Places for Grizzly Bears

A Blueprint for Restoration and Recovery in the Lower 48 States

DEFENDERS OF WILDLIFE

Defenders of Wildlife is dedicated to the protection and restoration of wild animals and plants in their natural communities. Founded in 1947, Defenders has more than 490,000 supporters nationwide.

ACKNOWLEDGEMENTS

Grizzly bear recovery would not be happening without the tireless work of many individuals on behalf of numerous organizations, state, tribal and federal agencies. Defenders of Wildlife is especially grateful for the work of Dr. Chris Servheen, grizzly bear recovery coordinator for the U.S. Fish and Wildlife Service; past and present members of the Interagency Grizzly Bear Committee and subcommittees; and grizzly bear management specialists for the Blackfeet and Confederated Salish and Kootenai Tribes, Idaho Fish and Game Department, Montana Fish, Wildife and Parks, Wyoming Game and Fish Department and Yellowstone and Glacier national parks. Were it not for their efforts, the grizzly bear may have disappeared from the lower 48 states forever.

AUTHOR

Minette Johnson, Northern Rockies Representative

GRIZZLY BEAR POLICY TEAM

Jamie Rappaport Clark, Executive Vice President
Nina Fascione, Vice President, Field Conservation
Chris Haney, Conservation Scientist
Robert Irvin, Senior Vice President, Conservation Programs
Brian Segee, Staff Attorney
Michael P. Senatore, Vice President, Conservation Litigation
Amaroq Weiss, Director, Western Species Conservation

EDITORIAL TEAM

Editor: Heidi Ridgley
Art Director: Jen Lee
Photo Editor: Krista Schlyer

MAPS

International Mapping

1130 17th Street, NW
Washington, D.C. 20036
(202) 682-9400
www.defenders.org

Cover Photo: A female grizzly bear in Yellowstone National Park. © Jess Lee/jessleephotos.com

FSC

Recycled
Supporting responsible use of forest resources

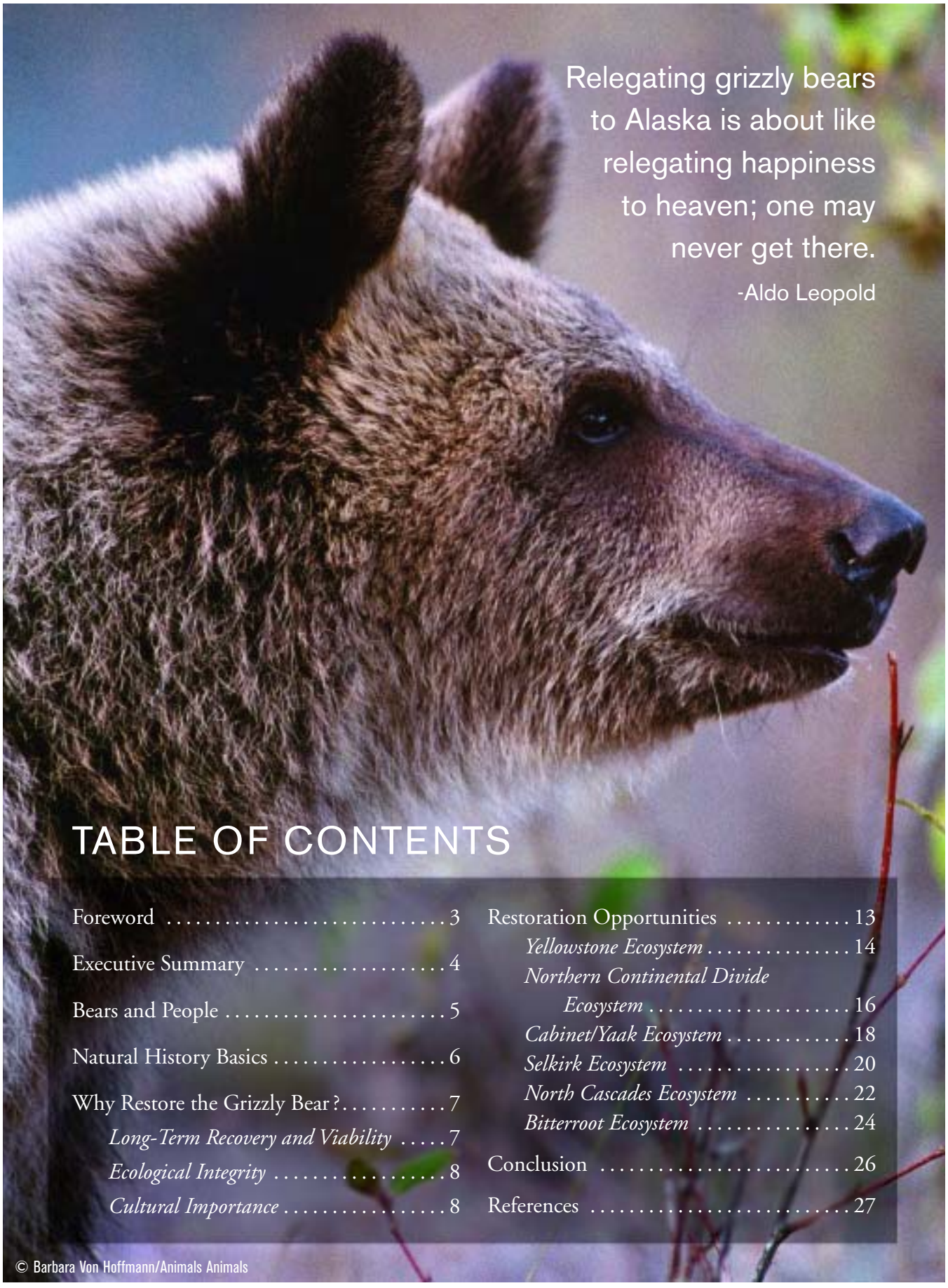
Cert. no. SCS-COC-00635
www.fsc.org
©1996 Forest Stewardship Council

Printed by Monroe Litho

Printed on 100% post-consumer-waste, process-chlorine-free recycled paper manufactured with wind power, creating the following environmental benefits: 15 trees not cut down; 6,525 gallons of water/waste flow saved; 692 pounds of solid waste not generated; 1,353 pounds of atmospheric emissions eliminated; 8,841,632 Btus of energy not consumed; 191 pounds of air emissions not generated.

Places for Grizzly Bears

A Blueprint for Restoration and Recovery in the Lower 48 States



Relegating grizzly bears to Alaska is about like relegating happiness to heaven; one may never get there.

-Aldo Leopold

TABLE OF CONTENTS

Foreword

Defenders of Wildlife has been a leader in grizzly bear conservation since grizzlies were first listed as threatened under the Endangered Species Act in 1975. In recent years, Defenders has worked to encourage grizzly bear recovery in the Yellowstone and northern Continental Divide ecosystems and to bolster efforts to increase populations elsewhere in the lower 48 states. Our efforts are crucial, as grizzlies have been reduced to a mere 2 percent of their historic range in these states, and only two relatively healthy populations remain in the five areas where they still roam. Recovery of this important species represents a major step in restoring ecological imbalances and repairing errors in public policy.

Female grizzly bear and cubs in Yellowstone National Park | © Erwin and Peggy Bauer/Wildstock

Defenders is working to ensure that the livestock industry does not bear the full burden of restoring grizzly bears in the northern Rockies. To reduce the economic hardship that can result when grizzly bears kill livestock, Defenders pays full market value to the livestock owner for each verified loss. Defenders established a grizzly bear compensation fund in 1997 and has paid more than $122,000 to livestock growers for cattle and sheep losses (see sidebar on page 10).

The compensation fund has built tolerance for grizzly bear recovery, reducing the chance that individuals resort to a "shoot, shovel and shut up" solution. Its limitation is that it addresses the problem after the damage occurs and only deals with livestock depredations. For this reason, Defenders created The Bailey Wildlife Foundation Proactive Carnivore Conservation Fund to cost-share with private individuals, corporations and state, tribal and federal agencies on tangible projects to prevent conflicts between bears and humans. Since establishing the fund in 1999, Defenders has invested $232,000 in 63 cooperative projects throughout the northern Rockies (see sidebar on page 12).

In *Places for Grizzly Bears,* Defenders of Wildlife highlights additional opportunities for grizzly bear conservation that can assure the continued survival of this magnificent creature well into the future. The U.S. Fish and Wildlife Service (FWS) has identified six recovery zones for grizzly bears in the lower 48 states (FWS 1993). The time is ripe to use the lessons learned from grizzly recovery efforts in the Yellowstone ecosystem as a foundation for speeding up efforts to establish viable populations in all places with the potential to support bears. *Places for Grizzly Bears* provides an assessment of the state of bears in each of the recovery zones and sets out clear directives for bringing bears back where they belong.

Executive Summary

In early 2006, for the first time, the Department of the Interior proposed to remove a population of grizzlies from the list of threatened and endangered species. To some, this was a triumph of phenomenal proportions, proof that the Endangered Species Act works to recover our nation's most treasured wildlife. To others, it was an abandonment of a population of bears that still desperately needs protection. For many, it was a combination of the two.

The move to de-list the grizzly bears in the Yellowstone ecosystem comes after more than 30 years of intensive management. With efforts by federal agencies to prevent habitat degradation, states zeroing in on reducing human-bear conflicts and National Park Service strategies to keep bears from gaining access to garbage and hand-outs by visitors, the bear population has increased threefold. Populations have grown from a low of 200 bears in 1975 when they were first listed as threatened to 600 today (Interagency Grizzly Bear Study Team 2005). Grizzly bear numbers in the northern Continental Divide also appear to be on the rise thanks to habitat protections. The potential contribution of adjacent populations in Alberta, Canada, is uncertain, as grizzlies in that province have been recommended for "threatened" status.

But the future is unclear for other populations of the grizzly bear. Proposed oil and gas drilling near Glacier National Park could jeopardize this rebounding population. Smaller populations in the Cabinet/Yaak, Selkirk and North Cascades ecosystems are hanging by a thread, and the Bush administration in 2001 ignored a proposal developed by citizens of Montana and Idaho, as well as more than 26,000 comments from across the nation supporting restoration of bears to public lands in the Bitterroot ecosystem of central Idaho and western Montana.

Achieving true long-term conservation of grizzly bears in the lower 48 states will require protecting existing populations, augmenting smaller ones and actively reintroducing bears to places like the Bitterroot ecosystem.

Defenders believes that achieving true long-term conservation of grizzly bears in the lower 48 states will require protecting existing populations, augmenting smaller ones and actively reintroducing bears to places like the Bitterroot ecosystem, with more than 5,600 square miles (14,500 square kilometers) of potential habitat and a minimal chance of conflicts. Ultimately, the fate of grizzly bears depends on linking existing populations to provide crucial genetic interchange. The establishment of several viable populations of grizzly bears in a greater portion of their historical range should be the standard by which recovery is judged. Consequently, Defenders urges the U.S. Fish and Wildlife Service to:

- Ensure strong, long-term habitat protections in the Greater Yellowstone ecosystem.
- Reduce human-caused mortality—particularly illegal killings—of bears in the northern Continental Divide ecosystem.
- Cooperate with Montana Fish, Wildlife and Parks to put more bears in the Cabinet/Yaak ecosystem.
- Work hand in hand with the provincial authorities in British Columbia to boost bear populations in the Selkirk ecosystem.
- Initiate an environmental assessment and outline actions and a timeline for active recovery of grizzly bears in the North Cascades ecosystem.
- Reintroduce grizzly bears to the Bitterroot ecosystem of central Idaho.
- Work closely with states and provincial governments in Canada to maintain and encourage connectivity among bear populations.

To restore grizzly bears successfully, there must also be an ambitious program by state, tribal and federal agencies and conservation organizations to develop an understanding and tolerance of bears among people residing in and near recovery areas.

BEARS AND PEOPLE

When North America was first inhabited by Anglo-Europeans, it is estimated that as many as 50,000 grizzly bears (Servheen 1999) ranged across the West—from Alaska south to central Mexico and from California to the Great Plains (Roosevelt 1907, Wright 1909, Dobie 1950, Storer and Tevis 1955, Rausch 1963, Herrerro 1972, Mattson et. al 1995, Schwartz et. al 2003a). European settlers were less tolerant of the great beasts than native peoples and grizzly bears were shot, poisoned and trapped wherever they were found. The resulting population declines were precipitous. By the 1930s, grizzly bear populations were reduced to less than 2 percent of their historic range (FWS 1993, Mattson et. al 1995, Servheen 1999).

The shift from hunting and gathering to agrarian ways of life brought many different cultures into conflicts with predators. Where bears had once hunted only wild game, they were now a direct threat to the livelihood of humans if they killed sheep, goats or cattle raised for food. With the arrival of pioneers in the West in the late 1800s, settlers began a concerted campaign to rid the prairies and forests of grizzly bears to make way for livestock. Of the 37 populations that still remained in 1922, 31 were extirpated by 1975 (Servheen 1999). At that time several hundred bears occurred in the Yellowstone and northern Continental Divide ecosystems, while grizzlies barely held on in the Cabinet/Yaak, Selkirk and North Cascades.

Recognizing the dire state of the grizzly bear, the U.S. Fish and Wildlife Service listed it as a threatened species under the Endangered Species Act (ESA) in 1975. In 1982, FWS completed the first Grizzly Bear Recovery Plan, which identified five ecosystems within the coterminous United States where grizzly bears were thought to remain (FWS 1982). Shortly thereafter, an Interagency Grizzly Bear Committee was established to move recovery forward. Composed of representatives from state and federal agencies, it meets regularly to revisit the goals of the recovery plan, which was updated in 1993. In addition, subcommittees have been established to focus more closely on the specifics in each recovery zone.

Today, thanks to ESA protections, concerted efforts by conservation organizations and agencies and the general shift in public attitudes from persecution to conservation of predators, grizzly bears are recovering. In fact, FWS is proposing to remove federal protections for the Yellowstone ecosystem population and leave management to the states of Montana, Wyoming and Idaho. While Defenders of Wildlife and others believe that delisting is premature until long-term protection of the bear's habitat is in place, there is no question that the grizzly bear is making a remarkable comeback.

A symbol of our nation's heritage, the grizzly bear is also an umbrella species—an animal that helps gauge an ecosystem's health because of its habitat requirements and large home range. If there is enough good habitat to support a grizzly, it is likely that the other less sensitive species have what they need to survive. Conversely, declining bear populations often signal that an ecosystem is in decline. By restoring this incredible creature we demonstrate our commitment to protect and conserve the natural world around us.

European settlers shot, poisoned and trapped grizzlies until the great bears were reduced to only 2 percent of their historic range. | © Michael Maslan Historic Photographs/CORBIS

NATURAL HISTORY BASICS

The recovery of grizzly bears presents a challenge for reasons related to their natural history. One of the most important considerations for those working to conserve this unique animal is the grizzly bear's reproductive rate. Besides the musk ox, the grizzly is the slowest reproducing land mammal in North America. They breed late with long intervals and have small litters (Bunnell and Tait 1981). Female grizzly bears usually do not have their first cub until they are four to seven years old (Craighead and Mitchell 1982). They average two cubs born in late January or early February while they hibernate. After the cubs emerge in spring, they may remain with their mother for two to four years. She will not breed again until they leave her side. As a result, it may take a female 10 years to replace herself in the population (FWS 1993). For this reason, conservation efforts have focused on protecting breeding-age females.

Another factor that makes grizzly conservation complicated is that these omnivores are eating machines. Most of a grizzly bear's life is spent in search of a diverse array of food, aided by a remarkable sense of smell and incredibly dexterous foreclaws. Scientists estimate that a grizzly bear can smell an animal carcass from miles away. They are skilled at hunting elk, catching fish, picking berries and digging roots with their four-inch front claws. Grizzly bears also have incredible strength and can move huge boulders to get the insects underneath. These qualities, however, can work against them. Their excellent sense of smell can lead them to non-natural foods, such as human garbage, dog food or backyard bird feeders, and their strength and long claws enable them to pry open garbage containers, coolers and freezers. Some bears have even learned how to open car doors and windows. Unfortunately, grizzly bears can quickly become accustomed to these food sources, which may bring them into close contact with humans. On occasion, efforts are made to prevent these bears from getting habituated to humans or to relocate the bears elsewhere, but more often than not, the behavior to search for non-natural foods has become too ingrained and managers have to kill these bears.

One of the most unusual characteristics of bears is what takes place during hibernation between November and March or April. Bears can spend as long as seven months without eating, drinking, urinating or defecating (Folk et. al 1976, Nelson 1980). Because bears sleep most of winter, they must consume as much food as possible to build up their fat reserves before they enter their dens. Bears may gain as much as three pounds a day while in this phase, called "hyperphagia" (Craighead and Mitchell 1982). The fat reserves provide crucial energy to keep the bear alive. It also provides insulation from the cold. Unlike other mammals, bears do not wake up during hibernation to feed or excrete waste. They live off their reserves and recycle their wastes. Some bears may lose a third of their body mass during hibernation (Hilderbrand et. al 2000). In addition, unlike sedentary humans, bears do not lose bone mass. But when the bears do wake up, they are ravenous. An increase in conflicts with people often results soon after bears leave their dens.

Left: Grizzly bear claws | © Erwin and Peggy Bauer/Animals Animals
Right: Yellowstone grizzly bear turning over rock in search of insects | © Jeff Henry/Roche Jaune Pictures

WHY RESTORE THE GRIZZLY BEAR?

Grizzly cub eating cattail in Glacier National Park | © Joe McDonald/Animals Animals (captive)

We should restore the grizzly bear for three reasons: for the bear's own sake, for the health of our environment and for the benefit of all Americans. First, the grizzly bear is an American icon, and it is our responsibility to do our best to restore it to as much of its former range as we can. Second, grizzly restoration is necessary to maintain the health of native ecosystems. Third, continuing grizzly bear restoration makes the economic, recreational, spiritual and aesthetic benefits of wild bear populations available to as many Americans as possible. For these reasons, Defenders wants to realize the widest practical restoration of grizzly bears in the lower 48 states.

Long-Term Recovery and Viability

The long-term survival of any species depends on the size, number and connectivity of its populations: the larger and more connected, the better the bears will survive when faced with natural disasters, disease or food shortages. It is likely that the two populations of grizzly bears that appear to be approaching sustainable levels in the lower 48 states are nevertheless still imperiled because they are disconnected and thus more susceptible to being harmed by a catastrophic event. There are also a number of fundamental differences between ecosystems, and it is important to the future of the grizzly bear that it be represented in as many of its historic habitat types as possible.

Even after 30 years of protection under the Endangered Species Act, there are still probably only 1,000 to 1,200 grizzly bears south of the Canadian border. Further, the United States can no longer rely on Canadian populations in Alberta and British Columbia to serve as source populations for U.S. bears. Grizzly bears there are now in decline and the Alberta population has been recommended for "threatened" status. Defenders believes that the U.S. Fish and Wildlife Service and other land and wildlife management agencies have made significant progress in restoring grizzly bears to a portion of their historic range, but it is only a beginning. Much remains to be accomplished to assure that our children and grandchildren will be able to enjoy and appreciate this noble symbol of America's natural heritage.

Ecological Integrity

Predators play an essential role in maintaining the health of ecosystems. By weeding out mostly aged, sickly and injured individuals, grizzly bears help keep ungulate populations healthy and vigorous. For example, by limiting populations of large herbivores such as elk, grizzly bears help maintain biodiversity. When deer or elk become too numerous they can overgraze plant species. The resulting degradation of the habitat can have negative impacts on other species (Terborgh 1988). Scientific studies also suggest that grizzly bears are crucial in circulating nutrients. In areas where they consume large amounts of salmon, grizzly bears spread nutrients by excreting nitrogen to soils far from the locations where the fish are consumed (Hildebrand et. al 1999).

Cultural Importance

The cultural importance of grizzly bears ranges from the economic to the spiritual. The native people of the West often had close ties to the grizzly bear. For many, the bears were considered brothers because they are similar to humans in so many ways—both stand upright, have similar skeletal structure, care for their young for years and eat a wide variety of foods. Many Plains people considered the bear a healer, having witnessed bears digging medicinal roots. They incorporated the grizzly bear into their life with bear dances, bear societies and stories of bears saving humans. They also used bear parts in healing. The grizzly bear was admired for its strength and courage. The Blackfeet tribe had a rigorous ceremony to pass on a bear jaw knife. Only an exceptional individual could survive this ordeal. Many great warriors painted grizzly bears on their shields, and the possession of a bear claw necklace was the mark of a prominent leader (Rockwell 1991).

Many people today consider the grizzly bear a symbol of wilderness. If a place is healthy enough to support bears, then it must be truly wild. People travel long distances and invest considerable amounts in local economies in hope of seeing a grizzly bear. When Yellowstone visitors are asked to rank wildlife species they most hope to see, grizzly bears are consistently number one, ahead of wolves, buffalo and elk. Many Americans also sense the appeal of living near these great beasts, as evidenced by the fact

People watching grizzly bears in Yellowstone National Park | © Jess Lee/jessleephotos.com

Yearling grizzly bears playing in Yellowstone National Park | © Tom and Pat Leeson

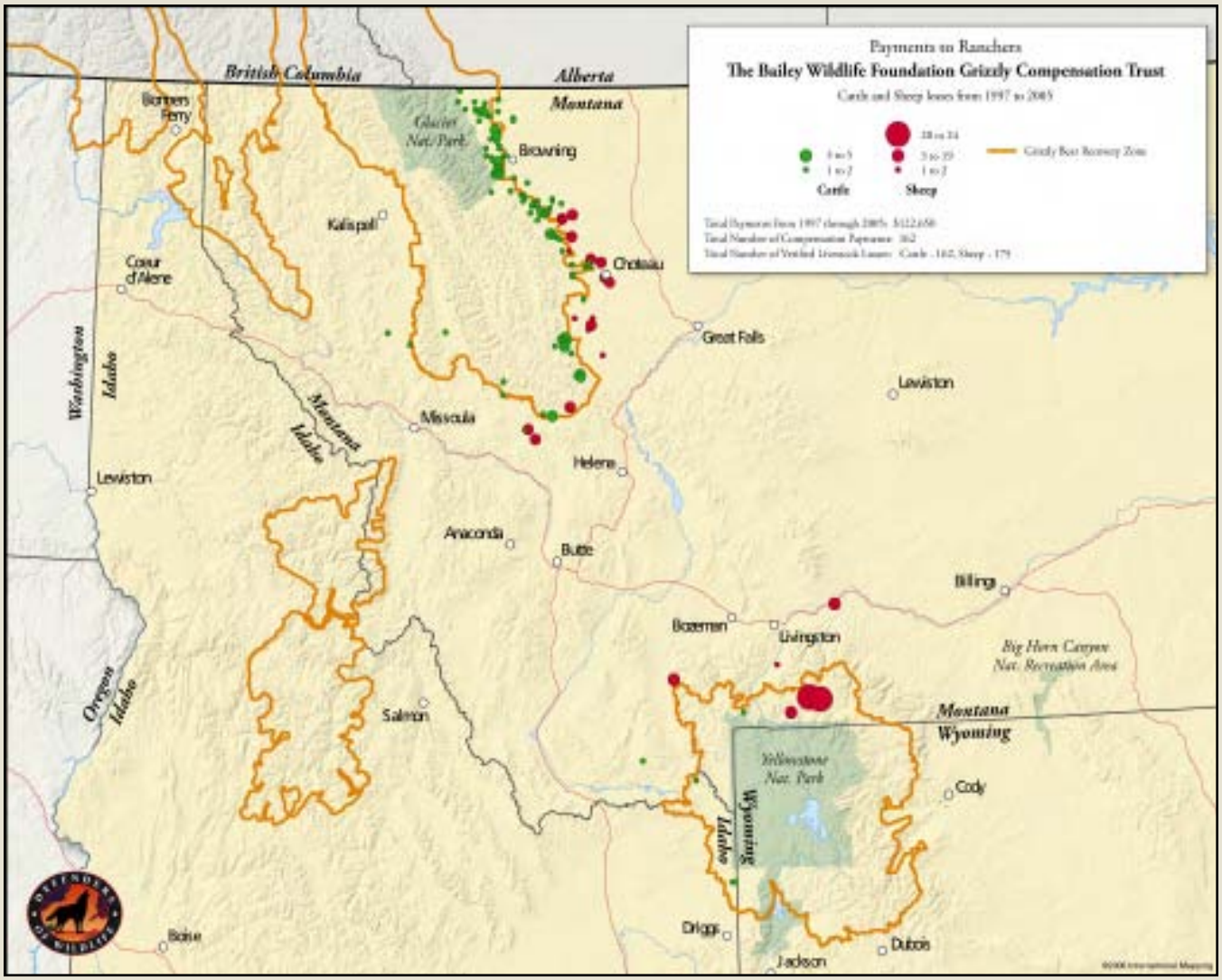
that the fastest growing counties in Montana are those adjacent to grizzly bear populations.

The positive contribution of grizzly bears to local economies far outweighs their negative impacts on the livestock industry. Opponents of grizzly bear recovery have often argued that grizzly bears kill too many livestock, causing ranchers and sheep growers financial hardship. The reality is that grizzly bears kill few cattle and sheep.

Since 1999, when Defenders began paying for livestock depredations in all of Idaho and Montana (the state of Wyoming has its own compensation program), grizzly bears have killed 130 cattle (as of February 2006). This is a tiny percentage of Montana's cattle population alone, which in 2006 exceeded 2.4 million head. A single spring storm in 1997 killed nearly 8,000 cattle, 50 times the total number of cattle killed by grizzly bears between 1999 and 2005. In 2005, sheep growers in Montana reported losing 12,000 sheep—only 10 were verified kills by grizzly bears (U.S. Department of Agriculture 2006). Each year, grizzly bears kill an average of 18 cattle and 18 sheep in Idaho and Montana combined. While these losses can have an impact on individual ranchers, the economic impact of the loss is mitigated by The Bailey Wildlife Foundation Grizzly Bear Compensation Trust (see sidebar on page 10), which has paid more than $122,000 to ranchers for cattle and sheep losses since 1997.

Many people today consider the grizzly bear a symbol of wilderness. If a place is healthy enough to support bears, then it must be truly wild.

Given the ecological, economic and spiritual benefits of restoring grizzly bears, it is no wonder that polls conducted throughout the nation show strong support for their recovery. For example, a 2005 poll of residents in Whatcom and Skagit counties in Washington showed that 79 percent supported grizzly recovery in the North Cascades (Davis and Morgan 2005).



DEFENDERS' COMPENSATION FUND: Building tolerance for grizzlies

By taking responsibility for the occasional problems that grizzly bears cause, Defenders of Wildlife hopes to increase landowner tolerance for bears, reduce mortality and improve recovery prospects. Defenders' grizzly compensation program covers the entire northern Continental Divide ecosystem, which includes Glacier National Park, adjoining national forest lands and the Blackfeet and Flathead Indian reservations. It also includes the Selkirk, Cabinet/Yaak, Bitterroot and North Cascades ecosystems as well as the Idaho and Montana portions of the Yellowstone ecosystem and the Wind River Indian Reservation. From 1997 to 2005, Defenders paid ranchers $122,650 for cattle and sheep losses. Thanks to a significant contribution, the fund was renamed The Bailey Wildlife Foundation Compensation Trust in 2000.

Defenders' goal is to shift the economic responsibility for grizzly bear recovery away from individual ranchers and toward the millions of people in the United States who want to see bears restored. When livestock producers are forced to bear the cost of bear recovery, it creates ill will toward grizzlies that can result in illegal killing.

The way the program works is simple. Once federal, tribal or state wildlife officials or animal damage control experts verify a grizzly bear kill, Defenders ascertains the current market value of the livestock and tries to send the landowner a check within two weeks. Defenders also pays 50 percent of the value of livestock that was probably killed by a grizzly bear but cannot be verified as a confirmed loss, and pays full-market value for calves and lambs killed in spring or summer.

Grizzly bear in Yellowstone National Park | © Jess Lee/jessleephotos.com

Grizzly bears are excellent at getting access to garbage and this is a source of conflict with people. Defenders of Wildlife purchased this bear-resistant dumpster (insert) for a community near Glacier National Park where bears had been regularly walking through town in search of easily accessible garbage. Before putting new containers into use, Defenders tests their effectiveness on captive bears. This container (left) failed the test. | **Above left:** © Jeff Henry/Roche Jaune Pictures
Insert: © Minette Johnson/Defenders of Wildlife

PREVENTING CONFLICTS

For grizzly bears to recover in the lower 48 states human-caused bear deaths must be minimized. Fortunately, we can limit the likelihood of problems with humans in a variety of ways. Since 1997, Defenders has been working in cooperation with private landowners, corporations and state, tribal and federal officials on preventive measures to reduce conflicts between grizzly bears and humans and to encourage grizzly bear recovery. We established The Bailey Wildlife Foundation Proactive Carnivore Conservation Fund to share the costs of hands-on projects that keep bears alive. To date, we have invested $232,674 in 63 different projects. The goals of the fund are to reduce conflicts between grizzly bears and humans, increase tolerance for bears across the landscape and keep bears from being killed.

Defenders collaborates on a range of approaches including: building electric fences to protect cattle, sheep and bee yards; purchasing bear-resistant dumpsters and bins; funding “aversive conditioning” to teach bears to associate proximity to humans with a negative experience; buying bear-resistant panniers and electric fencing kits for loan to guides and outfitters, which enable them to keep a clean camp; and providing financial incentives that encourage ranchers on public lands experiencing chronic livestock depredation to move to another allotment with fewer problems, while Defenders works to secure the allotment as wildlife habitat.

RESTORATION OPPORTUNITIES

Reestablishing healthy, resilient, connected grizzly bear populations necessary for the long-term survival of the species means taking steps to ensure that those that exist continue to expand, that smaller populations increase to viable levels and that bears be restored to areas of suitable habitat where they are currently absent. Efforts must also be focused on connecting U.S. grizzlies with those in Canada to foster the genetic exchanges needed to keep the species healthy.

The grizzly bear is well on its way to recovery in the Yellowstone ecosystem and from all indications seems to be increasing in the northern Continental Divide ecosystem. However, high human-caused mortality in both these areas will require continued work to reduce conflicts so these populations remain on the upswing.

Grizzly bear populations in the Cabinet/Yaak ecosystem of northwestern Montana and northeastern Idaho, the Selkirk ecosystem of northwestern Idaho and northeastern Washington, and the North Cascades ecosystem of Washington all have perilously few grizzly bears. In the Cabinet/Yaak there may be 30 to 40 grizzly bears in two disconnected subpopulations. The Selkirks may have 40 to 50. No grizzly bears have been identified in the North Cascades in the last decade, although a few may still remain in the remote reaches of the park. To keep these populations from disappearing forever, all three ecosystems need more bears.

The Bitterroot ecosystem, a 5,600-square-mile (14,500 square-kilometer) area in central Idaho bordering Montana, contains the largest remaining expanse of suitable bear habitat that is not already occupied by grizzly bears. A plan for reintroducing grizzlies that enjoyed a broad base of support was proposed in 2000 by the U.S. Fish and Wildlife Service. Unfortunately, former Interior Secretary Gale Norton refused to follow the advice of FWS and bowed instead to pressure from former Idaho Governor Dirk Kempthorne to kill the plan. As a result, a project that could triple the amount of occupied grizzly bear habitat and connect existing bear populations is currently on the backburner and likely to remain there with the appointment of Kempthorne as Norton's successor at the Interior Department.

Following are discussions of the six places in the lower 48 states with the greatest potential to have thriving grizzly bear populations. The accompanying maps provide an overview of specific sites. Each area has its unique challenges but the common thread is that all provide sufficient habitat, security and food for the great beast we call the grizzly.

Places for Grizzlies: Present and proposed recovery areas

Shaded arrows indicates distance between recovery zones.

YELLOWSTONE ECOSYSTEM

Background

The Yellowstone ecosystem includes 9,200 square miles (24,000 square kilometers) in northwestern Wyoming, eastern Idaho and southwest Montana. Yellowstone National Park is considered by many Americans as the quintessential place for grizzly bears. Photographs taken in the 1950s of roadside bears begging food from vehicles and grizzlies eating garbage as visitors watched from nearby stands are familiar to many. But in truth, the Yellowstone grizzly bear came frighteningly close to disappearing. With the closure of the dumps and the end of artificial feeding in the 1960s, grizzly bear populations in the park plummeted. Concern about that situation prompted FWS to list the bear as a threatened species in 1975.

Site-Specific Natural History

The Yellowstone population of grizzly bears is the most studied bear population on Earth. The Interagency Grizzly Bear Study Team has monitored population trends, reproduction, survival and habitat since 1973. During that time they have documented a number of characteristics that make the Yellowstone grizzly distinct from others. Most notable are its food habits. Unlike other bears in the lower 48 states, the Yellowstone grizzly eats a great deal of meat because there is so much prey available. On average, meat constitutes 75 percent of the diet of an adult male and 45 percent of the diet of an adult female (Jacoby et. al 1999). Grizzly bears feed on winter-killed buffalo, elk and deer carcasses from March through May and concentrate on elk calves in June. (Gunther and Renkin 1990, Green et. al 1997, Mattson 1997). Some bears shift their feeding to spawning cutthroat trout during early summer (Haroldson et. al 2005). In the late summer and early fall, army cutworm moths become an important food source, serving as a high-caloric food eaten by bears (Mattson et. al 1991b, French et. al 1994). A foraging bear can eat 40,000 moths a day (White et. al 1999). In the fall, when bears need to put on as much weight as possible before hibernation, whitebark pine nuts are a vital source of fat (Mattson and Jonkel 1990, Mattson et. al 1991a). The production and availability of all of these foods can have an impact on the reproduction and survival of Yellowstone's grizzlies (Mattson et. al 2002).

Current Status

Today, through the aggressive efforts of the National Park Service to keep bears from gaining access to non-natural foods, the work of federal agencies to protect habitat and state efforts to reduce conflicts, the Yellowstone grizzly is on the rebound. Current population estimates suggest that about 600 bears now live in the Yellowstone ecosystem, up from 229 individuals in 1975. The Yellowstone ecosystem consists of more than 5.8 million acres—the "primary conservation area"—with two parks at its core and an additional 6 million acres of suitable habitat on U.S. Forest Service lands. Because the Yellowstone population has met and exceeded the goals set out in the recovery plan, FWS is proposing to remove the Yellowstone population from the endangered species list. The states of Montana, Idaho and Wyoming have written and approved management plans discussing how grizzly bears will be managed in each state.

As part of the requirements for de-listing, federal agencies have worked to craft a conservation strategy that outlines protections, research and monitoring in the Yellowstone ecosystem after federal protection is removed. The U.S. Forest Service and National Park Service are incorporating the recommendations from this document into their management plans. However, because of changes adopted by the Bush administration to national forest management regulations, Defenders is concerned that continued protection of grizzly bear habitat is not assured. Consequently, Defenders has opposed the de-listing of the Yellowstone population until such assurances are in place.

Hayden Valley, Yellowstone National Park | © John Elk, III

Threats

While degradation of habitat is always a concern for wildlife, the Yellowstone ecosystem encompasses two national parks that serve as a core of secure habitat for grizzly bears. Continued vigilance will be necessary to ensure that lands adjacent to the park are not degraded by road-building, logging, or oil and gas exploration and development.

The primary threat to continued grizzly bear recovery in Yellowstone is human-caused mortality. From 1973 to 2004, 73 percent of the known grizzly bear deaths were human-caused (Haroldson and Frey 2003, Haroldson and Frey 2005). These include instances when bears came into conflicts with people over non-natural foods and had to be euthanized by managers, mistaken identification (when a grizzly bear was shot by a hunter who thought it was a black bear), vandal killings and self-defense by hunters who felt threatened.

Future Actions Needed

- Reduce human-caused mortality through education and on-the-ground projects to prevent conflicts between bears and humans.
- Maintain adequate secure habitat by keeping existing road densities low, maintaining developments at existing levels, reducing timber harvest and preventing oil and gas exploration in key areas.
- Ensure that funds are available to implement the state management plans and conservation strategy.
- Eliminate livestock allotments from occupied grizzly bear habitat—and potential habitat south of the ecosystem—by negotiating with willing sellers.

NORTHERN CONTINENTAL DIVIDE ECOSYSTEM

Background

The second region in the lower 48 states where the grizzly population appears to be increasing is the northern Continental Divide ecosystem, which includes Glacier National Park, several national forests and reservations of the Blackfeet and Confederated Salish and Kootenai Indian tribes. Located in the northwest corner of Montana, the area includes 9,600 square miles (25,000 square kilometers) of primarily forested habitat. The bear population—between 400 and 600—appears linked to the existing bear populations in Alberta, although a major highway through Crowsnest Pass, natural resource extraction and unregulated road access threaten to sever this connection.

Recently, the U.S. Geological Survey launched a research program to determine how many grizzly bears range in the northern Continental Divide ecosystem. By placing an odorous

lure inside a 400-square-foot area surrounded with two-foot-high barbed wire, scientists were able to collect grizzly bear hairs and, through DNA analysis, determine how many individual bears enter the "traps." The study was conducted over 8 million acres and gathered 33,739 different samples in 2004. By the winter of 2006 researchers should have an accurate population estimate. Montana Fish, Wildlife and Parks is also undertaking a study to monitor bear numbers, reproduction and mortality to ascertain whether the population is stable, increasing or decreasing.

Site-Specific Natural History

Historically, grizzly bears roamed more than mountains and forests. They also inhabited the Great Plains. The northern Continental Divide ecosystem is the one place in the lower 48 states where bears can once again be seen in the prairies, ranging far beyond the recovery zone boundaries on the east along the Rocky Mountain Front and the Blackfeet Indian Reservation. Unlike in Yellowstone, bears in this ecosystem eat little meat—95 percent of a grizzly's diet in Glacier National Park is plant-based (Jacoby et. al 1999). In the spring, bears eat elk and moose and the roots of various plants, later shifting to grasses and forbs (McClellan and Hovey 1995). In summer and fall, they can spend 50 percent of their day eating berries (Welch et. al 1997).

Current Status

Recognizing that much of Montana is suitable grizzly bear habitat, the state is developing a management plan for grizzly bears in western Montana. Montana Fish, Wildlife and Parks is holding meetings with the public and other interested parties to craft the plan, which is expected to be completed by December 2006. In addition, state and federal agencies are currently composing a conservation plan to discuss how the bear would be managed within the recovery zone should federal protections be removed.

Threats

Although the population in the northern Continental Divide ecosystem seems to be increasing, an alarming number of human-caused mortalities have occurred there recently. In 2005, 25 grizzly bears were killed. In 2004, 34 bears died. These numbers are the highest in three decades. Particularly worrisome is the fact that 21 of the bears were killed illegally (*Great Falls Tribune* 2006).

Another threat to the bears' recovery is the attempt to open the Rocky Mountain Front to oil and gas drilling. Despite efforts to reduce conflicts elsewhere, the habitat destruction that would result from the roads and oil rigs necessary for large-scale resource extraction in crucial bear habitat would almost certainly result in the deaths and displacement of grizzlies. In the past, 63 percent of the grizzly bear deaths on the Rocky Mountain Front were less than a mile from the nearest road (Aune and Kasworm 1989).

Just across the border in the Canadian portion of the ecosystem, a mining proposal in the Flathead Valley of British Columbia could severely degrade grizzly bear habitat. And in southern Alberta, the Grizzly Bear Recovery Plan (2005) identifies conflicts with cattle ranching, recreational and industrial development, residential growth and high human-caused mortality as threats to the grizzly population.

Future Actions Needed

- Ensure that long-term funding is in place to complete the trend-monitoring survey to determine whether this population is increasing, decreasing or stable.
- Reduce human-caused mortality through:
  - Completing concrete projects, such as building protective electric fence around livestock and bee yards, and purchasing bear-resistant containers to keep garbage from bears to reduce conflicts;
  - Informing residents about actions they can take to prevent bears from getting access to human garbage, pet food, bird food and other non-natural foods that may attract bears;
  - Monitoring grizzly bear movements through GPS technology to detect illegal killing;
  - Prosecuting those who illegally kill bears to the full extent of the law.
- Protect the Rocky Mountain Front from oil and gas development.
- Ensure genetic and population connectivity between U.S. and adjacent Canadian grizzly populations, including linkages across Highway 3 in Crowsnest Pass connecting British Columbia and Alberta.

Swiftcurrent Creek, Glacier National Park | © Kirkendall-Spring Photographers

CABINET/YAAK ECOSYSTEM

Background

The Cabinet/Yaak ecosystem, located on the northern border between Montana and Idaho, is home to two small, disconnected and declining bear populations. The ecosystem encompasses approximately 2,600 square miles (6,700 square kilometers) in the Yaak River drainage and the Cabinet Mountains. Ninety percent of the ecosystem is public land administered by the Kootenai and Idaho Panhandle (which encompasses the Coeur d'Alene and Kaniksu) national forests. Because the population in the Cabinet/Yaak is so small, efforts were made to move the bear from threatened to endangered status under the ESA. However, FWS determined in 1993 and again in 1999 that while the Cabinet/Yaak population warranted the additional protection, such federal action was precluded by other higher priorities.

Recognizing that the Cabinet/Yaak population was in dire

need of more bears, FWS relocated four grizzlies to the Cabinet Mountains between 1990 and 1994. Young females—chosen because they would most easily assimilate into existing populations—were released at the height of the berry season in July when food was plentiful. One died of natural causes. Two others dropped their radio-collars and disappeared. The fourth raised several cubs and is still in the area. Recent DNA results show that her cubs have also reproduced. Another female was relocated to the Cabinets in the fall of 2005 and appears to be doing well.

Site-Specific Natural History

Grizzly bears in the Cabinet/Yaak ecosystem eat much of the same foods as the neighboring populations in the northern Continental Divide ecosystem to the east. Taking advantage of whatever is available, they consume mostly berries, roots and grasses. They also dig for rodents and eat termites, ants and other insects. Only about 2 percent of their diet is big game such as deer or elk, which is mostly scavenged from carcasses.

Current Status

As few as six adult females may remain in the Cabinet Mountains, cut off from the Yaak populations by a major highway, railroad tracks and a river. Current estimates suggest that combined, there may only be 30 to 40 bears in this ecosystem (Kasworm and Manley 1988, Kasworm et. al 2004, Wakinnen and Kasworm 2004). The recovery plan calls for 100 bears.

Threats

The greatest threat to the future of the Cabinet/Yaak grizzly bear population is its low numbers. Recently, U.S. and Canadian bear biologists determined that augmenting the area's existing population with additional bears would have the greatest impact on the short-term survival of the population and that reducing mortality would contribute the most to the population's long-term persistence (Proctor et. al 2004).

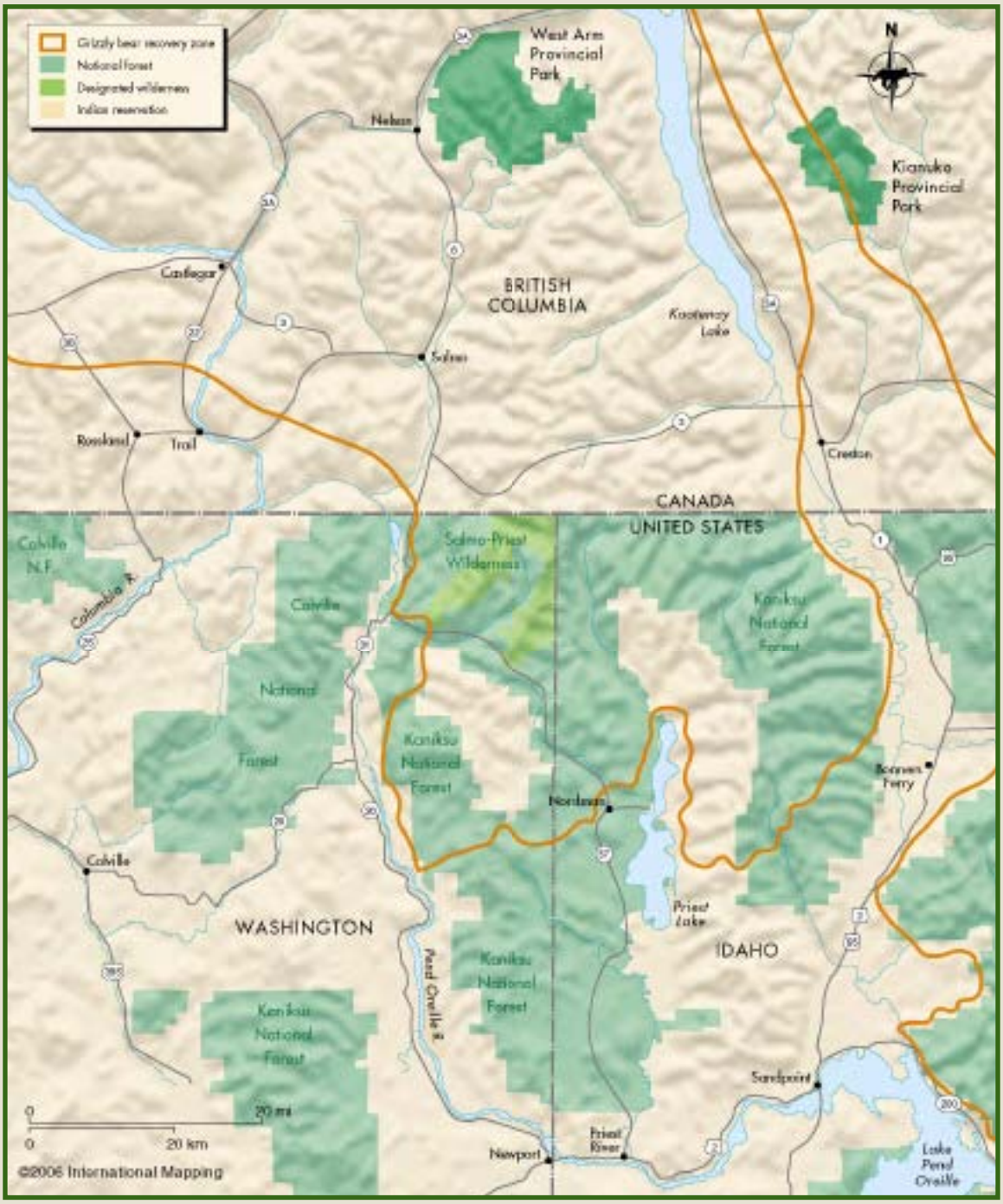
Grizzlies in the Cabinet/Yaak also face ongoing threats to their habitat, such as the Rock Creek mine. For several years, a copper and silver mining company, currently owned by Revett Minerals Inc., has been applying for permits to drill underneath the Cabinet Mountain Wilderness Area. They propose to remove 10,000 tons of earth a day over a 35-year period. This effort would require construction of extensive roads and infrastructure. First proposed by the American Smelting and Refinery Company in 1987, the project has been undergoing environmental review and litigation in the courts since that time. In 2001, FWS ruled that the mine would harm grizzly bears but added that the damage could be offset. Another company, Montanore Inc., is pursuing a permit for another mine on the east slope of the Cabinet Mountains and has already drilled three miles of underground tunnels.

Besides the mine, timber harvesting and the creation of a ski area also threaten to displace grizzlies by degrading their habitat. Increased roads would make the area more accessible and could result in more illegally killed bears. Between 1983 and 2002, 33 grizzly bears were known to have died inside or within 10 miles (16 kilometers) of the Cabinet/Yaak recovery zone. While 12 of those deaths were natural, 84 percent of the remaining human-caused mortalities occurred less than half a mile (500 meters) from a road (Kasworm 2005).

Future Actions Needed

- Augment the existing bear population with breeding age females.
- Reduce human-caused mortality through:
  - Educating hunters to minimize mistaken identity shootings and surprise encounters;
  - Providing educational materials to recreationists and residents on proper food storage;
  - Implementing food storage regulations on the Kootenai and Idaho Panhandle national forests;
  - Increasing enforcement to reduce illegal killing.
- Stop the plans to build a mine underneath grizzly habitat.
- Maintain and create linkage zones to the Selkirk, northern Continental Divide and Bitterroot ecosystems and north to Canada by reducing development, timber harvest and road building in key habitat and building structures to allow bears to travel safely over and under major roads and interstates.

Kootenai National Forest, Montana | © Randy Beacham



SELKIRK ECOSYSTEM

Background

The Selkirk ecosystem encompasses 2,200 square miles (5,700 square kilometers) in northeastern Washington, northern Idaho and southern British Columbia. Forty-seven percent of it lies within British Columbia. Land ownership in the U.S. portion is approximately 80 percent federal, 15 percent state and 5 percent private (Wakkinen and Johnson 2005).

Few grizzly bears roam in the Selkirks, prompting conservationists to push for a change in the bears' status under the ESA from threatened to endangered. In 1993, FWS determined that the Selkirk Cabinet/Yaak population did not merit an increase in federal protection. In 1999, FWS changed its decision, stating that the Selkirk bears' status should be upgraded to endangered but that such action would not take place because of higher priorities.

Site-Specific Natural History

Grizzly bears in the Selkirks eat much of the same foods as those in the Cabinet/Yaak and northern Continental Divide ecosystems.

Current Status

Approximately 40 to 50 bears remain in this ecosystem and their numbers appeared stable in the mid-1990s (Weilgus et. al 1994). Recent increases in human-caused mortality, however, may now be causing a decline. The recovery plan calls for 90 bears.

Threats

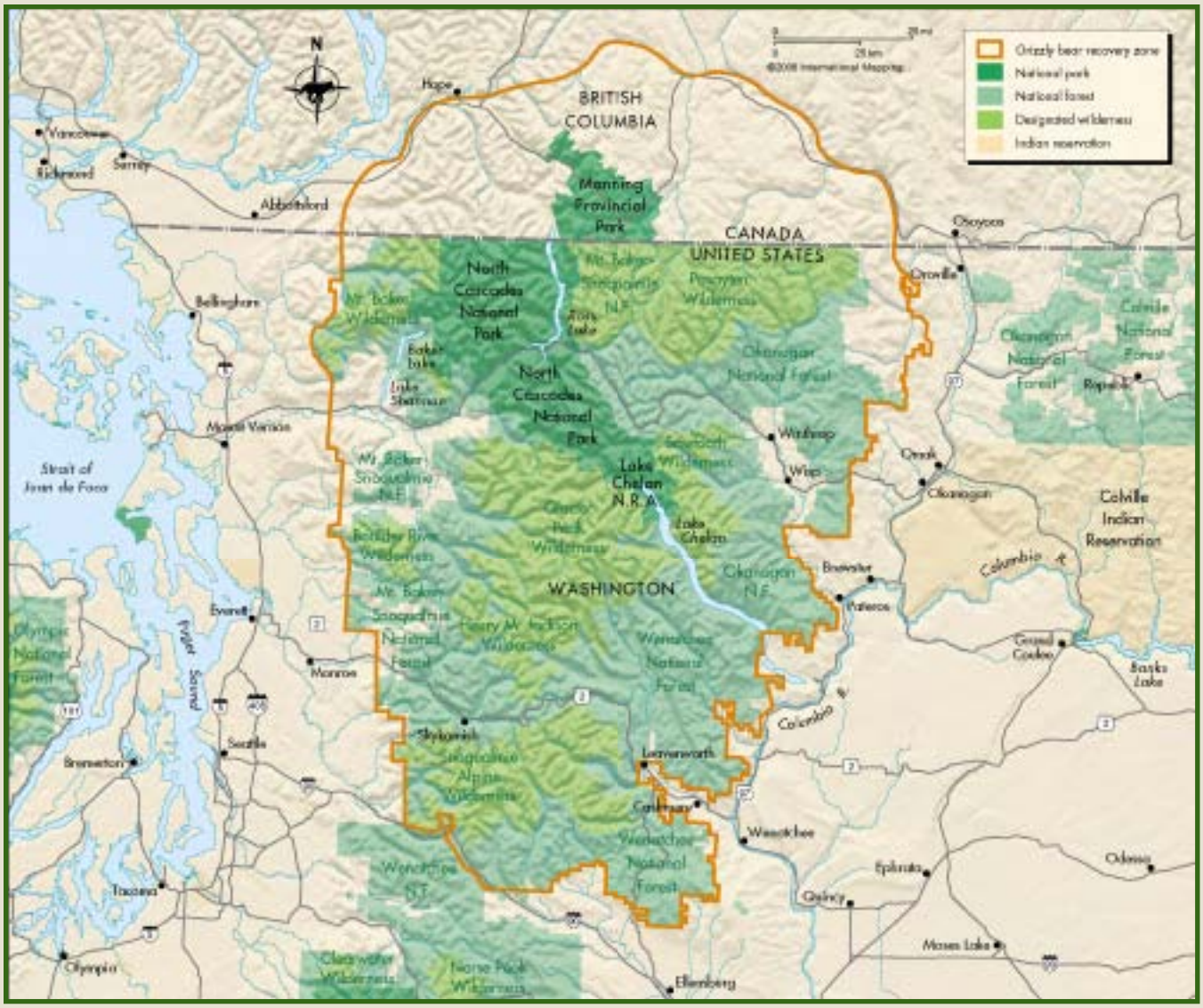
Human-caused mortality is a concern in the Selkirks. Between 1983 and 2002, 40 grizzly bear deaths were detected within 10 miles (16 kilometers) of the recovery zone, with 31 caused by humans. Of those 31, 11 died of unknown circumstances, nine were removed by managers after the bears got into conflicts with people, six were killed illegally and five were killed by hunters—either legally in Canada or after being mistaken for a black bear in the United States. Of known mortalities, 76 percent took place within a half a mile (500 meters) of roads (Wakkinen and Kasworm 2004).

Managers have long assumed that the Selkirk population, while small, was more resilient because of its connection to existing healthy bear populations in Canada. But a recent study found that highways and the resulting development may be severing these connections. The study found no evidence of male or female grizzly bears moving between the south Selkirks and the north Selkirks to the Purcells to the east (Proctor et. al 2005).

Future Actions Needed

- Augment the existing bear population with breeding age females.
- Reduce human-caused mortality through:
  - Hunter education to minimize mistaken identity shootings and surprise encounters;
  - Educational materials for recreationists and residents on proper food storage;
  - Food storage regulations on the Idaho Panhandle National Forests, which includes the Kaniksu National Forest;
  - Enforcement to reduce illegal killing.
- Maintain and create linkages with the Cabinet/Yaak, northern Continental Divide and Bitterroot ecosystems and north to Canada by protecting habitat from degradation by resource extraction and by creating underpasses and overpasses that allow bears to cross roads safely.

Mount Sir Donald, Selkirk Mountains, British Columbia | © Stephen Weaver



NORTH CASCADES ECOSYSTEM

Background

The North Cascades ecosystem includes one of the largest contiguous blocks of federal land in the lower 48 states. It encompasses 9,500 square miles (25,000 square kilometers) in north-central Washington and extends for an additional 6,000 square miles (10,350 square kilometers) into south-central British Columbia. The U.S. portion consists of 85 percent federal lands, 5 percent state lands and 10 percent private lands (Gaines et. al 2001). The ecosystem was not identified in the original recovery plan, but after FWS determined that sufficient habitat was available to support a viable population, it added a chapter to the recovery plan specific to this population in 1999. With no verified sightings of grizzly bears in this ecosystem since 1990, conservationists petitioned FWS to consider granting greater protections to the North Cascades grizzly bear population by changing its status under the ESA from threatened to endangered. In both 1991 and 1998, FWS found that the move was warranted but that other species had higher priorities. To force FWS to act, Defenders has given notice of intent to sue.

Meanwhile, British Columbia is considering boosting the grizzly bear population just north of the U.S. border in Manning Provincial Park. Fewer than 25 grizzly bears remain in this area (Austin 2004). Provincial biologists have drafted a recovery plan calling for augmentation of up to six bears over a five-year period. In 2004 and 2005, Defenders helped provincial biologists radio-collar several grizzly bears in Wells Gray Provincial Park with the intention of moving them to

Manning once the minister approves the plan. The process has been delayed, however, by political turnover and bureaucratic red tape. Augmentation likely will not begin before 2007.

Site-Specific Natural History

At one time in their history the grizzly bears of the North Cascades probably depended on salmon as their primary food source. Research suggests that salmon constituted 33 percent to 90 percent of their diet in the Columbia River drainage (Hilderbrand et. al 1996). Unfortunately those salmon runs are now all but gone. The lack of salmon and large ungulates such as deer, elk and moose, forces these bears to forage mostly on plants.

Current Status

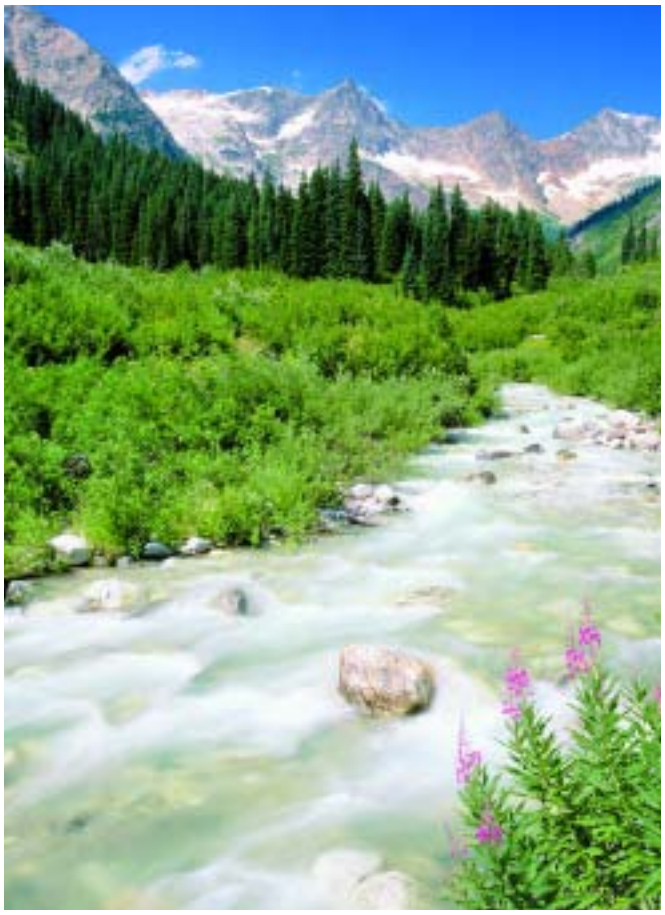
There have been no verified sightings of grizzly bears in this ecosystem since 1990, when a grizzly bear track was documented. Scientists estimate that the area may be home to as few as five grizzly bears.

Threats

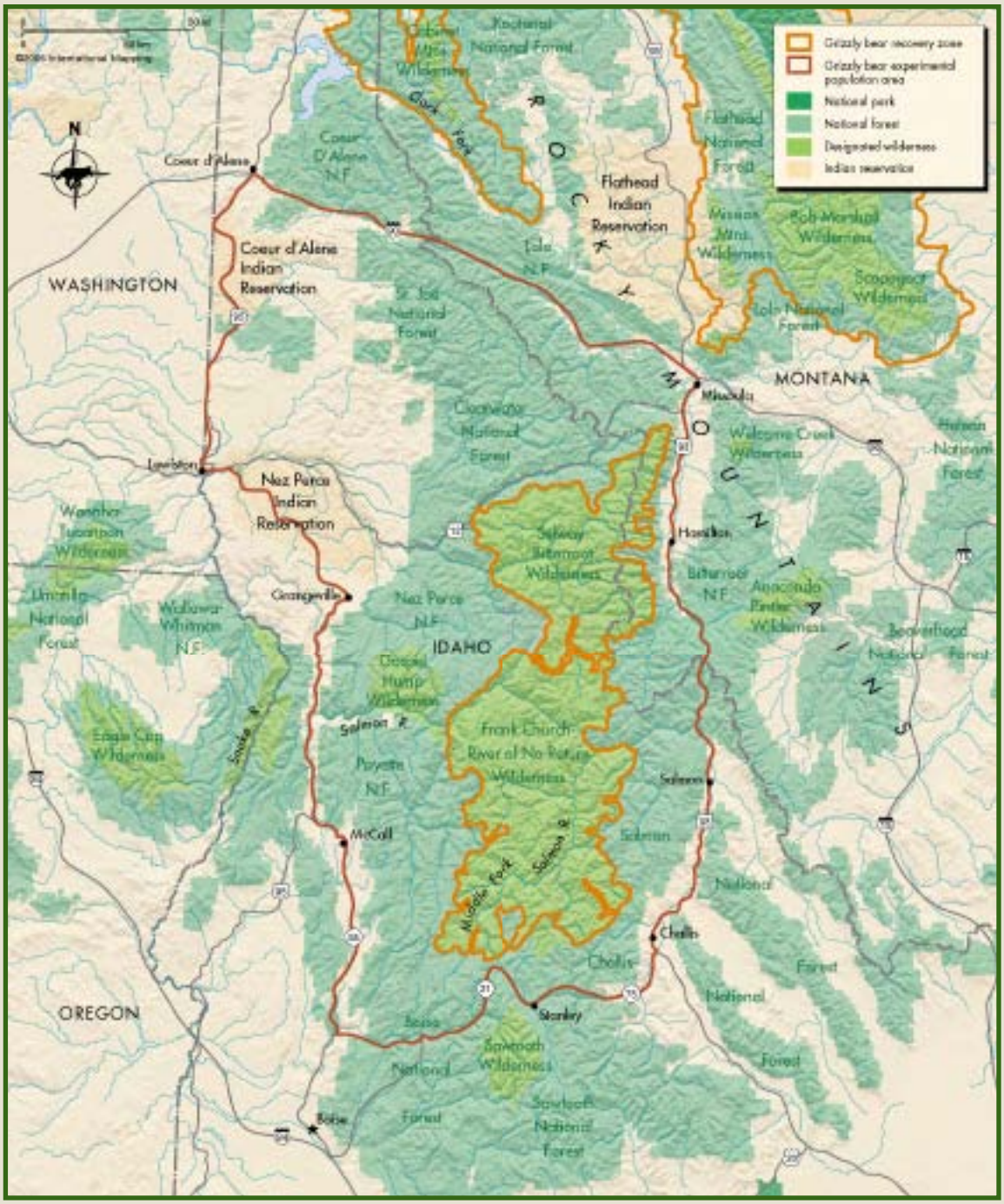
The greatest threat to the U.S. portion of the North Cascades grizzly bear population is neglect. Crippled by budget cuts, state and federal agencies are unable to launch FWS's recovery plan, and the Bush administration seems content to watch this population die out. The North Cascades recovery zone is a huge expanse of excellent habitat—90 percent is publicly owned, 68 percent has no motorized access and more than 40 percent is designated wilderness—which means there is little chance of disturbance by and conflicts with humans.

Future Actions Needed

- Initiate an Environmental Impact Statement process to outline specific actions and a timeline for grizzly recovery in the North Cascades.
- Raise the profile of this population on a national and state level.
- Support efforts to augment the grizzly bear population in Manning Provincial Park, British Columbia, and ensure that the recovering Manning population is adequately connected to other grizzly populations.



Top: North Fork Bridge Creek, Cascades National Park | © Terry Donnelly
Above: Grizzly bear, British Columbia | © Barry Steven Greff



BITTERROOT ECOSYSTEM

Background

The Bitterroot recovery zone consists of 5,600 square miles (14,500 square kilometers) of land in east-central Idaho and western Montana. Once common in the Bitterroot ecosystem but now nonexistent, grizzly bears were first recorded by Lewis and Clark, who reported killing six. Hunter and naturalist William H. Wright shot 13 grizzlies during a single hunt in the early 1890s. Today the Bitterroot ecosystem contains excellent habitat with very low likelihood of bear conflicts with humans. It has at least 12 roadless areas comprising more than 100,000 acres. Nearly 4 million acres is federally designated wilderness. There is very little cattle grazing, low potential for oil, gas and mineral development, and not much pressure to harvest timber.

Restoring grizzly bears to the Bitterroot ecosystem would increase the total number of grizzlies in the lower 48 states by a third and eventually provide a crucial linkage between bear popu-

lations in the Cabinet/Yaak, northern Continental Divide and Yellowstone ecosystems (Servheen et. al 1991).

Recognizing the crucial importance of restoring grizzly bears here, Defenders began working on a unique partnership in the early 1990s. To avoid the polarization that occurred during wolf recovery, Defenders reached out to the timber and labor industries and crafted a proposal that everyone could agree on. Called the "citizen management alternative," it called for a committee composed of wildlife professionals and local citizens to manage grizzlies with the goal of restoring grizzly bears while minimizing impacts on local economies and communities (see sidebar below).

Site-Specific Natural History

The bears that once roamed the Bitterroot ecosystem were probably very dependent on salmon. Unfortunately, the salmon is gone. But other favorite grizzly bear food—deer, elk and huckleberries—abound.

Current Status

No grizzly bears have been seen in the ecosystem since the 1940s. In the 1990s, FWS did extensive surveys of the region searching for any sign of grizzly bears and found none.

Threats

The greatest threat to the recovery of grizzly bears in the Bitterroot is government inaction. Due to widespread local and national support for the citizen's management alternative, FWS used it as their "proposed action" in 2000. Then-governor Dirk Kempthorne of Idaho filed suit. As a result, the Interior Department refused to implement the proposal and called for more public comment in 2001. After receiving close to 26,000 comments, documenting that 93 percent of Montanans and 98 percent of Idahoans wanted bears back in the Bitterroot, former Interior Secretary Gale Norton ignored the comments, bowed to pressure from Kempthorne and shelved the project indefinitely (*Rocky Mountain News* 2001). With the appointment of Kempthorne to replace Norton as Interior Secretary, prospects for reviving the proposal are bleak.

Future Actions Needed

- Reintroduce grizzly bears under the citizen management alternative.
- Initiate a broad outreach campaign in communities within the Bitterroot ecosystem.
- Work with federal, state and private entities to reduce potential conflicts between bears and humans.

CITIZEN MANAGEMENT ALTERNATIVE

The citizen management alternative was crafted during seven years of negotiations by a coalition of conservationists, timber industry representatives and organized labor to restore grizzly bears to the Bitterroot ecosystem. This alternative was adopted by the U.S. Fish and Wildlife Service as their "proposed action" in November 2000 and would have been implemented had it not been derailed by the Bush administration, which shelved the proposal indefinitely. Below are key points of the proposal:

- The plan would reintroduce a minimum of 25 grizzly bears over a five-year period.
- Restoration efforts would focus on the Selway-Bitterroot and Frank Church-River of No Return wilderness areas.
- The citizen management committee would be made up of 15 members serving six-year terms consisting of a cross-section of people committed to collaborative decision-making. All decisions by the committee must lead to the recovery of grizzly bears.
- State wildlife agencies would assume day-to-day management of grizzly bears.

The committee would be composed of:

- Seven Idaho citizens, including a representative of Idaho Fish and Game;
- Five Montana citizens, including a representative of Montana Fish, Wildlife and Parks;
- One representative of the Nez Perce Tribe;
- One representative of the U.S. Fish and Wildlife Service;
- One representative of the U.S. Forest Service.

CONCLUSION

Grizzly bears face a variety of threats—from mines, oil derricks and roads to poachers and even kindly old ladies who put food out for birds without realizing it might attract a 600-pound visitor. But they are also extremely adaptable animals—as demonstrated by their differing food habits between ecosystems in the lower 48 states—and today they are better off than they were in recent decades. In the last 20 years we have learned much about grizzly bear ecology and what they need to prosper: secure habitat, ample food and protection from humans. We now understand how to increase bear numbers, and many who live in bear habitat are learning to coexist. But our progress remains slow—just like the reproductive rate of the great creature we are striving to recover.

The recovery goals that U.S. Fish and Wildlife Service set for the grizzly bear serve as a valuable road map that points out what needs to be achieved to ensure grizzlies are no longer imperiled. While greater numbers of grizzly bears in Yellowstone are a sign of success, there is still a great deal of work remaining before the grizzly bear's future in Yellowstone and elsewhere is secure. Only two of the six recovery zones identified have increasing grizzly bears population—Yellowstone and the northern Continental Divide ecosystem. The Cabinet/Yaak and Selkirks are holding on by a thread, the North Cascades will soon die out if immediate action is not taken and the Bitterroot ecosystem, which encompasses so much prime habitat, remains uninhabited by grizzlies. Now is the time to redouble our efforts to restore grizzly bears in the lower 48 states. The future of our natural heritage depends upon it.

Female grizzly bear and her cub foraging in Yellowstone National Park | © Daniel J. Cox/naturalexposures.com

REFERENCES

Aune, K. and W. Kasworm. 1989. Final Report. *East Front Grizzly Bear Studies.* Montana Department of Fish, Wildlife and Parks. Helena, Montana.

Austin, M. A. 2004. Grizzly bear recovery planning in the British Columbia portion of the North Cascades: Lessons learned and re-learned. *Ursus* 15(1) Workshop Supplement: 123-128.

Bunnell, F.L. and D.E.N. Tait. 1981. Population dynamics of bears -Implications. *Dynamics of large mammal populations.* C.W. Fowler and T.D. Smith, editors. John Wiley and Sons, New York, New York. Pp. 75-98.

Craighead, J.J. and J.A. Mitchell. 1982. Grizzly Bear. Pages 515-555 in J.A. Chapman and G.A. Feldhamer, editors. *Wild Mammals of North America.* The Johns Hopkins University Press, Baltimore, Maryland.

Dobie, J.F. 1950. *The Ben Lilly Legend.* Little, Brown and Company, Boston, Massachusetts.

Folk, G. E. Jr., M.A. Folk, and J.J. Minor. 1972. Physiological condition of three species of bears in winter dens. International Conference for Bear Research and Management 2:107-124.

French, S.P., M.G. French, and R.R. Knight. 1994. Grizzly bear use of army cutworm moths in the Yellowstone ecosystem. International Conference on Bear Research and Management 9:389-399.

Gaines, W.L., W.O. Noble, and R.H. Naney. 2001. Grizzly bear recovery in the North Cascades ecosystem. Western Black Bear Workshop 7:57-62.

Great Falls Tribune. 2006. Poachers put bite on grizzly recovery. January 22. Great Falls, Montana.

Green, G.I., D.J. Mattson and J.M. Peak. 1997. Spring feeding on ungulate carcasses by grizzly bears in Yellowstone National Park. *Journal of Wildlife Management* 6:1040-1055.

Gunther, K.A. and R. A. Renkin. 1990. Grizzly bear predation on elk calves and other fauna of Yellowstone National Park. International Conference for Bear Research and Management 8:329-334.

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 and Frey. 2003. *Grizzly bear mortalities.* C.C. Schwartz and M.A. Haroldson, editors. Pp. 24-28. Yellowstone grizzly bear investigations: Annual report of the Interagency Grizzly Bear Study Team, 2003. U.S. Geological Survey, Bozeman, Montana.

Herrero, S. 1972. Aspects and adaptation in American black bears *(Ursus americanus Pallas*) and brown and grizzly bears (*Ursus arctos Linne*) of North America. International Conference for Bear Research and Management 2:221-231.

Hilderbrand, G.V., S.D. Farley, C.T. Robbins, T.A. Hanley, K. Titus, and C. Servheen. 1996. Use of stable isotopes to determine diets of living and extinct bears. *Canadian Journal of Zoology* 74:2080-2088.

Hilderbrand, G.V., T.A. Hanley, C.T. Robbins, and C.C. Schwartz. 1999. Role of Brown Bears (*Ursus arctos)* in the flow of marine nitrogen into a terrestrial ecosystem. *Oecologia* 121:546-550.

Hilderbrand, G.V., C.C. Schwartz, C.T. Robbins, and T.A. Hanley. 2000. Effect of hibernation and reproductive status on body mass and condition of coastal brown bears. *Journal of Wildlife Management* 64:178-183.

Interagency Grizzly Bear Study Team. 2005. Reassessing sustainable mortality limits for the greater Yellowstone ecosystem grizzly bear. Interagency Grizzly Bear Study Team, USGS Northern Rocky Mountain Science Center, Montana State University, Bozeman, Montana.

Jacoby, M.E., G.V. Hilderbrand, C. Servheen, C.C. Schwartz, S.M. Arthur, T.A. Hanley, C.C. 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.

Kasworm, W.F. and T.L. Manley. 1988. Grizzly bear and black bear ecology in the Cabinet Mountains of northwest Montana. Montana Department of Fish, Wildlife, and Parks. Helena, Montana. 122 pp.

Kasworm, W.F. and T.L. Manley. 1990. Road and trail influences on grizzly bears and black bears in northwest Montana. International Conference for Bear Research and Management 8:79-84.

Kasworm, W.F., H. Carriles, and T.G. Radandt. 2004. Cabinet-Yaak grizzly bear recovery area 2003 research and progress report. U.S. Fish and Wildlife Service, Missoula, Montana. 62 pp.

Kasworm, W.F. 2005. Cabinet-Yaak grizzly bear recovery area 2003 research and progress report. U.S. Fish and Wildlife Service, Missoula, Montana. 69 pp.

Mattson, D. J. and C. Jonkel. 1990. Stone pines and bears. General Technical Report INT 270:223-236, U.S. Forest Service.

Mattson, D.J., B.M. Blanchard, and R.R. Knight. 1991a. Food habits of Yellowstone grizzly bears. *Journal of Applied Ecology* 34:926-940.

Mattson, D.J., C.M. Gillin, S.A. Benson, and R.R. Knight. 1991b. Bear use of alpine insect aggregations in the Yellowstone ecosystem. *Canadian Journal of Zoology* 69:2430-2435.

Mattson, D.J., R.G. Wright, K.C. Kendall, and C.J. Martinka. 1995. Grizzly Bears. Pages 103-105 in E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, and M.J. Mac, editors. Our living resources: a report to the nation on the distribution, abundance and health of U.S. plants, animals and ecosystems. U.S. Department of the Interior, National Biological Service, Washington, D.C.

Mattson, D.J. 1997. Use of ungulates by grizzly bears *Ursus arctos. Biological Conservation* 81:161-177.

Mattson, D.J., K. Barber, R. Maw and R. Renkin. 2002. Coefficients of productivity for Yellowstone's grizzly bear habitat. U.S. Geological Survey. Biological Resources Division Information and Technology Report. USGS/BRD/BRSR-2002-2007.

Merriam, C.H. 1918. Review of the grizzly and big brown bears of North America (genus *Ursus*) with the description of a new genus, *Vetularctos. North American Fauna* 41:1-136.

McLellan, B.N. and F. W. Hovey. 1995. The diet of grizzly bears in the Flathead River drainage of southeastern British Columbia. *Canadian Journal of Zoology* 73:704-712.

Nelson, R.A. 1980. Protein and fat metabolism in hibernating bears. Federal Proceedings 39:2955-2958.

Proctor, M.F., C. Servheen, S.D. Miller, W.F. Kasworm, W.L. Wakkinen. 2004. A comparative analysis of management options for grizzly bear conservation in the U.S. Canada trans-border area. *Ursus* 15(2):145-160.

Proctor, M.F., B.N. McLellan, C. Strobeck, and R.M.R. Barclay. 2005. Genetic analysis reveals demographic fragmentation of grizzly bears yielding vulnerably small populations. Proceedings of the Royal Society. 8 pp.

Rausch, R. L. 1963. Geographic variation in size of North American brown bears, *Ursus arctos L,* as indicated by condylobasal length. *Canadian Journal of Zoology* 41:33-45.

Rockwell, D. 1991. *Giving Voice to Bear: North American Indian rituals, myths and images of the bears.* Roberts Rinehart, Niwot, Colorado.

Rocky Mountain News. 2001. Distaste for grizzly plan bears out in survey, scrapping reintroduction to the Bitterroot range leaves public growling. October 24. Denver, Colorado.

Roosevelt, T. 1907. Hunting the grizzly and other sketches. Part 2. The Wilderness Hunter. *Current Literature*, New York, N.Y.

Schwartz, C. C., S.D. Miller, and M.A. Haroldson. 2003a. Grizzly/brown bear. Pages 556-586 in G. Feldhamer, B. Thompson, and J. Chapman, editors. *Wild Mammals of North America: biology, management and conservation.* Johns Hopkins University Press, Baltimore, Maryland.

Servheen, C., A. Hamilton, R. Knight, and B. McLellan. 1991. Report of the Technical Review Team: Evaluation of the Bitterroot and North Cascades to Sustain Viable Grizzly Bear Populations. Interagency Grizzly Bear Committee, Missoula, Montana.

Servheen, C. 1999. Status and management of the grizzly bear in the lower 48 United States. C. Servheen, S. Herrero, and B. Peyton, compilers. Pp. 50-54. Bears: Status survey and conservation action plan. IUCN/SSC Bear and Polar Bear Specialists Groups. IUCN, Gland, Switzerland and Cambridge, United Kingdom.

Storer, T.I. and L.P. Tevis. 1955. *California Grizzly.* University of California Press, Berkeley.

Terborgh, J. 1988. The big things that rule the world. *Conservation Biology.* 2:402-403.

U.S. Department of Agriculture. 2006. National Agricultural Statistics Service. www.nass.usda.gov/Statistics_by_State.

U.S. Fish and Wildlife Service. 1982. Grizzly bear recovery plan. Denver, Colorado. 195 pp.

U.S. Fish and Wildlife Service. 1993. Grizzly bear recovery plan. Missoula, Montana. 181 pp.

Wakkinen, W.L. and W.F. Kasworm. 2004. Demographics and population trends of grizzly bears in the Cabinet-Yaak and Selkirk Ecosystems of British Columbia, Idaho, Montana and Washington. *Ursus* 15(1) Workshop Supplement: 65-75.

Wakkinen, W.L. and B.K. Johnson. 2005. Selkirk Ecosystem Project: January 2004-December 2004. Idaho Department of Fish and Game. Boise, Idaho.

Welch, C.A., J. Keay, K.C. Kendall, C.T. Robbins. 1997. Constraints on frugivory by bears. *Ecology* 78:1105-1119.

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

Wielgus, R.B., F.L. Bunnell, W.L. Wakkinen, and P.E. Zager. 1994. Population dynamics of Selkirk Mountain grizzly bears. *Journal of Wildlife Management* 58:266-272.

Wright, W.H. 1909. *The grizzly bear.* University of Nebraska Press, Lincoln.

DEFENDERS OF WILDLIFE
1130 17th Street, NW
Washington, D.C. 20036
(202) 682-9400
www.defenders.org