Murphy, K. 2016. Upper Green River area rangeland project. Supplemental wildlife specialist report, federally listed species, sensitive amphibians, management indicator species. Bridger-Teton National Forest, Jackson Ranger District.

NCDE Subcommittee. 2018. Conservation strategy for the grizzly bear in the Northern Continental Divide Ecosystem. (170 pages + appendices).

North Cascades Grizzly Bear Recovery Team. 2004. Recovery plan for grizzly bears in the North Cascades of British Columbia. Ministry of Water, Land and Air Protection, Victoria, British Columbia, Canada.

Orme, M.L. and R.G. Williams. 1986. Coordinating livestock and timber management with the grizzly bear in situation 1 habitat, Targhee National Forest. Proceedings-Grizzly Bear Habitat Symposium, Missoula, Montana. General Technical Report 207: 195-203

Pearson, A.M. 1972. Population characteristics of the northern interior grizzly in the Yukon Territory, Canada. Pages 32-35 *in* S. Herrero, ed. Bears — Their biology and management. IUCN Publ. New Series 23. 37

Podruzny, S. and K. Gunther. 2001. Spring Ungulate Availability and Use by Grizzly Bears in Yellowstone National Park. Pages 33-36 in C. C. Schwartz and M. A. Haroldson, editors.

Yellowstone Grizzly Bear Investigations: Annual report of the Interagency Grizzly Bear Study Team, 2000. U.S. Geological Survey. Bozeman, MT.

Podruzny, S., S. Cherry, C. C. Schwartz, and L. A. Landenburger. 2002. Grizzly Bear Denning and Potential Conflict Areas in the Greater Yellowstone Ecosystem. Ursus 13:19-28.

Proctor, M.F., D. Paetkau, B. McLellan, G. Stenhouse, K. Kendall, R. Mace, W. Kasworm, C. Servheen, C. Lausen, M. Boyce, and C. Strobeck. 2012. Population fragmentation and inter-ecosystem movements of grizzly bears in western Canada and the northern USA. WildlifeMongraphs 180:1-46.

Pyare, S., S. Cain, D. Moody, C. Schwartz, and J. Berger. 2004. Carnivore re-colonization: reality, possibility, and a non-equilibrium century for grizzly bears in the southern Yellowstone Ecosystem. Animal Conservation: 1-7. As cited in: USFWS. 2005. Endangered and Threatened Wildlife and Plants; Designating the Greater Yellowstone Ecosystem Population of Grizzly Bears as a Distinct Population Segment; Removing the Yellowstone Distinct Population Segment of Grizzly Bears From the Federal List of Endangered and Threatened Wildlife; Proposed Rule. Federal Register 70 (22I):69854- 69884.

Reinhart, D. P., M. A. Haroldson, D. J. Mattson, and K. A. Gunther. 2001. Effects of exotic species on Yellowstone grizzly bears. Western North American Naturalist 61(3):227- 288.

Robbins, C.T., C.C. Schwartz, K.A. Gunther and C. Servheen. 2006. Grizzly bear nutrition and ecology studies in Yellowstone National Park. Yellowstone Science 14(3):19-26.

Robison, H.L., C.C. Schwartz, J.D. Petty, and P.F. Brussard. 2006. Assessment of pesticide residues in army cutworm moths (*Euxoa auxiliaris*) from the Greater Yellowstone Ecosystem and their potential consequences to foraging grizzly bears (*Ursus arctos horribilis)*. Chemosphere 64: 17 04-17 12.

Russell, R.H., J.W. Nolan, N.G. Woody, G. Anderson, and A.M. Pearson. 1978. A study of the grizzly bear (*Ursus arctos*) in Jasper National Park. Canada Wildlife Service, Edmonton. 95 pp.

Schwartz, C. C., M. A. Haroldson, K. A. Gunther, and D. Moody. 2002. Distribution of Grizzly Bears in the Greater Yellowstone Ecosystem,1990-2000. Ursus 13:203-212.

Schwartz, C.C., M.A. Haroldson, M.A., Cherry, S., and K.A. Keating. 2008. Evaluation of rules to distinguish unique female grizzly bears with cubs in Yellowstone. Journal of Wildlife Management 72:543-554.

Schwartz, C.C., M.A. Haroldson, K. West, editors. 2011. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2010. U.S. Geological Survey, Bozeman, Montana.

Schwartz, C. C., M. A. Haroldson, and G.C. White. 2010. Hazards affecting grizzly bear survival in the Greater Yellowstone Ecosystem. Journal of Wildlife Management. 74(4):654-657.

Schwartz,, C.C., M.A. Haroldson, G.C. White, R.B. Harris, S.Cherry, K.A. Keating, D. Moody, C. Servheen. 2006. Temporal, spatial, and environmental influences on the demographics of grizzly bears in the greater Yellowstone ecosystem. Wildlife Monographs 161(1):1-8.

Servheen, C. 1986. Habitat research needs for grizzly bear recovery. Pages 14-18 in: B.P. Contreras and K. E. Evans, eds. Proc. Grizzly Bear Habitat Symposium. U.S.D.A. For. Serv. Intermountain Res. Stat., Ogden, Utah, Gen. Tech. Rep. Int-207.

Stokes, A.W. 1970. An ethologist's views on managing grizzly bears. BioScience 20:1154- 1157.

Swenson, J. E., F. Sandegren, S. Brunberg, and P. Wabakken. 1997. Winter den abandonment by brown bears Ursus arctos: causes and consequences. Wildlife Biology 3(1):35-33.

USFWS. 1986. Interagency Cooperation - Endangered Species Act of 1973, as amended; Final Rule. Federal Register, June 3, 1986. Vol. 51, No. 106 [also see 50 Code of Federal Regulations Part 402].

USFWS. 1993. Grizzly bear recovery plan. U.S.D.I. Fish and Wildl. Serv., Missoula, Montana. 181pp.

USFWS. 2005. Endangered and threatened wildlife and plants; designating the Greater Yellowstone Ecosystem population of grizzly bears as a distinct population segment; removing the Yellowstone distinct population segment of grizzly bears from the Federal List of Endangered and Threatened Wildlife. Federal Register 70:69854-69883.

USFWS. 2007. Grizzly bear recovery plan supplement: revised demographic criteria for the Yellowstone Ecosystem. 72FR11377. Available at: http://www.fws.gov/mountain-prairie/species/mammals/grizzly/Grizzly_Bear_Recovery_Plan_Supplement_Demographic.pdf.

USFWS. 2007b. Revised demographic recovery criteria for the Yellowstone Ecosystem; supplement to the 1993 Grizzly Bear Recovery Plan. 34pp.

USFWS. 2011a. NCDE human-caused mortality issues – received March 2011. Unpublished report. U.S. Fish and Wildlife Service Grizzly Bear Recovery. Missoula, Montana.

USFWS. 2011b. Grizzly bear (*Ursus arctos horribilis*) 5-year review: summary and evaluation. Missoula, MT. 205 pp.

USFWS. 2013. Draft NCDE Grizzly Bear Conservation Strategy. April 2013. 148 pp

USFWS.2016. Draft 2016 conservation strategy for the grizzly bear in the greater Yellowstone ecosystem. U.S. Fish and Wildlife Service, Missoula, Montana, USA 128pp.

U.S. Forest Service. 2010. 2010 Amendment to the 1999 Biological Assessment for livestock grazing on the northern portion of the Pinedale Ranger District. On file, Pinedale Ranger District, Bridger-Teton National Forest, Pinedale, Wyoming, USA.

Wakkinen, W. L. 2010. Research and management update, Selkirk Ecosystem, Fall 2010. Update to the Selkirk and Cabinet-Yaak Ecosystem Subcommittee of the Interagency Grizzly Bear Committee. Dec. 1. 2 pp.

White Jr., D. D., Kendall, K. C., Picton, H. D. 1999. Potential energetic effects of mountain climbers on foraging grizzly bears. Wildlife Society Bulletin 27:146-151.

Wilson, S.M., M.J. Madel, D.J. Mattson, J.M. Graham, J.A. Burchfield and J.M. Belsky. 2005. Natural landscape features, human-related attractants, and conflict hotspots: a spatial analysis of human-grizzly bear conflicts. Ursus 16(1):117-129.

Wyoming Game and Fish Department (WGFD). 2016. Grizzly Bear Management Plan. 61pp.

WGFDa. 2016. Grizzly Bear conflict, relocations, and removal data for Park County, Wyoming. Personal Communication with Dan Thompson Large Carnivore Coordinator.

WGFD. 2005. Wyoming grizzly bear management plan. 50 pp.

(1) Livestock depredation will be reported to U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), and Wyoming Game and Fish Department (WGFD). Agency contact representatives and contact information will be identified annually prior to each grazing season. This Protocol must be followed for every removal event; however, reporting may be adjusted as needed.

The notification protocol for reporting depredation incidents will be as follows:

- Initial suspected depredations —Permittee and/or their employees (Rider) → WGFD Bear Specialist → USFS District Rep (designated by the Pinedale District Ranger).
- Confirmed livestock depredation and initiation of trapping sessions—WGFD Bear Specialist → Permittee + USFS District Rep → SO Forest Biologist.
- Bear capture events—WGFD Bear Specialist → FWS Rep + Permittee + USFS District Rep → SO Forest Biologist.
- Bear Removal events—WGFD Bear Specialist + FWS Rep → Permittee + USFS District Rep → SO Forest Biologist → FWS Consultation Bio.
- Bear Relocation events—WGFD Bear Specialist + FWS Rep → Permittee + USFS District Rep → SO Forest Biologist → FWS Consultation Bio + SO Forest Bio on Forest to which the bear was relocated.

(2) Annual meetings with representatives of the USFWS, BTNF, WGFD, and Upper Green River permittees to discuss the conservation measures and notification protocol summarized in #1 above will be held prior to each grazing season.

(3) Livestock depredations will be investigated and managed by WGFD or its authorized agent following the 2016 Wyoming Grizzly Bear Management Plan, or subsequent revisions.

(4) The Forest completed an assessment for the Grizzly Bear Habitat Security in 2014. The analysis will continue to identify areas within the Upper Green Project Area that currently provide for less than desirable grizzly bear security values as defined in the Grizzly Bear Conservation Strategy. This analysis may identify the locations of "user created" motorized routes not authorized for motorized uses in the current Travel Management Plan for the Pinedale Ranger District that could be physically closed or reclaimed to improve grizzly bear security habitat within the Upper Green Project area.

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Appendix B: USFWS Biological Opinion Terms and Conditions
Reporting Template (last updated: April 14, 2014)

Project Name:		**Formal Consultation # (e.g., WY12F0123):**	
Report Date (mm/dd/yyyy):		**Date Biological Opinion Issued by USFWS (mm/dd/yyyy):**	

Report Submitted by:		**Agency:**	
Contact Name:		**Phone #:**	
Email:			

Calendar Year(s) of Report (e.g., 2019):

Amount of Incidental Take (IT)				
Species Name	**Amount IT in Biological Opinion**	**Total Amount IT in Previous Report(s)**	**Amount IT for Current Reporting Period**	**Total (additive) IT for Project**

(1) Brief description and date of each lethal take for reporting year (e.g., 1 adult male grizzly bear lethally removed on 7/15/13 from XYZ allotment for on-going cattle depredations):

(2) Brief description of activities completed under Conservation Measures, Terms and Conditions, Reasonable and Prudent Measures (e.g., implementation and monitoring compliance of appropriate grazing regulations as described in the 2016 Specialist Report proposed action related to grazing activities on the Allotments and descriptions of violations, such as food storage or improper grazing practices):

(3) Identify which Conservation Measures (in Biological Opinion) unable to implement and brief description of why not:

(4) Additional information (e.g.: unforeseen events, new behaviors, new or emerging conflicts, large landscape changes, etc.: