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Grizzly Bear Recovery in Idaho

Dale D. Goble
University of Idaho, College of Law, gobled@uidaho.edu

Idaho Forest, Wildlife and Range Policy Analysis Group

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GRIZZLY BEAR RECOVERY IN IDAHO

by

James G. MacCracken
Dale Goble
Jay O'Laughlin

Idaho Forest, Wildlife and Range Policy Analysis Group
Jay O'Laughlin, Director

Idaho Forest, Wildlife and Range Experiment Station
Leonard R. Johnson, Director

University of Idaho

- The Idaho Forest, Wildlife and Range Policy Analysis Group was established by the Idaho Legislature in 1989 to provide objective analysis of the impacts of natural resource proposals (see Idaho Code § 38-714).
- The Policy Analysis Group is administered through the University of Idaho's College of Forestry, Wildlife and Range Sciences, Leonard R. Johnson, Interim Dean.

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GRIZZLY BEAR RECOVERY IN IDAHO

by

James G. MacCracken[1]

Dale Goble[2]

and

Jay O'Laughlin1[3]

November 1994

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[1] Dr. MacCracken is Research Scientist, Idaho Forest, Wildlife and Range Policy Analysis Group, University of Idaho, Moscow. He is a member of The Wildlife Society, the Ecological Society of America, the Society for Range Management, and the Northwest Scientific Association.

[2] Dr. Goble is Professor, College of Law, University of Idaho, Moscow. He periodically teaches public land law and wildlife law, and is a member of the Society for Northwestern Vertebrate Biology, the American Society for Environmental History, and the Oregon State Bar.

[3] Dr. O'Laughlin is Director, Idaho Forest, Wildlife and Range Policy Analysis Group, University of Idaho, Moscow. He is a member of the Society of American Foresters, and periodically teaches natural resource policy.

In Genesis, God commanded Man to assert dominion "over everything that moves." This injunction has been observed much more closely than other biblical lessons.

George Cameron Coggins (1994)
Public Natural Resource Law

Permanent grizzly ranges and permanent wilderness areas are of course two names for one problem.

Aldo Leopold (1949)
A Sand County Almanac

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Northern Rockies Conservation Cooperative
Jackson, WY

Hank Fischer
Defenders of Wildlife
Missoula, Montana

Dave Mattson
Dept. of Fish and Wildlife Resources
University of Idaho

Stephen P. Mealey[1]
Boise National Forest
Boise, Idaho

Dr. Wayne Melquist
Idaho Dept. of Fish and Game
Boise, Idaho

Dr. James M. Peek
Dept. of Fish and Wildlife Resources
University of Idaho

Dr. Chris Servheen
U.S. Fish and Wildlife Service
Missoula, Montana

David Wright
Idaho Panhandle National Forests
Coeur d'Alene, Idaho

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The grizzly bear image on the front cover is from a photograph by Chuck Bartlebaugh.

[1] Mr. Mealey was appointed in September 1994 as the leader of the Upper Columbia River Basin EIS Project and is based in Boise.

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FOREWORD

The Idaho Forest, Wildlife and Range Policy Analysis Group (PAG) was created by the Idaho legislature in 1989 to provide Idaho decision makers with timely and objective data and analyses of pertinent natural resource issues. A standing advisory committee (see inside cover) suggests issues and priorities for the PAG. Results of each analysis are reviewed by a technical advisory committee selected separately for each inquiry (see the acknowledgements on page *i*). Findings are made available in a policy analysis publication series. This is the twelfth report in the series. The other eleven reports are listed on the inside cover.

Idaho is one of the few places in the lower 48 states where grizzly bears still exist and as the largest and most fearless predator on the continent, grizzlies require special management considerations. They are also a powerful symbol of wild lands. At issue in Idaho is how to manage grizzly bears outside of designated wilderness areas in ways that reduce conflicts with humans and land-use activities. Also at issue is finding new areas for grizzlies, which the federal government feels is necessary to comply with the Endangered Species Act.

Four areas across the state of Idaho are involved in the controversy. People are quick to offer arguments for and against the continued existence of grizzlies. Some of the discussion is based on fact, some of it on theory, and some of it on myth. This report is designed to provide the factual basis necessary for informed discussions of the respective roles of humans and grizzlies in Idaho, with the Endangered Species Act as the policy context for these issues. Specific provisions of this law must be considered as the fundamental underpinnings for debates about grizzly bear recovery in Idaho.

Leonard R. Johnson
Interim Dean
College of Forestry, Wildlife
and Range Sciences
University of Idaho

EXECUTIVE SUMMARY

Grizzly bear recovery in the lower 48 states is guided by a controversial plan developed by the U.S. Fish and Wildlife Service (USFWS) that was revised in 1993. Four of the six grizzly bear recovery areas identified in the plan are at least partially in Idaho. Scientists, resource users, and citizen conservationists are arguing among themselves and with others about the merits of this plan.

Controversies about grizzly bear recovery illustrate several shortcomings with implementation of the Endangered Species Act of 1973 (ESA). Some people question the need for listing and recovering distinct population segments of grizzlies, others question whether established measures of population status are adequate to either establish or assess recovery goals, and others question land-use changes enacted by federal agencies responsible for grizzly bear populations and their habitat. To relieve these and other problems, some people are calling for changes in the ESA itself. Such proposals cover a wide range of options and are not reviewed here except in reference to grizzly bears.

As perhaps the ultimate challenge of the willingness of humans to make room for other species, as well as a powerful symbol of wilderness for some, grizzly bears epitomize many public land and resource management challenges. As with many debates about the ESA, the issues have less to do with saving individual species or ecosystems than with the relationship of humans to their environment. Grizzly bears do not sustain humans, but grizzly habitat does, and that habitat is biologically richer when occupied by grizzlies.

As more and more people inhabit areas in grizzly country, the issues become more difficult. The presence of grizzly bears complicates resource management on federal lands, but it does not mean cessation of all land-use activities. There is evidence that grizzly bears and humans can co-exist to some degree, at least in the short term in some areas.

How many bears are enough? No one seems to agree on an answer. What are the alternative approaches for recovering grizzly bears? The current recovery plan calls for continuing efforts to recover grizzly bears in six different areas. Two populations of grizzly bears are very close to meeting their recovery goals and could be proposed for delisting in a few years, while others will continue to be managed following the stipulations in the revised recovery plan. Some populations are not improving, and could either be written off as unrecoverable or have recovery efforts continue into the indefinite future. All grizzly bear populations could be delisted, which could be touted as a great success story for the ESA. None of these actions require modifying the ESA, a law that gives the USFWS broad latitude and flexibility to allow what agency biologists feel is the appropriate set of actions.

The revised recovery plan is controversial among those with different scientific as well as resource management perspectives. Some feel the plan is overly restrictive, others feel it is not restrictive enough. Some feel it is trying to do too much in too many areas, others feel it is not doing enough and should have higher population goals and include larger areas. Perhaps these arguments mean the plan is fairly balanced, and therefore the appropriate course of action to pursue under the current laws of the land. Or perhaps the debate means that it is very difficult, if not impossible, to find the balance between economic development and species conservation that is the overall goal of the ESA. As the political scientist James Tobin (1990) said in his analysis of the ESA, "The protection of biological diversity raises fascinating economic, social, political, and institutional issues that will not soon fade."

As long as society continues to ask federal biologists to make the decisions, we can expect conservative recovery plans that promote the continued existence of species in as many areas as biologists think are necessary and feasible.

OVERVIEW

The purpose of this report is to provide information on the reasons for listing grizzly bear populations that occur in Idaho, the goals for delisting, the management and recovery programs designed to reach those goals, the unique interagency bureaucracy associated with these efforts, and the impacts of grizzly bear management and recovery programs on the use of natural resources by humans. We also discuss current controversies and issues that will effect grizzly recovery, attempt to define problems and barriers to recovery in various contexts, and identify some recovery alternatives. This information should be useful to policy makers, agency administrators, managers and researchers, and various interest groups as well as the general public. The hoped-for result is better-informed decisions about grizzly bear recovery in Idaho.

Readers will notice that grizzly bear recovery involves many technical issues as well as special language used by biologists and legal experts. Most of these technical or unfamiliar terms are defined in the Glossary contained in this report and readers are encouraged to consult the Glossary when an unfamiliar term is encountered. The symbol § means section (§§ means sections) and is used to refer to portions of the Endangered Species Act, or ESA.

The ESA assigns government agencies the responsibility to identify and protect plants and animals that are near extinction. In 1975, six isolated populations of grizzly bears in the conterminous United States (the lower 48) were officially listed as threatened under the ESA. Listing under the ESA not only entitles these species to special protection, but also requires federal agencies to make efforts to recover them to the point where they can be taken off the list of protected species. As the lead agency, the USFWS is required to develop a recovery plan detailing those efforts.

This report analyzes planned recovery efforts in Idaho. Grizzly persistence is primarily a function of large land areas where there is little human occupancy and use. In 1975, and currently, the Cabinet/Yaak, Selkirk Mountains, and Yellowstone Grizzly Bear Ecosystems had confirmed populations of grizzlies. Portions of these three ecosystems occur in Idaho. In addition, the Selway-Bitterroot area, most of which is in Idaho, and the North Cascades of Washington were suspected to contain grizzly bears and have habitat characteristics making them suitable as recovery areas. A sixth area, the Northern Continental Divide Ecosystem, has grizzlies and is in Montana. Four Grizzly Bear Ecosystems (Cabinet/Yaak, Selkirk, North Cascades, and Northern Continental Divide) extend into Canada. The degree to which Canadian and United States bears interact is either unknown or inadequately documented.

Grizzly bears have been protected in Idaho since 1947 and are on the Idaho Department of Fish and Game's list of threatened and endangered species. Idahoans have decades of experience with grizzly bears and have been actively managing their habitat for more than a decade.

Following listing in 1975, the USFWS developed a grizzly bear recovery plan and approved it in 1982. At that time little information on grizzlies was available for the Selkirk Mountains, Selway-Bitterroot, or North Cascades Ecosystems. The goal of the 1982 plan for these three areas was to gather information on their suitability as recovery areas and on the status of those grizzly populations. The first revision of the grizzly bear recovery plan was finalized and approved in September 1993. However, it did not contain chapters on the Bitterroot or North Cascades Ecosystems, which were to be added to the plan later. The Bitterroot Chapter was finalized in July 1994 and has been approved as part of the revised plan.

Grizzly bear management and recovery plans did not become major public policy issues in Idaho until 1991, when the Interagency Grizzly Bear Committee decided to pursue grizzly recovery in the Selway-Bitterroot area, which had been officially designated the Bitterroot Grizzly Bear Ecosystem. The debate became more heated in 1992 when the draft revision of the grizzly bear recovery plan was released, followed a

year later by the draft chapter for the Bitterroot Ecosystem that has since been revised and approved, and awaits implementation.

In addition to the recovery plan actions, some environmental groups have called for even more comprehensive measures to protect grizzlies and their habitat. A number of lawsuits, many of them still pending, may change grizzly habitat management on federal lands by making road density standards more stringent. Some suits may also redefine the purpose of the recovery plan. The USFWS states that the recovery plan is advisory in nature and that actual recovery actions will be taken by other federal agencies, specifically the U.S. Forest Service and National Park Service in consultation with the USFWS. Thus, the recovery plan does not set specific standards and guidelines, allocate resources, or initiate actions, and is not subject to environmental analysis under the National Environmental Policy Act (NEPA). Some environmental groups and scientists criticize the plan because it does not contain habitat protection and road density standards, which presumably would change the advisory role of the recovery plan and redefine the relationship of the plan to NEPA.

Resource user groups—timber, livestock, and recreation—and environmental groups are concerned about the recovery plan, especially the proposal to reintroduce grizzlies to the Bitterroot Ecosystem. Concerns have been expressed about additional access restrictions, delays in timber sales, and potential livestock depredations as well as new and more restrictive regulations, standards, and guidelines. Others believe that even more stringent restrictions than those in the plan are needed to insure grizzly recovery. Human encounters with grizzlies possibly resulting in injuries are also feared. Claims of impending economic disaster from overly restrictive policies are made by some groups and countered by others, leading to confusion and the proliferation of misinformation.

As a result of the many concerns and conflicting points of view, the Idaho Legislature created a Grizzly Bear Management Oversight Committee in early 1993 to provide information to Idahoans and increase the involvement of the state in recovery plans and future management programs. In mid-1993 the Advisory Committee of the Idaho Forest, Wildlife and Range Policy Analysis Group suggested an analysis of grizzly bear recovery plans and management programs specific to Idaho. This report is the result.

The Advisory Committee of the Policy Analysis Group suggested six focus questions to guide the analysis. These questions, with short answers, appear in the next section of this Overview. Expanded replies are provided in Chapter 1. Chapters 2 to 6 provide the information base supporting the replies to the focus questions, and contain details on other issues as well.

Several alternatives for grizzly bear recovery under the ESA are presented and reviewed in Chapter 7. We do not recommend any particular alternative. Preference for one alternative or another is a function of individual beliefs about different scientific theories, moral questions about the relationship of humans and other species, and political questions reflecting different positions on the relative importance of the social and economic impacts of managing and recovering imperiled species.

Focus Questions and Short Replies

[1] What was the rationale for listing the Selkirk, Cabinet/Yaak, Bitterroot, and Yellowstone populations of grizzly bears under the Endangered Species Act?

In response to a petition from a citizen group, the USFWS listed grizzly bears as threatened in 1975. The Selkirk, Cabinet/Yaak, and Yellowstone areas—portions of which are in Idaho—supported distinct populations of grizzlies, and continue to support them. Based on biological evidence, the USFWS determined that grizzly bears in the lower 48 states were threatened with extinction, thus the ESA obligated the agency to list these populations and develop a recovery plan for them. During recovery

planning, the agency concluded that although there was no confirmed evidence of grizzlies in the Selway-Bitterroot area, it was once occupied at one time, and could support grizzlies now. Furthermore, the USFWS believes that re-establishing this population segment would aid in recovering grizzly bears in the lower 48 states.

[2] What is the origin, structure, and function of the Interagency Grizzly Bear Committee (IGBC)?

Interagency efforts associated with grizzly bear management began with the formation of the Interagency Grizzly Bear Study Team in 1973. The study team originally consisted of research biologists from the National Park Service, U.S. Forest Service, and States of Idaho, Montana and Wyoming. In 1975, the Interagency Grizzly Bear Steering Committee, made up of mid-level administrators from the federal and state agencies listed above, was formed to provide direction for the study team. When it became apparent in 1983 that higher-level administrators with decision-making authority were needed to effectively implement the original recovery plan, the steering committee was disbanded and replaced with the Interagency Grizzly Bear Committee (IGBC).

The IGBC is composed of regional directors of the USFWS, regional foresters of the U.S. Forest Service, regional directors of the National Park Service, the director of the Bureau of Land Management in Montana, and directors of the wildlife agencies in Idaho, Montana, Washington, Wyoming, and British Columbia. From these members a chairman and vice-chairman are chosen to serve a two-year term.

The IGBC meets at least twice a year and coordinates all grizzly bear research and management programs that are necessary to implement the grizzly bear recovery plan developed by USFWS under the ESA. The IGBC has a number of subcommittees that create working groups or ad hoc task forces to perform specific tasks as they arise. The IGBC also convenes review teams to consider issues common to several ecosystems or requiring expertise not available in one of the subcommittees.

[3] What is the process for delisting grizzly bears?

Listed species can be delisted for three reasons: [1] they have gone extinct, [2] they have met the recovery goals, or [3] the original listing was in error. When a listed species has met the recovery goals, the five factors specified in the ESA that are to be considered in listing must also be considered in delisting proposals.

The revised grizzly bear recovery plan states that grizzlies can be delisted by ecosystem, independent of the status of grizzlies in other ecosystems, and sets two general criteria for delisting. One is the achievement of the population goals set for that ecosystem, and the other is the approval of an interagency conservation strategy that will guide grizzly bear management following delisting.

Two grizzly bear populations (the Yellowstone and Northern Continental Divide) are close to being delisted, as most of the population recovery goals have been met as specified for the respective ecosystems in the grizzly bear recovery plan. In addition, interagency conservation strategies are currently being prepared for each of these two areas. Proposals for delisting grizzly bear populations could appear in the next few years.

[4] What is the status of the Grizzly Bear Recovery Plan?

The original grizzly bear recovery plan was completed in 1982. The first revision of the plan was approved in September 1993, and included chapters for the Selkirk, Cabinet/Yaak, Yellowstone, and Northern Continental Divide Ecosystems. Chapters for the Bitterroot and North Cascades Ecosystems had not been completed at that time, however the Bitterroot Ecosystem chapter was approved and accepted in July 1994 as part of the recovery plan. The North Cascades chapter is in draft form and currently under review.

[5] What have been the actual impacts of grizzly bear recovery actions in Idaho on traditional and planned uses of federal, state, and private lands?

The presence of species listed under the ESA complicates federal land management and can also effect state and private lands. An assessment of actual impacts however, is extremely difficult and would require separating impacts due to grizzly bear conservation from other impacts, such as those associated with environmental analysis of all major projects on federal lands under the NEPA process, and those associated with dispersed recreation goals, maintaining old-growth forests, the needs of other wildlife species, and maintaining water quality. Such an effort would be a major research undertaking, but very helpful in the recovery process. Timber harvesting, livestock grazing, hunting, off-road vehicle use, hiking, horseback riding, minerals prospecting, and other activities continue to occur in grizzly bear habitat in Idaho, but levels of these activities are probably lower than if grizzlies were not present or not managed under the mandates of the ESA.

The major management concern in grizzly bear habitat on federal lands is providing grizzlies with secure habitat in order to minimize displacement of bears to other areas and to reduce human-caused mortality. This is accomplished by restricting motorized access and scheduling activities so they take place when grizzlies are hibernating or not using a particular area. Limiting grizzly bear access to human foods and garbage is another management technique. Motorized access has been reduced in certain places or at certain times to protect grizzlies. The ESA requires interagency consultation between the U.S. Forest Service and the USFWS on planned activities, which to date has modified how and when these activities may occur in grizzly habitat. The USFWS has generally issued no jeopardy opinions following consultations.

Although the ESA taking prohibition applies everywhere, impacts to state and private lands in Idaho are relatively few. State and private lands are currently not obligated to provide secure habitat for grizzly bears. In addition, completion of projects on state and private lands has priority over projects on federal lands when both are in grizzly habitat.

[6] To what extent is grizzly bear recovery in Idaho compatible with existing and probable future land uses?

Any reply to this question will be highly subjective. Judgments about the compatibility of humans and grizzly bears depend on how willing a person is to accommodate the needs of grizzly bears. The interagency grizzly bear guidelines are designed to make land uses compatible with grizzly recovery. The Northern Continental Divide and Yellowstone populations appear to be increasing and the fact that these populations are close to meeting the recovery and delisting goals support that approach. The low populations in the Selkirk and Cabinet/Yaak Ecosystems suggest that conditions and management programs in these areas may need to be reevaluated.

Contrasting points of view about the compatibility of grizzly bears and humans are rooted in human values and personal beliefs, some of which are culturally based. One major obstacle in grizzly bear recovery is that people tend to kill grizzlies, for any of several reasons.

Under the ESA mandate, managers are attempting to strike a balance between the needs of grizzlies and humans. However, people on both sides of the issue are claiming that the balance has moved too far from where they think it should be. In the face of existing scientific uncertainty, political judgments become necessary. Moral, cultural, social, and economic values come into play, as do institutional factors such as executive agency structures and budgets, and the interpretation of agency actions by the courts. Thus the issue of grizzly bear recovery involves many value judgments.

Other Issues

During the process of attempting to answer the assigned focus questions, a number of other issues effecting current and future grizzly bear

management programs were identified. These issues were not addressed specifically by the six focus questions, but nonetheless contribute to controversies about grizzly recovery. Among these issues are biological considerations such as genetic diversity, population monitoring, viable population estimates, and ecosystem linkages. Management issues include such things as habitat protection, road density standards, management following delisting, risk of injury to humans from grizzlies, and recent lawsuits and court decisions. All these issues are discussed in detail in this report, and a brief summary discussion follows.

Grizzlies in the lower 48 states exist in small, fragmented populations. During the last two decades, scientists have increased research efforts on this type of population structure by emphasizing population viability and genetic diversity. Grizzlies have been the subject of these analyses, based on data from Yellowstone. In general, studies have indicated that populations should be much larger and that linkage zones connecting the different grizzly bear ecosystems would be valuable. These conclusions are based on extrapolations of ecological theories and computer simulations, and tests of the results have not been performed.

Grizzly bear management following delisting will likely be similar to current practices. Interagency committees will be maintained, but at state and regional levels, not the federal level. Many management guidelines will remain the same but some may require changes, as is likely in the case of road densities. The goal of these guidelines will be to avoid an emergency re-listing of grizzlies by the USFWS that would be triggered if population trends or habitat conditions fall below specified levels.

Grizzly bears occasionally injure and kill people. The risk of being involved in a bear-human confrontation resulting in human injury or death ranges from one in 400 to one-in-a-million, depending on the area, type of activity, and season. Most attacks on humans occur either when grizzlies are surprised at close range or humans deviate from predictable patterns, such as venturing off high-use trails. Research indicates that women are not more susceptible to attacks than men. Bears in Yellowstone, Glacier, and North Cascades National Parks are probably the most dangerous because they can become habituated to humans and conditioned to human garbage or camp food. A number of steps can be taken to decrease the risk of an unwanted encounter with a grizzly bear, and pamphlets are available from federal and state agency offices in and near grizzly country. If attacked, the best course of action is to roll up in the fetal position and play dead. However, if the bear persists with the attack after playing dead for a number of minutes, the victim should vigorously fight back.

Grizzly bear management is undergoing changes as researchers learn more. Research projects initiated over the last five to ten years are providing new direction for the management of grizzlies and their habitat. This trend is likely to continue. Some of these results will have broad-based application to all grizzly bear ecosystems, others will be more site-specific. Recent court decisions and pending litigation may require a reevaluation of some national forest plan standards and guidelines for grizzly bear habitat, and possibly the purpose and scope of the grizzly bear recovery plan.

Chapter 1. Focus Questions

The Advisory Committee of the Policy Analysis Group (PAG) meets approximately four times per year. Their legislatively assigned mission is to suggest issues of interest to the people of Idaho for which timely and objective information and analysis would be valuable. As a matter of operating policy, the Advisory Committee works closely with PAG staff to develop a list of focus questions for each inquiry undertaken. The task of the PAG staff is to locate information and expertise to develop replies to the questions, and to ensure that the results are accurate and unbiased. A team of technical advisors and reviewers helps to accomplish this. Six focus questions were determined for this inquiry. Detailed replies to these questions follow. The discussion is cross-referenced to other sections of this report that provide further explanations, details, or pertinent examples.

[1] What was the rationale for listing the Selkirk, Cabinet/Yaak, Bitterroot, and Yellowstone populations of grizzly bears under the Endangered Species Act?

At one time grizzly bears ranged across nearly the entire western two-thirds of North America from Alaska to Central Mexico. Due to indiscriminate killing and habitat modification, grizzlies currently occupy less than 2% of their former range in the lower 48 states (see Chapter 2 and Figure 2). Before 1800, the total population in the lower 48 states might have been 50,000 to 100,000 bears.

Following the enactment of the ESA in 1973, a citizen conservation group called the Fund for Animals petitioned the U.S. Fish and Wildlife Service (USFWS) to list grizzlies as endangered in the lower 48 states. As justification for listing, the group cited habitat loss due to logging and road building, the grizzly bear management program in Yellowstone National Park that contributed to the death of approximately 200 bears from 1968 to 1973, the continued legal hunting of grizzlies in Montana, and the illegal killings in Idaho, Montana, and Washington. In 1975, the USFWS determined that less than 1,000 bears lived in the lower 48 states and that population declines, habitat loss, and population isolation warranted listing grizzlies as a threatened rather than an endangered species (see Chapter 2, page 20 for differences between these listing categories). The USFWS therefore listed the six populations of grizzlies in the lower 48 states as a threatened species.

Listing decisions are based on the available evidence that a species "is in danger of extinction throughout all or a significant part of its range" or "likely to become [so]" (ESA §§ 3(6), (20)). In reaching its 1975 decision on grizzlies, the USFWS was precluded by the ESA from considering that at least 15,000 grizzly bears live in Canada and at least 32,000 bears live in Alaska. The ESA precludes the USFWS from considering the Canadian and Alaskan bears because it defines "species" in terms of distinct population segments (ESA § 3(16)). That is, the Act applies not only to species and subspecies, but also to distinct population segments of species. Thus, if a population of bears is separated from other populations, that population is defined as a species under the Act. If the population meets the statutory criteria as either "threatened" or "endangered," it is subject to protection under the Act. This means that the status of grizzly bears in the Selkirk Mountains, for example, is determined independently of the status of grizzlies in Alaska or the Cabinet/Yaak Mountains or the Yellowstone area. Bears in one area could be taken off the endangered species list while bears in another could remain listed as threatened or endangered.

If a population—i.e., "a group of fish or wildlife in the same taxon below the subspecific level, in a common spatial arrangement that interbreed when mature" (50 CFR § 17.3 [1993])—is a "distinct population segment," and if that population satisfies the biological criteria as either "threatened" or "endangered" (ESA §§ 3(6), (20)), then the USFWS must list the "species" as either threatened or endangered. The legislative history of the Act is clear that listing decisions are to be based solely on biological information (Conf. Rep. No. 835, 97th Cong. 2d

Sess. [1982]). To the extent that the biological information on a species is uncertain, a court is likely to defer to the expertise of the USFWS if the agency's listing decision is challenged.

The USFWS also has some flexibility because the Act does not provide a definition of "distinct population segment." The agency has however, given this phrase a common-sense definition that focuses on whether the population interbreeds with other populations. Thus, to the extent that one group of grizzly bears is reproductively distinct from another group, the two are "distinct population segments" that will be accorded protection under the Act if they are either threatened or endangered.

Probably the most important single determinant of a species status under the ESA is its population. In 1990, the USFWS estimated that the grizzly bear population in the lower 48 states was between 700 and 900 individuals. Grizzly bear populations are, however, difficult to accurately estimate and the actual numbers of bears in each ecosystem are unknown (see Chapter 2, page 21). Furthermore, some of the most fundamental pieces of information needed to assess population status and trends are fraught with uncertainty—for example, how many bears are there, and what is the direction and magnitude of change? Listing proposals often are not accompanied by indisputable information on population trends, and this can influence listing decisions. In uncertain situations, wildlife biologists can be expected to make decisions that do not put wildlife at further risk. Thus biological uncertainty may lead to a listing in order to provide effective protection until more population data can be gathered and analyzed. This approach is consistent with the ESA because one of the basic criteria for delisting a species is that the original listing was in error (see Chapter 2, page 26).

Legal and political risks also can complicate the listing and delisting decisions. Although the Act requires the listing decision be made "solely on the basis of the best scientific and commercial data available" (ESA § 4(b)(1)(A)), concerns about social and economic impacts can overshadow uncertain biological evidence (Thomas and Verner 1992, GAO 1993). Listing petition denials or delays by the USFWS have in some cases forced petitioners to seek court rulings. Furthermore, delisting proposals are also subject to litigation. For example, the USFWS relies on information other than the total number of bears as criteria for assessing recovery of grizzlies (see Chapter 2, page 21). Scientists and environmentalists alike are divided on the effectiveness of this approach. These indicators of bear population status are a source of contention over the current recovery plan (see Chapter 2, page 26), are a major focus of a current law suit (see Chapter 5, page 72), and will be controversial if delisting is proposed.

In 1991, petitions were filed requesting the USFWS to reclassify grizzlies from threatened to endangered (see Chapter 2, page 20). The USFWS concluded that a status change was not necessary for most populations, but agreed that endangered status was warranted for the Cabinet/Yaak Ecosystem because of population declines. However, the status change was precluded by a previous agreement with the litigants to expedite listing of other candidate species in the region before committing additional efforts to species already listed. The Sierra Club Legal Defense Fund filed suit in August 1993 over this ruling; the case is pending in October 1994. A change in status from threatened to endangered would have only one major impact on grizzly re-covery programs. The USFWS would be required to designate critical habitat and prepare an environmental impact statement (see Chapter 2, page 28).

ESA listing requires that the USFWS not only protect listed populations, but also recover them and develop a plan to do so (ESA § 4(f)(1)). Because there are relatively few grizzly bears in the lower 48 states, the USFWS has determined that it is necessary to identify additional areas where populations of bears can be established. Such areas are selected by the agency based on evidence of a low potential for human-bear conflicts, historic occupation of the area by grizzlies, and the presence of high quality habitat. The

Bitterroot Ecosystem, most of which is in Idaho, was selected by the USFWS even though there is no confirmed evidence that grizzlies have inhabited the area for a long time. This decision is very controversial.

Bitterroot Issues. The existence of grizzly bears has not been physically confirmed in the Bitterroot Ecosystem in the past four decades or more. However, historical accounts indicate that grizzly bears were once numerous in the area, and there have been numerous unconfirmed reports of grizzly activity (see Chapter 4, page 54; Table 6). The Bitterroot Eco-system was included in the 1982 recovery plan, which noted that the area needed to be evaluated as a recovery zone. Following the completion of several studies, the Interagency Grizzly Bear Committee (IGBC) decided to pursue grizzly bear recovery in this area in 1991. In July 1994, the Bitterroot chapter of the revised recovery plan was finalized and approved by the IGBC, and it now awaits implementation.

Because there is no known population of grizzlies in the area, they can be reintroduced as an "experimental-nonessential" population under section 10(j) of the ESA. An experimental-nonessential designation allows for the greatest management flexibility for listed species. Flexibility is provided by limiting the consultation requirements of section 7 of the ESA and by permitting special rules to be written covering section 9 takings (see Chapter 3, pages 31 and 32). The designation complicates the delineation of a recovery area because an experimental-nonessential bear that leaves the recovery zone is once again under the full protection of the ESA. The Bitterroot chapter of the revised grizzly bear recovery plan suggested that the recovery zone for the reintroduction program be defined through the development of an environmental impact statement under the National Environmental Policy Act (NEPA).

Although reintroduction of grizzly bears to the Bitterroot Ecosystem is highly controversial, a consensus among a number of different interest groups representing local industries and environmentalists exists on several points: [1] grizzly bear restoration in the area is likely to occur whether or not local groups are involved, [2] the reintroduced population should be classified as experimental-nonessential, and [3] reintroductions should be confined solely to the Selway-Bitterroot Wilderness, with the possibility of also including the Frank Church-River of No Return Wilderness. These issues are explored in more detail in Chapter 4, beginning on page 54.

[2] What is the origin, structure, and function of the Interagency Grizzly Bear Committee (IGBC)?

Because many grizzly bear management issues, and grizzlies themselves, transcend individual jurisdictional boundaries—such as state lines, national forests, national parks, and international borders—interagency cooperation was needed to implement an effective, efficient, and uniform recovery program. Interagency efforts associated with grizzly bear management and research began with the formation of the Interagency Grizzly Bear Study Team in 1973. This was in response to a suggestion made by the National Academy of Sciences following their review of grizzly management controversies in Yellowstone National Park. The study team was to provide information on grizzlies in the Yellowstone Ecosystem and included federal research biologists from the USFWS, the National Park Service, and the U.S. Forest Service cooperating with biologists from Wyoming, Idaho, and Montana wildlife agencies (see Chapter 3, page 34).

In 1975, the Interagency Grizzly Bear Steering Committee was formed to provide direction for the study team, and was comprised of mid-level administrators from the federal and state agencies that constituted the study team. When it became apparent in 1983 that higher-level administrators with decision-making authority were needed to effectively implement the original recovery plan, the steering committee was disbanded and replaced with the Interagency Grizzly Bear Committee (IGBC) (see Chapter 3, page 34).

The IGBC is composed of the Regional

Directors of the USFWS, the Regional Foresters administering the effected areas in the National Forest System, the regional directors of the National Park Service, the director of the Bureau of Land Management in Montana, and the directors of the wildlife agencies in Idaho, Montana, Washington, Wyoming, and British Columbia. From these members a chairman and vice-chairman are chosen to serve a two-year term (see Appendix 1).

The IGBC meets at least twice a year and is charged with coordinating research and management programs that are necessary to implement the grizzly bear recovery plan. The IGBC has a number of subcommittees, including one for research, one for information and education, and one for each grizzly bear ecosystem (see Chapter 4, pages 41, 49 and 54). The subcommittees create working groups or ad hoc task forces that perform specific tasks as they arise, such as the preparation of ecosystem chapters for the recovery plan. The IGBC also convenes review teams to consider issues common to several ecosystems or that require expertise not available in a subcommittee (see Chapter 3, page 34).

The legal standing of the IGBC is affirmed in sections 4(f)(2), 6, and 7 of the ESA, which provide for involvement of the various members in grizzly bear recovery. The real power of the IGBC is in the agreement of the members to participate and abide by the committee's decisions. Funding for the IGBC's programs apparently comes from the budgets of the members as they commit to pursuing specific programs.

[3] What is the process for delisting grizzly bears?

Listed species can be delisted for three reasons: [1] they have gone extinct, [2] they have met the recovery goals, or [3] the original listing was in error (see Chapter 2, page 26). The delisting process is essentially identical to the listing process, but in reverse (see Chapter 2, page 25). The five factors specified in the ESA to be considered in listing (see Chapter 2, page 26) also apply to delisting. Because the ESA specifies that only those five factors can be considered in the listing or delisting process, these decisions are not subject to the requirements of the National Environmental Policy Act (see Chapter 2, page 28).

The revised grizzly bear recovery plan states that grizzlies can be delisted by ecosystem, independent of the status of grizzlies in other ecosystems, and sets two overall criteria for delisting (see Chapter 2, page 21). One is the achievement of the population goals for an ecosystem. The other is the approval of an interagency conservation strategy by the IGBC and participants in the strategy, that will guide grizzly bear management following delisting (see Chapter 5, page 69).

Two grizzly bear populations, the Yellowstone and Northern Continental Divide, are close to meeting the population recovery goals for those ecosystems as specified in the grizzly bear recovery plan. In addition, a draft interagency conservation strategy for the Northern Continental Divide Ecosystem is currently being revised and the Yellowstone Ecosystem Subcommittee is beginning to prepare a conservation strategy for that population. Proposals for delisting these grizzly bear populations could appear in a few years and will likely be challenged by some environmental groups. The Cabinet/Yaak and Selkirk populations are at low levels and not close to meeting population recovery goals, thus the preparation of a conservation strategy is not being considered at this time.

[4] What is the status of the Grizzly Bear Recovery Plan?

The original grizzly bear recovery plan was completed in 1982. During 1990, a draft of the first revision of the plan was sent out for agency and public review. A second draft was sent out for review in July 1992. Numerous public hearings concerning the draft revisions were conducted and more than 2,000 written comments were received. The current version of the plan was approved in September 1993, but did not include chapters for the Bitterroot and North Cascades Ecosystems. The Bitterroot Ecosystem chapter was finalized and approved in July 1994. The North Cascades

chapter is in draft form and under review as of September 1994.

There are substantial differences between the original recovery plan and the 1993 revision. In 1982 information on grizzly populations was available in only three of six ecosystems, and the original plan focused primarily on these three areas. The original plan also set goals for increasing the information base on grizzlies in the other ecosystems for which information was lacking. In addition, the original plan essentially treated the six populations as one by stating that when recovery targets were met for the three areas with information, all grizzly bears would be delisted. The original plan did not include the requirement of an approved interagency conservation strategy for delisting.

The revised recovery plan states that grizzlies in an ecosystem can be delisted separately and sets recovery targets for each of the six ecosystems. Population recovery targets in the revised plan are based on minimum estimates for counts of females with cubs, distribution of those family groups, and mortality rates in relation to total population size. In contrast, the original plan used a total estimate for counts of females with cubs, no distribution requirement, and higher annual mortality rates. The revised recovery plan has generated controversy among scientists and environmental groups alike (see Chapter 2, pages 26-28), and a lawsuit is pending that seeks to have the plan withdrawn and rewritten (see Chapter 5, page 72). The plaintiffs in that case will be recommending larger recovery zones with habitat linkages among them, larger population goals, greater habitat protection, and better methods by which to assess recovery.

[5] What have been the actual impacts of grizzly bear recovery actions in Idaho on traditional and planned uses of federal, state, and private lands?

This is a difficult question to answer; any reply is subjective. Some would argue that there are impacts and social costs associated with grizzly bear conservation, but it is extremely difficult to separate those impacts from others associated with environmental analyses required under NEPA and the need to provide dispersed recreation, maintain old-growth forests, manage other wildlife species, conserve other imperiled species, and maintain water quality. Others would argue that there have been major environmental costs associated with traditional land-use practices and that grizzly conservation has helped to mitigate these costs. Nonetheless, timber harvesting, livestock grazing, hunting, off-road vehicle use, hiking, horseback riding, and minerals prospecting are currently taking place in grizzly bear habitat in Idaho (see Chapter 4). In grizzly habitat, modifications of these activities based on the needs of grizzlies—such as scheduling (see Chapter 4, page 44), limiting motorized access (Chapter 4, page 46), sanitation guidelines, firearms restrictions, and others—allow for the continuation of those activities and help to mitigate their effects. Although the presence of grizzly bears probably reduces the amount of such activities, this has not been documented.

Management programs for grizzly bears have been blamed for declines in timber sales from U.S. Forest Service lands in Idaho and Montana. In response to these claims, Servheen (1992) presented data for 13 national forests, focusing on the percentage of the annual allowable sale quantity (ASQ) that seven national forests with grizzly bears and six national forests without grizzly bears in Idaho and Montana achieved from 1987 to 1991. The primary assumption was that if grizzly bear management led to reduced timber availability, forests with grizzlies would not be able to sell as high a percentage of their ASQ as forests without grizzlies. The analysis showed that forests without grizzlies sold an average of 69% of their ASQ from 1987 to 1991, while forests with grizzlies sold 67% of their ASQ. The difference is not statistically significant ($t = -0.74$, $P = 0.49$), suggesting that grizzly bear management has not reduced timber sales on national forests.

This analysis does raise another question: Are national forests with grizzlies harvesting timber from areas or districts outside of grizzly bear recovery zones at a higher rate

than would otherwise occur if grizzlies were not present on portions of the forest? A definitive answer is elusive. As an example, the Bonners Ferry Ranger District of the Idaho Panhandle National Forests had 64% of their timber sales from 1986 to 1991 in areas outside of grizzly habitat. Because approximately 60% of the suitable timberland was in grizzly bear management units, one could say that 40% of the suitable timberland base outside grizzly bear habitat provided 64% of the timber sales from 1986 to 1991. One could thus say that in this one ranger district, grizzly bear management has shifted the harvesting of timber out of grizzly habitat. Implications for meeting the ASQ in the future as a result of this shift are uncertain.

The major management problem is providing grizzlies with secure habitat to reduce human-caused mortality and displacement (see Chapter 3, page 38). Providing secure habitat means limiting human access, which currently translates into restricting motorized access. But access restrictions also help the agencies meet other management objectives for water quality, other wildlife species, and dispersed recreation. Road restrictions only effect motorized vehicles; people are still free to pursue traditional activities such as berry picking, hunting, and fishing on foot, horseback, or with other non-motorized means. In addition, use of snowmobiles is generally allowed because grizzlies are hibernating at that time. However, some traditional activities, such as firewood gathering, are extremely difficult without motorized access.

Most bear management units (BMUs) for grizzlies (see Chapter 3, page 36) in Idaho have exhausted their cushion of secure habitat. As a result, when a project is proposed in grizzly habitat managers may have to either wait until another ongoing project is completed or conduct the project during the relatively short time frame when grizzlies are inactive in the winter or not present in the area (see Chapter 4, page 44). These restrictions result in relatively short periods of time to complete tasks, and unforseen problems such as equipment failures, bad weather, and sick employees can create scheduling problems that will delay current and future activities.

Although ESA section 9 takings restrictions apply to all individuals on all lands, impacts to state and private land-use activities in Idaho are relatively few. State and private lands are currently not obligated to provide secure habitat for grizzly bears, so in BMUs of mixed ownership this responsibility falls solely on the federal agencies. In a BMU in the Cabinet/Yaak Ecosystem, the Idaho Department of Lands, the U.S. Forest Service, and a private industrial timberland owner have developed a cooperative road use restriction program to increase the secure habitat base and allow access to timber on Forest Service lands that were previously devoted to meeting the secure habitat standard for that BMU (see Chapter 4, page 45).

[6] To what extent is grizzly bear recovery in Idaho compatible with existing and probable future land uses?

This question is more difficult to answer than the previous one; again, any reply is subjective. Some people believe humans and grizzlies can co-exist, others apparently do not. The compatibility of past and existing land uses may be an issue, but since the 1975 listing under the ESA, proposed projects have had to consider effects on grizzlies and be made compatible with grizzly protection and recovery.

Many people are working hard to identify the factors that lead to compatibility between grizzlies and humans, determine the degree of compatibility possible, and then develop appropriate procedures to take advantage of that compatibility. To date, such actions are embodied in the interagency grizzly bear guidelines as applied to specific units of the recovery zones under designated management situations (see Chapter 3, pages 34-38).

The continued general use of resources and recreation in grizzly bear habitat suggests that there is a degree of compatibility that can be achieved by considering the needs of grizzly bears and modifying human activities accordingly. The Northern Continental Divide and Yellowstone populations appear to have

increased, and the fact that these populations are close to meeting the delisting goals supports that approach. It is noteworthy that both of these areas contain a secure refuge area—a large national park where firearms are not allowed, thus eliminating incidental killings—and wilderness or large roadless areas around the core refuge that may act as a buffer between the parks and the areas of extensive human disturbance that exist in both areas. However, the long-term consequences of such a land classification arrangement are unknown and potentially detrimental if a population structure exists in which source-sink population dynamics are a result (see Chapter 2, page 24 and Chapter 5, page 66).

Other people argue that the delisting goals are unrealistically low and will lead to extinction, and that the continued use of grizzly habitat by people is at the expense of grizzly bears. These people believe fundamental incompatibilities exist between grizzlies and humans that can only be mitigated by further restrictions on access and use of grizzly bear habitat. The low populations in the Selkirk and Cabinet/Yaak Ecosystems seem to support that argument. Both areas are heavily roaded, do not have a large core refuge such as a national park or extensive roadless or wilderness areas as core zones or buffers, and poaching as well as accidental and malicious killings of grizzlies by people have a significant impact on these small populations. This view of fundamental incompatibility suggests several alternatives: [1] declare large areas to be inviolate grizzly bear reserves with tightly regulated human access, [2] allow grizzlies to go extinct in certain areas despite the ESA, or [3] modify the ESA or develop special legislation to allow protection of these small populations without requiring recovery goals that may not be attainable given current land-use patterns.

These contrasting views appear to be rooted in value systems and personal beliefs. Managers are attempting to strike a balance between the needs of grizzlies and humans. In some areas, managers appear to be succeeding, at least in the short term. However, people on both sides of the issue are claiming that the balance has moved too far from where they think it should be. This supports the observation that a good and fair policy involves attaining a middle ground through principled negotiation rather than trying to resolve conflicts over values. However, successful negotiations among groups with quite different values and little in common are hard to achieve. Compatibility between grizzlies and land-use activities will also be determined by the extent to which people are willing to negotiate and move toward finding common ground, which in turn is related to what they have at stake and their willingness to support the attainment of certain goals, perhaps at the expense of some others.

Focus questions five and six are currently unanswerable due to a lack of information. These questions could be addressed by comparing areas with and without grizzly bears as Servheen (1992) did with timber sale volumes relative to national forest plan ASQs. Although this is insightful, it is essentially a paired comparison with a sample size of one, and there are many other factors unaccounted for that may have also produced a similar result. In addition, many other resources and uses need to be compared such as livestock use, recreation use, water quality, species diversity, and so on. Adequate, comparable information on many of these resources does not exist. This high degree of uncertainty makes it difficult to reach a consensus on how grizzly bear management and recovery should proceed.

Perceptions of compatibility reflect the willingness of interested parties to recognize each others needs. Information on the willingness of people to accommodate grizzly bears might help address problems associated with these questions. In addition, the interaction of grizzly recovery measures and other environmental regulations and guidelines need to be estimated to attempt to isolate the effect of grizzly recovery actions. In short, assessing the impacts of grizzly bear management and the degree of compatibility with other land-use activities would require a major research effort.

Chapter 2. Grizzly Bear Ecology and Endangered Species Act Fundamentals

Grizzlies are the larger of two species of bears found in the United States, black bears being the smaller species. Grizzly bear cubs weigh somewhere between a few pounds to near 60, with adult males achieving 500 to 1,000 pounds (LeFranc et al. 1987). Grizzlies are omnivorous, consuming a wide variety of vegetation and animals. Generally, food habits follow the seasonal availability of certain foods. Following emergence from dens in the spring, succulent grasses and herbs as well as carrion of winter-killed ungulates are consumed. Newborn ungulates such as elk and moose may also be important foods for a relatively short period in the spring. As summer progresses, vegetation associated with wetter habitats is consumed along with insects and small mammals. In areas with abundant anadromous fish, this may be an important food source from mid-summer to late fall. During the fall, grizzlies need to build up fat reserves and the fruits of trees and shrubs (such as huckleberries and whitebark pine seeds) are eaten in large amounts. The remains of big-game, killed and field-dressed by hunters, may also be important at that time. Ground squirrels are often eaten prior to denning (LeFranc et al. 1987).

Grizzly bear home ranges can cover hundreds of square miles, often with considerable overlap among the ranges of individual bears. However, grizzlies are somewhat territorial in the sense that core areas of home ranges are distinct. Bears, especially females with cubs, are careful to avoid direct contact with other dominant bears. Young males disperse from their mother's home range during the spring as the breeding season begins. These subadult males (3 to 8 years old) may travel long distances in search of a new area to occupy and are subject to high rates of mortality at this time. Subadult females do not travel as far, and their range usually overlaps that of their mothers (LeFranc et al. 1987).

Grizzlies are generally most active at dawn and dusk, but behavior can vary significantly among individuals (LeFranc et al. 1987). In southern areas of their range such as Yellowstone, activity patterns are correlated with temperature. Researchers have documented activity periods throughout the night in many areas.

The breeding season generally occurs in the spring, but can occur from late April to early August, depending on location (LeFranc et al. 1987). Male and female grizzlies are generally polygamous, that is, have more than one mate. Sometimes mating pairs may stay together for as long as three weeks, sometimes for just the few minutes it takes to copulate. Litters vary in size from one to three cubs and each cub may be sired by a different male. Twins are the most common litter size.

Grizzlies generally breed for the first time between 4 and 10 years of age. Females breed every two to four years (LeFranc et al. 1987). Because of this breeding interval, most populations have low reproductive rates that are related to habitat quality, nutrition, climate, and population density. Grizzly populations are a function of social and environmental factors. Habitat quality—as determined by food resources, denning sites, and thermal and hiding cover, among other things—determines the carrying capacity of an area, and population trends are ultimately related to the size of the population in relation to the carrying capacity.

Human-caused mortality is a major factor effecting the size of grizzly bear populations.

Grizzly bears were listed as threatened in 1975 by the USFWS under the authority of the ESA (USFWS 1982, 1993*c*). At that time, six areas in the northwestern United States either supported or were suspected to contain grizzly bears. These large areas are called grizzly bear ecosystems; portions of 4 of those areas are in Idaho (Figure 1). The Yellowstone, Cabinet/Yaak, and Selkirk Mountains Ecosystems have known populations of grizzly bears. The Bitterroot Ecosystem may support a small number of resident or transient grizzly bears (Melquist

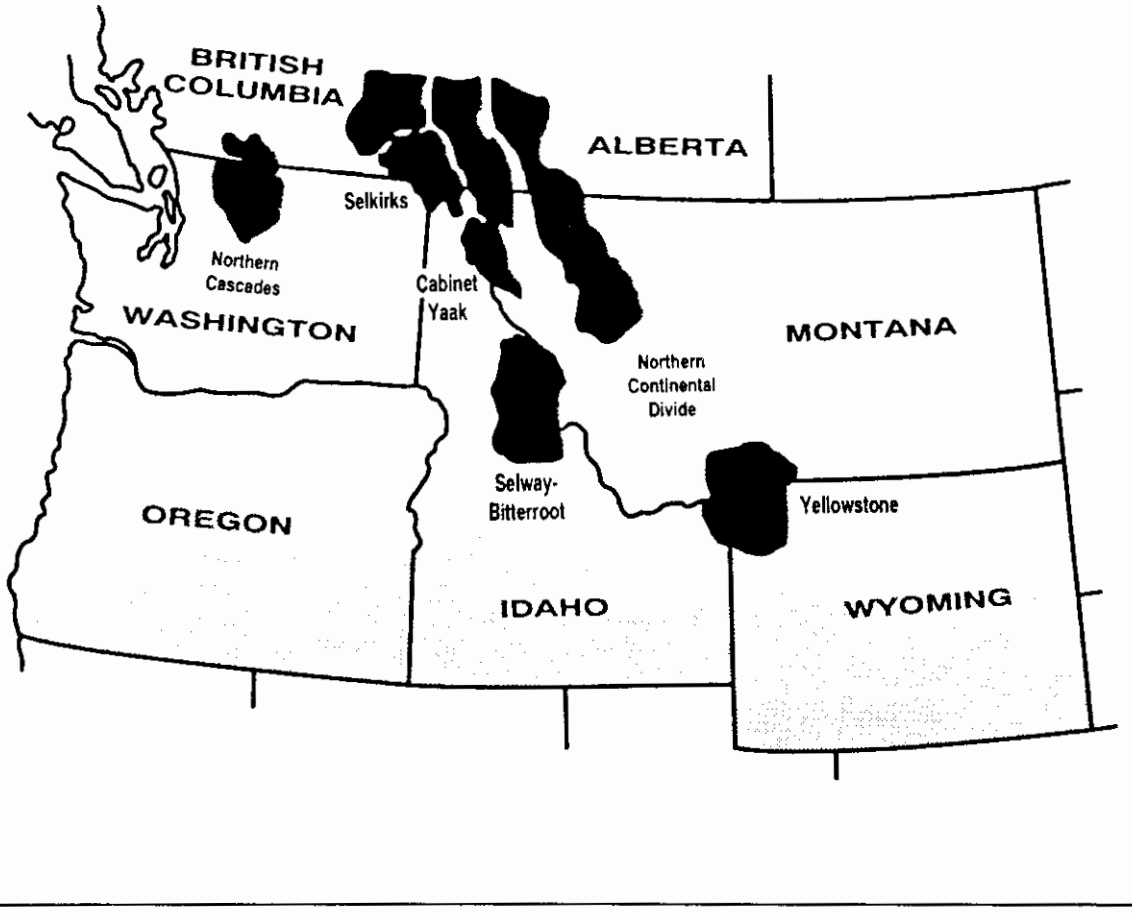

Fig. 1. Distribution of grizzly bears in the contiguous 48 United States, 1990.

Source: U.S. Fish and Wildlife Service (1993*c*).

1985, Kunkel et al. 1991, USFWS 1982, 1993*c*), but there have been no confirmed records of grizzlies in this large wilderness area, at least none since the 1940s (Moore 1984, pers. comm.).

The ESA requires the USFWS and all other federal agencies to not only protect listed species, but to also recover them (Eider-Orley 1978, Tobin 1990). The USFWS is required to develop and implement a recovery plan (ESA, § 4(f)) that will result in removing the species from the list. As is also the case with wolf recovery in Idaho (Wise et al. 1991), it is not a matter of whether or not grizzly bears will be recovered, but how, when, and where they will be recovered. To change the recovery directive would require fundamental changes to the ESA itself.

The USFWS has written two grizzly bear recovery plans (USFWS 1982, 1993*c*). The latest version was approved by the regional director of the USFWS in September 1993. Both documents described the status of grizzly bears in each area at the time, discussed the factors that led to listing and need to be corrected to recover grizzly bears, and outlined plans for their recovery. In the original plan, recovery efforts were focused on three grizzly bear ecosystems:

Yellowstone, Northern Continental Divide, and Cabinet/Yaak because little was known about grizzly bears in the other ecosystems (USFWS 1982). Since that time research and management efforts have provided information on the other three ecosystems: the Selkirk Mountains (Layser 1978, Zager 1983, Knick 1988, Wakkinen 1993, Volson 1994, Wielgus et al. 1994), the Bitterroot (Melquist 1985, Davis et al. 1986, Davis and Butterfield 1991, Kunkel et al. 1991), and the North Cascades (Almack et al. 1993). The revised recovery plan was released in 1993, and at that time did not include chapters on the Bitterroot or North Cascades Ecosystems (USFWS 1993*c*). However, the Bitterroot chapter of the plan was finalized in July 1994 and adopted as part of the recovery plan. A draft chapter for the North Cascades was sent out for review in November 1993. When it is approved, it will be added as a chapter of the revised plan. The San Juan Mountains in southwest Colorado also may be considered for grizzly bear recovery in the future (USFWS 1993*c*).

Idaho has a long history of involvement with grizzly bears both before and after the species was listed as threatened in 1975. Despite this history and the continued human use of resources in grizzly bear habitat, there is widespread concern about recovery efforts in Idaho. The reintroduction of grizzly bears to the Bitterroot Ecosystem is particularly controversial. The wide circulation of incomplete and inaccurate information and biased interpretations of current management programs and proposed recovery efforts have further complicated the situation. In addition, there is a fundamentally antagonistic relationship between humans and grizzly bears. Grizzly bears are large predators, and some bears are very aggressive. There are accounts of grizzly bears injuring and killing humans in the United States (Herrero 1985, 1990). Many people believe that grizzly bears pose a threat to life and property, and that grizzly bear management and recovery programs will mean the exclusion of people from areas of public land occupied by grizzlies, and the alteration or elimination of traditional land and resource management practices. In short, people have different attitudes about whether or not humans and grizzlies can co-exist in the same general area.

The Definition of a Species by the Endangered Species Act

A primary source of confusion among many people concerned with the impacts of the ESA is the apparent inconsistency of listing species as threatened or endangered in some regions of the United States, while the same species may be abundant and in some cases commercially exploited in other parts of this nation and in other countries. Both the grizzly bear and sockeye salmon, listed as endangered in Idaho in 1992, are good examples of this situation. Grizzly bears are abundant and legally hunted in Alaska (Table 1), and Alaskan sockeye salmon can be purchased at almost any grocery store. The ESA's definitions provide two explanations for this apparent discrepancy. First, the Act protects a species that is endangered or threatened "throughout all or a significant portion of its range" (ESA §§ 3(6), (20)). The grizzly bear is listed as threatened throughout its range in the lower 48 states. The question of whether this geographical area is a significant portion of the species range is negated by a second definition. The ESA defines "species" very broadly to include not only "any subspecies" but also "any distinct population segment of any species" (ESA § 3(16)). Under this definition, the Act's protections apply to any subspecies or distinct population segment that is threatened or endangered, regardless of the status of other subspecies or populations.

Two subspecies of grizzly bears exist: those that inhabit Kodiak, Shuyak, and Afognak Islands in Alaska (*Ursus arctos middendorfii*) and all other populations (*U.a. horribilis*). Subspecies are one level of a classification system that scientists use to describe plants and animals and their

Table 1. Estimated numbers of grizzly bears in jurisdictions of North America, mid-1980s.

Jurisdiction	Number
Alaska	32,000-43,000
Yukon Territory	6,600
Northwest Territories	4,000-5,000
British Columbia	6,000-7,000
Alberta	500-1,000
United States south of Canada	600-900
Greater Yellowstone Ecosystem[a]	272
Northern Continental Divide Ecosystems[a]	351

[a] U.S. Fish and Wildlife Service, minimum estimates as of July 1994
Source: Peek et al. 1987, except for footnote [a].

relationships to each other. Reference texts such as *Mammal Species of the World: A Taxonomic and Geographic Reference* (Honacki et al. 1982) describe the most recent subspecific classifications for groups of animals or plants. Generally, a subspecies is a specific portion of a species that is geographically separated from other populations of the same species. Although they often have characteristics such as body size or hair color that are different, individuals from different subspecies would readily interbreed if no longer separated. Interbreeding would likely lead to the loss of those physical characteristics unique to the subspecies, thus subspecies are components of biological diversity. O'Brien and Mayr (1991) stated that protecting subspecies was warranted because they all possess the potential to become a unique new species. The term "population" has been defined as "a group of fish or wildlife in the same taxon below the subspecific level, in a common spatial arrangement that interbreed when mature" (50 C.F.R. § 17.3 [1993]). Neither the ESA nor the regulations implementing the Act define the term "distinct population segment." This is the smallest group of individuals that can be considered for listing. The clear meaning of the term—a population that is separated from other populations of the species—has apparently been adopted by the USFWS. This designation is independent of whether or not a population is a subspecies. The key requirement is lack of interbreeding.

The species definitions in the ESA are somewhat hierarchial, with a species being the broadest and most encompassing, followed by subspecies, and then a distinct population segment. All three levels are treated the same under the ESA because each is defined as a species. Because the Idaho populations of grizzly bear and sockeye salmon are geographically and reproductively separated from other populations, they are treated as a different species from those in Alaska. Thus the ESA would be more accurately titled The Endangered Populations Act.

The revised recovery plan considers each grizzly bear ecosystem to harbor a distinct population segment of grizzly bears. Although these populations were once connected, they are now physically separated within the continental United States. Four of the United States populations border Canada (Figure 1), but the degree of interaction with

populations in Canada is unknown. Habitat modification, human settlement and activities, and the distances that need to be traversed probably block movements of bears among ecosystems in the United States. Thus, the members of one grizzly bear ecosystem are unlikely to interbreed with members of other ecosystems. Evidence supporting this conclusion is provided by Picton (1986), Allendorf and Servheen (1986), LeFranc et al. (1987), and Picton et al. (1990). Furthermore, the USFWS anticipates providing more definitive information on this question through habitat linkage zone evaluation studies (C. Servheen, pers. comm.).

The recognition of distinct population segments provides flexibility because it allows population segments to be delisted independently of the status of the other population segments (USFWS 1993*c*). This was not the case for grizzly bears under the original grizzly bear recovery plan, which stated that when the Yellowstone, Northern Continental Divide, and Cabinet/Yaak population segments met recovery goals, then all populations of the grizzly bear would be delisted (USFWS 1982). Focusing on individual population segments also provides the flexibility to tailor management guidelines and recovery programs to accommodate the unique conditions in each ecosystem (USFS 1979, 1984*a*, Mealey 1986, USFWS 1993*c*). At the same time, recovering population segments independently may foster the perception that recovery efforts lack coordination and may create confusion and frustration when some populations are delisted and others are not. In part, these potential problems reflect the lack of explanation and justification in the revised recovery plan for the focus on six distinct population segments in contrast to the recovery requirements of the original plan.

Listing Under The Endangered Species Act

Grizzly bears once ranged over much of North America from Alaska and the Northwest Territories to central Mexico, and from the Pacific coast to the Great Lakes (LeFranc et al. 1987, Servheen 1990). As human settlement expanded, the range of the grizzly bear decreased (Figure 2). Grizzly bears were killed for a variety of reasons and habitat modification often excluded use by grizzly bears. Today, grizzlies occupy only 2% of their former range in the lower 48 United States in remnant populations (Servheen 1990) where the risk of extinction is believed to be high (LeFranc et al. 1987, Mattson and Reid 1991). It has been estimated that 50,000 to 100,000 grizzly bears lived in the lower 48 states prior to 1800 (USFWS 1982, 1993*c*). In 1975, less than 1,000 grizzly bears still existed (USFWS 1982, 1993*c*) with estimates of 700 to 900 in 1989 (Servheen 1990).

Because of population declines, grizzly bears were included in the Secretary of the Interior's 1967 list of native species threatened with extinction. This list was assembled under the provisions of the Endangered Species Preservation Act of 1966. This act limited federal actions to: [1] compiling a list of native vertebrate species threatened with extinction, and [2] the preservation of the habitats of those species, but only to the extent practicable and consistent with the primary purposes of the federal agencies (Rohlf 1989, Tobin 1990, Kohm 1991). Rohlf (1989) described the 1966 act as a broad but toothless statement of policy.

In 1968, the National Park Service adopted a policy of natural regulation for the management of wildlife in the national parks. This policy led to the closure of garbage dumps in Yellowstone National Park that had been a major food source for grizzly bears (Craighead et al. 1974, National Academy of Sciences 1974, Craighead 1979). The idea was to restore more natural feeding habits and behavior in grizzlies (Cole 1971*a*,

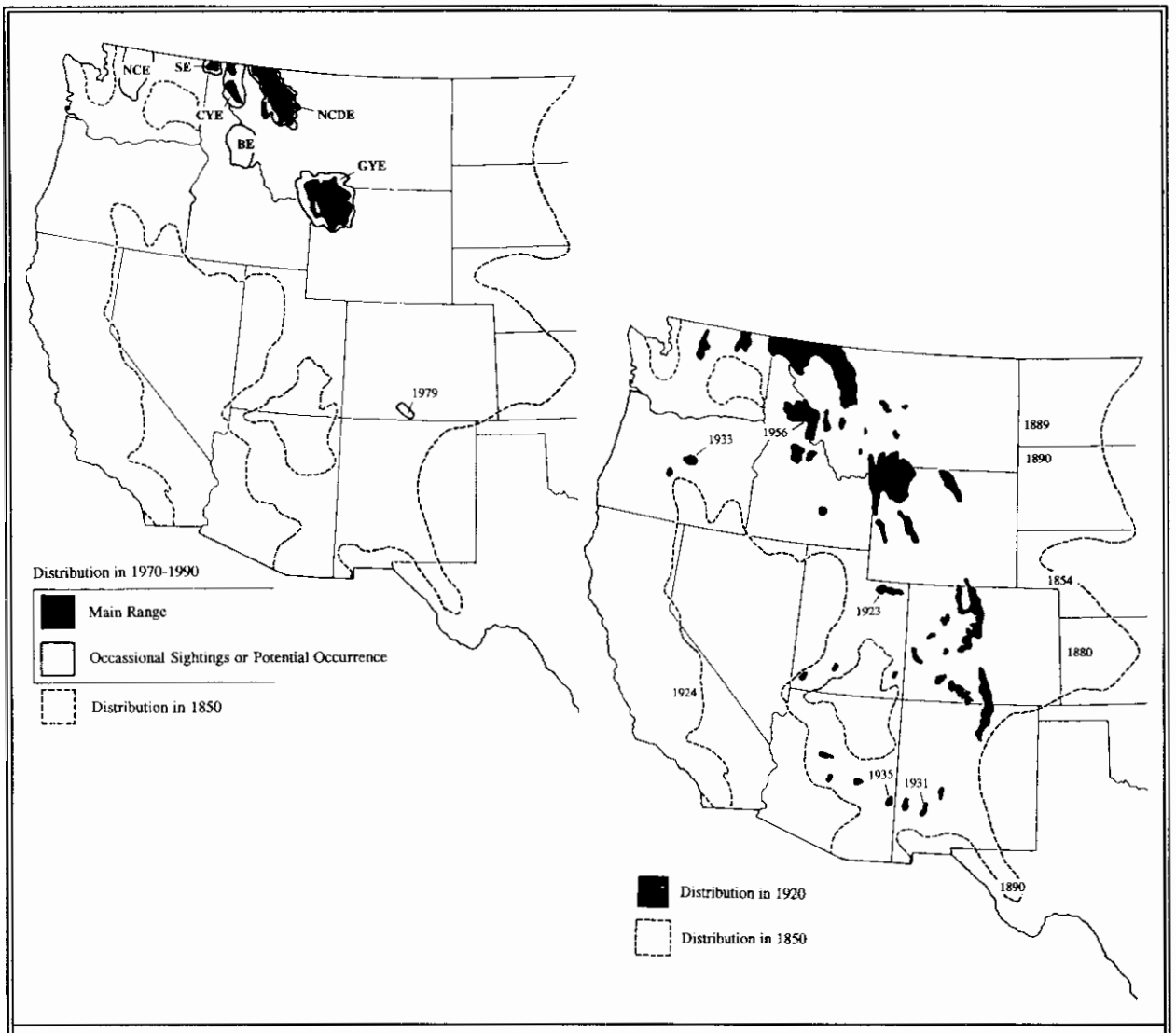

Fig. 2. Distribution of grizzly bears in the western United States in 1850, 1920 to 1990.

Note: NCE = North Cascades Ecosystem, SE = Selkirk Ecosystem, CYE = Cabinet/Yaak Ecosystem, BE = Bitterroot Ecosystem, NCDE = Northern Continental Divide Ecosystem, GYE = Greater Yellowstone Ecosystem.

1971*b*). Following the loss of this food source, both human and grizzly bear injuries and deaths increased. In March 1969, the grizzly bear was removed from the list of species threatened with extinction. Between 1968 and 1973, 189 grizzly bears were killed in Yellowstone (National Academy of Sciences 1974). Deliberate killing of grizzlies in Yellowstone prior to their removal from the list in 1969 may have been illegal (Craighead 1979).

The Listing Process. Largely due to the publicity surrounding the management of grizzly bears, a citizen group called the Fund for Animals petitioned the USFWS in February 1973 to list the grizzly bear as endangered in the lower 48 states (Craighead 1979, Jacobsen 1980, Mattson and Reid 1991). The Fund's petition initiated the ESA's four-step process for listing a species. The first step is the receipt and evaluation of a petition to list, delist, or reclassify a

species. Within 90 days of receipt of the petition, the USFWS is required to make a finding on whether it presents "substantial scientific or commercial information" indicating that the action "may be warranted" (ESA § 4(b)(3)(A)). The Fund's petition satisfied this threshold requirement, and the agency began a status review as the second step of the listing process. A status review is an evaluation of the best available biological information to determine whether a species is "endangered"—i.e., in danger of extinction throughout all or a significant portion of its range (ESA § 3(6))—or "threatened"—i.e., likely to become endangered within the foreseeable future throughout all or a significant portion of its range (ESA § 3(20)). The agency completed the status review in May 1975 and concluded that endangered status was not warranted but threatened status was. It published these findings in the *Federal Register* as a proposed rule. The final step in the process was completed with publication of a final rule in the *Federal Register* on 28 July 1975 (Jacobsen 1980). In the final rule, the USFWS concluded that four of the five factors to be considered in the listing decision as specified in the ESA (§ 4(a)(1)) applied to grizzly bears: [1] habitat modification, destruction, or curtailment of range, [2] over-utilization for commercial, sporting, scientific or educational purposes, [3] inadequate regulations, and [4] other factors, natural or manmade.

In early 1991, the USFWS was petitioned by the Fund for Animals and Mr. D.C. "Jasper" Carlton to reclassify the grizzly bear from threatened to endangered. The Fund for Animals petition included all grizzly populations in the lower 48 states, while Mr. Carlton's petition focused on the Cabinet/Yaak, Selkirk Mountains, and North Cascades Ecosystems. An initial review indicated that the information accompanying the petitions warranted some consideration of the Cabinet/Yaak and Selkirk populations, but not the others. In February 1993, the USFWS rejected these petitions because conditions in the Selkirk Ecosystem had improved substantially. In addition, the USFWS noted that a reclassification of the Cabinet/Yaak population was warranted, but this action was precluded because of an earlier agreement by the USFWS with litigants in another lawsuit to focus efforts on the backlog of candidate species in the region before taking further actions on listed species. In April 1993, the Sierra Club Legal Defense Fund filed notice that it would sue the USFWS over that ruling. The suit was filed in August 1993 and is pending in September 1994.

Threatened and Endangered Status. The most significant difference between the threatened and endangered designations is the degree of statutory protection accorded the species. The Act itself imposes stringent limitations on "takings" of endangered species (ESA § 9(a)(1)); it also allows, but does not require, the Secretary to adopt regulations protecting threatened species (ESA § 4(d)). While this accords the Secretary the opportunity to allow takings of threatened species, that alternative is limited by the requirement that the taking be for the "conservation" of the species (*Sierra Club v. Clark,* 755 F.2d 608 [8th Cir. 1985]). In the case of grizzly bears, this may be most pertinent to populations in Montana and Wyoming where state regulations list them as a game species. Montana was allowed a limited hunting season for grizzly bears (Jacobsen 1980, USFWS 1982, Dood and Pac 1993) which was terminated in August 1992 to comply with a judicial decision (*Fund for Animals, Inc. v. Turner,* 1991 WL 806232 [D.D.C. 1991]). In Idaho, the grizzly bear came under *de facto* protection in 1947 when it was no longer classified as a game animal. It is currently included on the state's threatened or endangered species list (Knick and Kasworm 1989, USFWS 1993*c*).

A reclassification of grizzly bears from threatened to endangered would not significantly increase protection of the species because management programs and guidelines will likely remain the same under the ESA, and civil penalties are the same for

both under the ESA. However, reclassification would require the designation of critical habitat. Some of the reluctance of the USFWS to change the status of grizzly bears from threatened to endangered may also be related to the subsequent requirement to designate critical habitat and prepare an environmental impact statement as part of that process (Kuehl 1993, see Chapter 2 page 28).

In addition, a change in status from threatened to endangered would indicate that past management has not worked and needs to be improved. In reality, grizzly bear management is a continually evolving process that adapts as new information becomes available and as program evaluations imply needed changes.

Recovery Goals

The revised grizzly bear recovery plan requires that two conditions be met before a population can be delisted: [1] the achievement of population goals set for that ecosystem, and [2] the approval of an interagency conservation strategy that will assure that the necessary regulatory mechanisms are in place to guarantee a sustained recovery (USFWS 1993*c*). The two most visible factors hampering the recovery of grizzly bears in the lower 48 states are human-caused deaths and inadequate habitat, in terms of quality and space (Peek et al. 1987, Shaffer 1992, USFWS 1993*c*, Wielgus et al. 1994).

Population Goals for Recovery. Population goals have been determined for each grizzly bear ecosystem based on the size of each area and its capacity to support grizzly bears (USFWS 1993*c*). Determining the population goal for each ecosystem and measuring progress toward that goal both present problems.

Grizzly bears are difficult to count because they occur at relatively low densities in areas that are often remote and inaccessible; they are highly mobile, avoid people, and use habitats where dense vegetation makes them unobservable (Knight and Eberhardt 1984). Direct monitoring of bear populations is difficult, so the USFWS has decided instead to monitor three key indicators of population status: [1] estimates of the minimum number of females with cubs, [2] the distribution of breeding females through an ecosystem, and [3] human-caused mortality (USFWS 1993*c*).

The USFWS uses these indicators of population status as recovery goals for each ecosystem by setting targets for the desired number of females with cubs and their distribution in the ecosystem, which serves as a proximate measure of the population level represented by the desired number of breeding females. Based on the estimated population, an annual acceptable mortality is determined. More specifically, the recovery goals (see Table 2) are [1] that a specific number of different females with cubs of the year be observed over a continuous six-year period, [2] females with cubs occupy at least 70 percent of the ecosystem during the six-year period, and [3] the annual number of human-caused deaths not exceed a specified percentage (4%) of the current total population estimate (USFWS 1993*c*). These three indicators are used together. Because grizzlies are polygamous the female component of the population is the most important. If females are not being killed, the assumption is that the population will be stable or increasing.

Specific numbers for each of the three recovery indicators have been determined for each ecosystem (Table 2). When these three indicators have been met for a continuous six year time period, the population will have met the population recovery goals for the particular ecosystem.

Specific rationales for setting the recovery goals for females with cubs and distribution in an ecosystem could not be found in the revised grizzly bear recovery plan (USFWS 1993*c*). However, these decisions appear to have been made by the appropriate ecosystem subcommittees (USFWS 1993*c*) of the IGBC, a high level multi-agency grizzly bear management and research coordination

Table 2. Size, potential populations, and population recovery goals for grizzly bear ecosystems in the United States.

Grizzly Bear Ecosystem	Size (acres)	Potential Populations[a]	Recovery Goals[b]		
			Females[c]	Distribution[d]	Mortality[e] Limit
Cabinet-Yaak	1,664,000	90	5	18 of 22 (82%)	4%
North Cascades	6,121,600	330	-------- not determined --------		
Northern Continental Divide	6,144,000	331	22	21 of 23 (91%)	4%
Selkirk Mountains	1,280,000	70	5	7 of 10 (70%)	4%
Bitterroot	3,465,996[f]	280	14	not determined	4%
Yellowstone	6,080,000	328	15	16 of 18 (89%)[g]	4%

[a] Based on one bear per 29 square miles, except Bitterroot which was one bear per 20 square miles (U.S. Fish and Wildlife Service 1993*c*).
[b] From U.S. Fish and Wildlife Service (1993*c*).
[c] Minimum number of unduplicated females with cubs as a running 6-year average.
[d] Females with cubs in number of bear management units (BMUs) over a 6-year period, with no 2 adjacent BMUs unoccupied.
[e] Percent of the population which is estimated from counts of females with cubs over a 3-year period. No more than 30% of the total 4% can be females. Current goals for all ecosystems are no deaths. If mortality exceeds the 4% limit the population will not be eligible for delisting.
[f] Estimated. The actual area likely will be determined through the development of an Environmental Impact statement under the provisions of the National Environmental Policy Act.
[g] Currently being re-evaluated to determine if the two bear management units (BMUs) in Idaho are still suitable as grizzly bear habitat.

effort (see Chapter 3, page 34). According to the USFWS (1993*c*) both the Yellowstone and Northern Continental Divide populations meet at least two of the three population goals. The distribution requirements for Yellowstone bears are currently being reevaluated in a five year study of two bear management units, portions of which occur in Idaho. Neither the Cabinet/Yaak nor Selkirk populations meet any of the recovery goals.

Females with cubs were chosen as a population indicator because it has been suggested that they could be counted with some reliability. Knight and Eberhardt (1984, 1985) recommended that grizzly bear population trends be assessed by using counts of female bears accompanied by cubs of the year. They felt that females with cubs were the most visible segment of a grizzly bear population and that it would be possible to reliably eliminate duplicate counts based on characteristics of the bears observed as well as the location and timing of the observations (Cole 1974, Knight and Eberhardt 1984). In addition, they suggested that a count of females with cubs was a relatively precise index, having a low variance when compared to other potential measures. However, those assumptions have not been rigorously tested, nor has the relationship in recent years between counts of females with cubs and total population trends and trends in the male segment of populations been investigated (Shaffer 1992, D. Mattson, pers. comm.) except with computer simulations (Knight and Eberhardt 1984, 1985, Eberhardt et al. 1986).

The grizzly bear recovery plan's requirement that recovery goals be met for six consecutive years is based on bear biology. Because grizzly bears breed every three years on average, population estimates are based on the number of females with cubs over a continuous three-year period (USFWS 1993*c*). In other words, in any given year only one-third of the females in the population will be accompanied by cubs born that year, so a three-year sum should represent a minimum number of females in the population. The requirement of a six-year average to meet the recovery goals is designed to take into account two breeding cycles for each female, decrease the variability in the counts, and to account for poor reproductive cycles (USFWS 1993*c*). However, a number of the assumptions underlying breeding females as a proximate measure have not been tested. There are a number of practical management considerations that need to be addressed, and this measure is controversial with some wildlife scientists (Shaffer 1992).

Because grizzly bears are hard to count, researchers have used computer models to simulate changes in grizzly bear populations and to determine which factors have the greatest influence on population trends (Shaffer and Samson 1985, Knight and Eberhardt 1984, 1985, Suchy et al. 1985, Eberhardt et al. 1986, Harris and Allendorf 1989, Allendorf et al. 1991). Some of the assumptions that these models depend upon have the support of an extensive data base and the models and outputs are constantly being refined and updated (USFWS 1993*c*). However, some assumptions are based solely on expert opinion.

Many of these modeling efforts have emphasized the importance of reducing the mortality of female grizzly bears (Knight and Eberhardt 1985, Suchy et al. 1985). The conservation of females is emphasized in the recovery plan which is supported by the results of the simulation models.

Simulations of Population Viability. A subset of the computer simulation research has focused on estimating the number of grizzly bears that are needed to have a high probability (95% to 99%) of survival for long periods (100 to 1,000 years). This branch of population studies is called viable population analysis and the analyses on grizzly bears use data from the Yellowstone population. Based on these simulations, minimum population requirements have been estimated to range from 40 to 3,800 bears (Shaffer 1978, 1981, 1987, Shaffer and Samson 1985, Suchy et al. 1985). This variation in estimates reflects model refinements, use of different assumptions, and variation in the chance of survival, as well as the time period modeled. The most recent total population estimate for the Yellowstone Ecosystem was 272 grizzly bears in 1994 (C. Servheen, pers. comm.), more than twice the minimum of 125 identified by Suchy et al. (1985), but far less than the 3,800 bears resulting from other simulations. Simulation by Dennis et al. (1991) indicated that the Yellowstone population was eventually going to go extinct, largely due to random changes in the environment, but not within what the researchers called the foreseeable future. Craighead et al. (1974) predicted extinction of the Yellowstone population sometime between 1980 and 1990. This most likely did not occur because of significant changes in grizzly bear management following the 1975 listing (see Chapter 3 and Chapter 4).

Viable population analyses are theoretical exercises generated through computer simulations. They are based on a number of assumptions, some of which are well founded, and some of which are simply best guesses by experts. The results of these analyses have not been tested through field experimentation with real animals and are extremely sensitive to changing the probability of persistence and the time period considered. Viable population estimates are simply probability statements and the actual outcome cannot be guaranteed. In other words, assuming a 95% chance of persistence for 100 years, if it were possible to establish 100 separate populations of a

minimum viable population of 90 grizzly bears each, under identical conditions, five of those populations would be expected to go extinct within 100 years. Furthermore, there is no way to predict which five would suffer that fate. With one population, there is a five percent chance that it would go extinct in 100 years, but as with tossing a coin, extinction (or getting heads) could occur with the first five years (or coin tosses). The simulation models assume that past populations, spatial structure, and demography can be projected into the future; that habitats and bear behavior are assumed to remain stable. In addition, it is also assumed that data quality and reliability (see Romesburg 1981) are suitable for such complex and sophisticated modeling.

Despite these shortcomings, many scientists and environmental groups are demanding that the USFWS set recovery goals based on population viability analyses. Basing policy on information with such high levels of uncertainty is extremely risky. However, most everyone would probably agree that although a grizzly population of close to 4,000 is very likely to persist well into the future, that goal is currently unrealistic given the amount of available habitat in the lower 48 states.

Maintaining the genetic diversity of isolated wildlife populations has been suggested to be a key element for their long-term existence. Soulé (1980) suggested that for many species, 500 breeding individuals were needed to maintain genetic viability (but see Simberloff 1988, p. 480, for a critique). Because all members of a population do not need to breed to maintain genetic diversity, another approach to estimating a minimum viable population is to estimate the ratio of the effective population size to total population size and extrapolate a minimum viable population using 500 individuals as a minimum effective population. Through computer simulation, Allendorf et al. (1991) estimated that the effective population for Yellowstone grizzly bears was about 25% of the total population. If 500 is used as the minimum effective population necessary to assure long-term survival of grizzly bears, then a total population of about 2,000 grizzly bears is needed (Metzger and Bader 1992). However, scientists have disputed the applicability of the 500 figure which is based on one study of a fruit fly (Simberloff 1988).

An emerging branch of population studies called metapopulation analysis, deals with largely independent, local populations that are distributed across a series of isolated patches. A key feature of classic metapopulation dynamics is that dispersal occurs frequently enough to recolonize patches that have gone extinct or rescue local populations from extinction (see Gilpin and Hanski 1991). Because classic meta-populations are rare in the wild (Harrison 1994) three other types of metapopulation structures have been proposed: mainland-island, patchy, and non-equilibrium metapopulations.

Dr. E.O. Garton (pers. comm.) of the University of Idaho performed an unpublished metapopulation structured viability analysis for grizzly bears using demographic data from Yellowstone and a non-equilibrium structure (i.e., no dispersal among local populations). The simulation was based solely on demography and the primary assumption was that there was little to no correlation in demographic rates among the distinct population segments or local populations. Garton's simulations indicated that grizzlies existing in a non-equilibrium metapopulation had the same chance of persistence with fewer total numbers than a single population due solely to random demographic changes. For example, with only one isolated population, about 3,800 bears are needed to have a 99% chance of survival for 1000 years. However, with as few as four local populations comprising a metapopulation, the total number of bears was estimated to be about 800. However, Dr. Garton's analysis did not consider genetic effects such as inbreeding and genetic drift on population viability.

A metapopulation structure may create

more problems than it solves. It could result in source-sink scenarios where bears from growing populations in good habitat (the source) experience higher rates of mortality when dispersing to other good habitats or when they colonize less than optimum habitats (the population sinks) (D. Doak, pers. comm.)

A problem with using minimum viable population estimates for recovery goals is that there are no reliable estimates of the ecological carrying capacity of grizzly habitats. Thus, there may not be enough suitable habitat in the lower 48 states to support the 2,000 to 4,000 grizzlies that result from these analyses. However, using a density of 1 grizzly per 25 square miles, Metzgar and Bader (1992) concluded that there was enough potential habitat in five ecosystems (Northern Continental Divide, Yellowstone, Bitterroot, Cabinet/Yaak, and Selkirk) and surrounding areas to support 2,000 bears, further noting that these ecosystems would have to be connected. To support 2,000 grizzlies, nearly all the U.S. Forest Service lands in the Northern Rockies would have to become part of the recovery zones and managed primarily for grizzly conservation (Metzgar and Bader 1992, Shaffer 1992).

The USFWS states that managing grizzly populations at minimum viable levels is risky and unwarranted (USFWS 1993*c*, p. 26). Furthermore, the wide range of estimates of population size (40 to 3,800) complicates setting management goals. For each ecosystem, the lower limit of population size for recovery is based on the area of each ecosystem and existing human factors, with the goal of maximizing grizzly bear numbers given those restrictions (USFWS 1993*c*). Maximizing grizzly bear populations is the best way to guard against extinction. Minimum viable population estimates assume that habitat conditions and human populations and activities will remain stable for the simulation period of 100 to 1,000 years, assumptions that are unlikely to hold true (Mattson and Reid 1991, USFWS 1993*c*). The size of each grizzly bear ecosystem and the estimated number of bears each can support is presented in Table 2 along with the recovery goals.

Delisting a Species

Two procedures may be used to make decisions on delisting or reclassifying a species: [1] a petition calling for listing, delisting, or reclassification, (ESA, § 4(b)(3)(A)), or [2] the requirement that the Secretary of the Interior, through the USFWS, review the status of a listed species at least every five years to determine if a change has occurred (ESA § 4(c)(2)).

A decision to delist or reclassify a species must satisfy the same procedural and substantive requirements as a decision to list. A petition to list, reclassify, or delist a species may be filed with the Secretary by any interested person. Within 90 days of receipt of a petition, the Secretary must make a finding on whether the petition presents substantial scientific or commercial information to warrant the requested action. If a petition satisfies this requirement, the USFWS must promptly commence a review of the status of the species (ESA § 4(b)(3)(A)), to be completed within 9 months, with a decision published in the *Federal Register* within 12 months of receipt of the petition. With the publication of the decision, a public comment period begins with a final decision to be adopted within one year of the initial publication (ESA § 4(b)(6)(A)).

The ESA requires the Secretary to conduct a status review of all listed species at least once every five years (ESA § 4(c)(2)). The review is to be based on the criteria used to make the initial decision on listing a species. The status review can play a major role in the reclassification and delisting process because it may indicate improvement or deterioration of the conditions for a listed species. According to Bean (1991), 17 species have either been reclassified from endangered to threatened through this process (e.g., peregrine falcon, bald eagle), or delisted (e.g., American alligator,

Aleutian Canada goose).

Recovery plans also play a major role when delisting or reclassification is proposed. The ESA requires that recovery plans include "objective, measurable criteria which, when met, would result in a determination ... that the species be removed from the list" (ESA § 4(f)(1)(B)(ii)). The USFWS (1993*c*, p.17) described the procedure that will be followed in delisting grizzly bear populations. The procedure is chronological and is outlined in Figure 3. It begins with the listing decision, followed by the development of the recovery plan, attainment of population recovery goals, approval of a conservation strategy, and then a delisting proposal and final rule.

The ESA suggests a linear process: a species is listed as threatened or endangered because of a specific problem(s), the USFWS prepares a recovery plan for the species that specifies how the threat(s) to the species will be corrected, the plan is then implemented, and the species then recovers to the point that it no longer requires protection. The key to the process is the accurate identification of the threat(s) to the species, accompanied by the development of effective management programs to correct the threat(s), and monitoring the response of the species to those programs. These three key tasks—identification of threats, correction, and monitoring—can be very difficult when dealing with imperiled species that are typically difficult to census and study. These tasks are further complicated by the fact that populations are at low levels when they are listed under the ESA.

As with listing a species under the ESA, delisting and reclassification decisions are to be based "*solely* upon the best scientific and commercial data available" (ESA § 4(b)(1)(A), emphasis added). In other words, the delisting decision is to be based on biological information; the economic impact of the decision is not to be considered.

A species can be delisted for any of the following reasons: [1] the species has gone extinct, [2] the species has recovered, and [3] the data on which the species was originally designated as threatened or endangered was in error (50 CFR § 424.11(d)(1)-(3) [1992]). If a species has been proposed for delisting because it has recovered, its status is to be evaluated in relation to the five factors considered in the listing process: [1] the present or threatened destruction, modification, or curtailment of a species habitat or range, [2] overuse for commercial, recreational, scientific, or educational purposes, [3] disease or predation, [4] the inadequacy of existing regulatory mechanisms, or [5] other natural or manmade factors effecting the species' continued existence (ESA § 4(a)(1)). If the best scientific and commercial data available substantiates the conclusion that the species is no longer endangered or threatened relative to the above factors, it is to be delisted.

The grizzly bear recovery plan is controversial. Some people do not believe that it is adequate to promote grizzly bear recovery, especially over the long-term (Shaffer 1992). In December 1993, at the IGBC meeting in Denver, Colorado, a coalition of environmental groups presented a copy of a letter sent to Secretary of the Interior Bruce Babbitt, suggesting that the plan be withdrawn and a completely new plan be developed (J.G. MacCracken, pers. observ.). Those environmental groups felt that the plan does not designate large enough recovery areas and high enough population goals, that the monitoring methods are not proven, and that the plan does not contain any standards for habitat protection. In general, these concerns center around the needs of grizzly bears to insure long-term survival for more than 100 years. However, there are other conservation groups that generally support the plan, recognizing that refinements will be made as more information is gathered (H. Fischer, pers. comm.).

On the other side of the issue are those that oppose the recovery plan because they oppose grizzly bear recovery outright, or feel that the plan is too restrictive (USFWS

I. Recovery Plan Revision Draft

II. Agency and Public Review

III. Final Revised Recovery Plan

IV. Achievement of Recovery Targets in Revised Recovery Plan

Conservation Strategy Developed
Review
Public Comment
Incorporate Comments
Final Conservation Strategy

V. Formal Consideration of Delisting Population

A. *Federal Register* Publication of Proposed Rule Change referring to:

1. Achievement of recovery targets demonstrated with biological data
2. Demonstration of the existence of adequate regulatory mechanisms (by reference to final Conservation Strategy) which will remain in place after delisting.

B. Comment Period

1. 120 days for written comments
2. Public meetings to solicit comments
3. Incorporate all comments and any new information developed as part of the comment period
4. *Federal Register* publication of Final Rule Challenge for delisting or to remain listed based on results of the process

Figure 3. Chronological events in grizzly bear delisting procedures.

1993*c*). The USFWS received 2,113 comments on the 1992 draft recovery plan revision. About one-half of the comments were general statements either for or against the plan. Of these 1,030 general comments, 65% were in support of the plan or felt that it required more stringent guidelines, the other 35% were opposed to the plan or felt it was too restrictive (USFWS 1993*c*). Much of the opposition to the plan centered on the presumed negative impacts of grizzly bear recovery to local economies. Also of concern was the possibility that the government may purchase private property from willing sellers and that road density standards were too low.

The other half of the public comments on the draft revision were more specific, such as on the size of the recovery zones, the need for habitat linkages, road density standards, etc. These comments could not be easily interpreted as either supporting or not supporting grizzly bear recovery (USFWS 1993*c*).

The recovery plan is also highly controversial within the scientific community. Twenty biologists, led by Mark Shaffer (1994) of the Wilderness Society, also wrote Secretary Babbitt and USFWS Director Mollie Beattie in January 1994 requesting the plan be withdrawn and revised. These scientists suggested that the plan lacked scientific credibility, established inadequate recovery criteria, used unproven population monitoring methods, and did little to provide effective and quality habitat for grizzly bears. They also noted that none of the four factors that led to the initial 1975 listing (see Chapter 2, page 20) has improved and that the plan did nothing to improve them.

In response to that letter, another group of 25 scientists led by Professor Hal Salwasser (1994) of the University of Montana also wrote to the Secretary and Director in February 1994 expressing support for the plan. They cited decreased human-caused mortalities, recent population increases, and progress on habitat protection as positive accomplishments that the revised plan would build on. They also emphasized the progress in efforts to restore grizzlies to the Bitterroot and North Cascades Ecosystems, and suggested that studies of habitat linkage zones as outlined in the plan should also proceed without delay. Apparently, restoration of grizzlies to the Bitterroot (see Chapter 4, page 54) and North Cascades Ecosystems is contingent upon approval of those chapters for the recovery plan and the recovery plan as a whole, since recovery efforts cannot proceed without an approved plan.

It should be kept in mind that the 1993 recovery plan is a revision of the 1982 plan, and is a relatively short-term planning document that will be reviewed and possibly revised every five years (USFWS 1993*c*). Given this planning time frame, some people suggest that concerns for the status of grizzly bear populations 100 to 1,000 years from now are beyond the scope of the current recovery planning effort. The counter argument is that the future of the species will be determined in the near-term because if opportunities to meet long-term goals are not considered now, they may be lost forever. Because these concerns are common to all ESA recovery plans, Scott et al. (1994) suggested that recovery planning take a two-tiered approach, with long-term and short-term goals formulated in the plan and current social and economic constraints identified.

The Endangered Species Act and the National Environmental Policy Act

An area of controversy with recovery plans is their relationship to the National Environmental Policy Act (NEPA) and the development of an environmental impact statement (EIS). Nearly 15% of the more than 2,000 public comments on the 1992 draft recovery plan revision stated that the plan should be subject to the NEPA process.

Recovery Plans. The USFWS (1993*c*) stated that the grizzly bear recovery plan was exempt from NEPA because it is not a decision document that allocates resources on public lands, but is instead solely a biological document. Implementation of the plan will be through the adoption of its recommendations in the context of action decisions made primarily by other federal agencies, specifically the U.S. Forest Service and National Park Service (USFWS 1993*c*). When the grizzly bear recovery plan recommendations are adopted by other federal agencies, they will then come under the NEPA process and appropriate NEPA documents will be prepared. Thus, in the case of the grizzly bear, the recovery plan is a recommended strategy to be applied to actions taken primarily by other federal agencies. This is consistent with Jacobsen's (1980, p. 7) assertion: "The Fish and Wildlife Service does not have the authority to tell another agency what it can or cannot do.... [US]FWS provides biological advice and opinions ..., but the final decision and authority rests with the federal agency." However, other agencies are unlikely to challenge a jeopardy opinion by the USFWS

because of interagency consultation requirements under section 7 of the ESA (see Chapter 3, page 31).

The USFWS interpretation of the relationship between recovery plans and NEPA is untested but appears to be legally sound. Section 102(2) of NEPA requires that "all agencies of the Federal Government shall include in ... major Federal actions significantly effecting the quality of the human environment," a statement of the environmental impacts. The recovery plan is not a major federal action as that term has been interpreted because no action is being proposed. The plan merely establishes recovery goals and suggests or recommends management strategies. The fact that it may effect subsequently proposed actions such as timber harvesting, road building, and a variety of recreation activities does not transform the recovery plan into a proposed action. However, the USFWS interpretation of what a recovery plan should do is currently being challenged (see Chapter 5, page 72).

Other Agency Decisions. The relationship between the ESA and NEPA varies with the decision the agency is making. For our purposes, agency decision-making under the ESA can be divided into four categories: [1] the listing/delisting decision, [2] the decision to designate critical habitat, [3] the decision to authorize, fund, or carry out an activity, and [4] reintroductions.

[1] Listing/delisting.—The USFWS is not required to prepare a NEPA document —either an EA or EIS—when it decides to list or delist a species. In *Pacific Legal Foundation v. Andrus* (657 F.2d 829 [6th Cir. 1981]) the court held that the Secretary (and thus the USFWS) was not required to prepare NEPA documents on a decision to list seven species of freshwater mollusks. The court held that the ESA precluded the Secretary from considering the environmental impacts of the decision. The ESA allows the Secretary to determine only whether the species is endangered or threatened—that is, whether it "is in danger of extinction" or "likely to become [so]" (ESA §§ 3(6), (20)). Because the Secretary is prohibited by the ESA from considering the environmental impacts of the listing decision, NEPA is inapplicable to that decision.

This conclusion has been buttressed by the subsequent amendment of the ESA to specify that the listing decisions be based "*solely* upon the best scientific and commercial data available" (ESA § 4(b)(1)(A), emphasis added). Because Congress has stated that the listing decision is to be a biological decision, the environmental impacts of the decision *cannot* be considered. The rules covering listing decisions also apply to delisting decisions.

[2] Critical habitat.—Critical habitat for grizzly bears has not been officially designated. The USFWS proposed critical habitat for the grizzly bear in November 1976 (Jacobsen 1980). Kuehl (1993), citing Yaffee (1982), stated that the proposed rule was never finalized due to political opposition. Furthermore, the USFWS is not required to designate critical habitat for grizzly bears because they were listed in 1975, which was prior to the critical habitat requirement made in 1978 amendments to the ESA. Species listed prior to the amendment were exempted from critical habitat designation requirements (Kuehl 1993).

If grizzly bears were reclassified from threatened to endangered, the designation of critical habitat would be required with the status change (Kuehl 1993). The USFWS does not appear to be interested in pursuing critical habitat designation. Furthermore, designation would probably have minimal effect on grizzly bear management (Jacobsen 1980, Kuehl 1993) because the management directions described in the interagency grizzly bear guidelines create *de facto* critical habitat under management situation I guidelines (Craighead and Craighead 1991; see Chapter 3, page 35).

The decision to designate critical habitat is similar to a decision to list or delist a species because the designation, or any revision, is

to be made on the basis of the best scientific data available (ESA § 4(b)(2)). It differs from the listing/delisting decision however, because the Secretary is required to consider the economic impact and any other relevant impact of designating critical habitat. The Secretary may exclude any area from critical habitat if he determines that the benefits of exclusion outweigh the benefits of specifying the area as critical habitat, unless he determines that the failure to designate the area as critical habitat will result in the extinction of the species (ESA § 4(b)(2)).

The critical habitat decision thus involves agency responsibilities that are lacking in the listing/delisting decision. It is not surprising, therefore, that when a court was presented with the question of whether NEPA required the USFWS to prepare an EIS for the critical habitat designation, it concluded that an EIS was necessary. In *Douglas County v. Lujan* (810 F. Supp. 1470 [D. Ore. 1992]), the district court held that the decision to designate critical habitat differed from the listing/delisting decision. Because the USFWS had to consider the economic impact and any other relevant impact, the agency was authorized to consider the factors specified by NEPA. Therefore, the critical habitat designation process set out in the ESA is not inconsistent with NEPA, and NEPA is not inconsistent with the ESA.

[3] Activity Decisions.—While an agency decision to authorize, fund, or carry out an activity is not *per se* a decision under the ESA, such decisions raise ESA issues because they require a determination of whether the decision will jeopardize the continued existence of a listed species or adversely effect its critical habitat. In addition, agency decisions to undertake a project will also require the agency to comply with NEPA, either by preparing an Environmental Assessment (EA) or by completing an EIS.

[4] Reintroductions.—There is another aspect of endangered species recovery plans that has been subject to the NEPA process. This involves the reintroduction of experimental populations (ESA § 10(j)) to areas that once supported the species and appear capable of supporting the species, but currently lack the listed species. Because species reintroductions are major federal actions that are authorized, funded, and carried out by the USFWS, the agency is required to comply with NEPA. Due to a high degree of public controversy, Congress directed the USFWS to prepare an EIS on wolf reintroduction in Yellowstone National Park and central Idaho. The Bitterroot chapter for the grizzly bear recovery plan recommends that grizzly bears be reintroduced to that ecosystem under the experimental-nonessential status. As with wolf recovery in Idaho (USFWS 1993*a*), the USFWS is also planning to prepare an EIS for the Bitterroot grizzly bear reintroduction program.

In general, as implementation of the ESA has evolved, the NEPA process and the ESA process have been combined. When an agency begins NEPA's EA/EIS procedures, it simultaneously initiates the ESA consultation through the preparation of a biological assessment or biological evaluation, and determines whether any listed species present in the area are likely to be effected by the proposed action.

Chapter 3. Grizzly Bear Management—General

Federal and state agencies in Idaho have been operating in grizzly bear habitat for decades. In addition, the IGBC, composed of federal and state agency leaders, has overseen grizzly bear management and research programs for the last decade. The Yellowstone ecosystem has served as a model for developing grizzly bear management guidelines and procedures (Mealey 1986). A number of legal mandates set forth by the ESA drive these management approaches and programs.

Protection Mandates of the Endangered Species Act

The ESA mandates two different types of protection for listed species. First, section 7 prohibits federal agencies from authorizing, funding, or carrying out actions that will jeopardize listed species and damage their critical habitat. Second, section 9 prohibits any person from taking an endangered species.

The legal mandates are stated in terms of the entities subject to them rather than in terms of land ownership. While section 7 applies only to federal agencies, it significantly effects private entities that require federal authorization. As a result, under some circumstances either or both of the mandates may apply to actions undertaken on federal, state, and private lands. For example, if an action to be undertaken on private land by a private party requires a federal permit, both section 7 and section 9 prohibitions apply. Similarly, a private person may not take an endangered species on public or private lands even if the conduct that results in the taking does not require a federal permit.

Section 7—**No Jeopardy.** This section of the ESA applies to "any action authorized, funded, or carried out" by a federal agency. Thus, all private activity that requires a federal permit falls within the purview of the section 7 prohibitions. This includes not only actions such as the sale of timber from federal lands but also the issuance of Clean Water Act permits. Section 7 imposes two constraints on agency decisions: the agency action must not [1] be "likely to jeopardize the continued existence" of a listed species, or [2] "result in the destruction or adverse modification" of the species' "critical habitat" (ESA § 7(a)(2)).

The USFWS has defined the term jeopardize as an action that would be expected, directly or indirectly, to appreciably reduce the likelihood of *both* the survival and recovery of a listed species in the wild by reducing its reproduction, numbers, or distribution (50 CFR § 402.02, emphasis added). Thus, any action funded, authorized, or carried out by a federal agency cannot appreciably reduce the chances of the survival and recovery of a protected species.

The application of this no-jeopardy standard to any particular action will generally involve a unique mix of factual elements. This precludes a precise specification of the actions that might be prohibited under the ESA. For example, timber harvesting *per se* may not be a problem for grizzly bears and may actually improve habitat in some instances (Mealey 1986). However, the roads associated with harvesting timber increase human access, which can result in the killing of grizzly bears, or bear-human conflicts that result in the removal of the nuisance bear, or displacement of grizzlies from important habitat (USFWS 1993*c*).

To insure that a federal agency complies with these substantive standards, the ESA established procedures requiring the agency to consider the possible impact of its proposed action on listed species. Before entering into any contracts or making any irreversible or irretrievable commitment of resources, the agency is required to request information from the USFWS on whether any listed or candidate species may be present in the area (ESA § 7(c)(1)). If a species may be present, the agency is required to conduct a biological assessment to determine whether the species is likely to be effected (ESA § 7(c)(1)). If the agency determines that the proposed action is likely to effect a listed species, it must consult with the USFWS to determine whether the proposal is likely to violate the prohibitions,

i.e., jeopardize the continued existence of the species and prospects for recovery, and result in the destruction or adverse modification of its critical habitat (ESA § 7(a)(2)). Consultation results in the preparation of a biological opinion by the USFWS that states the likely effects of the proposed action on the species.

Consultation generally results in modification of a proposed action that might otherwise jeopardize a listed species. The ESA specifies that when the USFWS finds either jeopardy or adverse modification, the agency is to suggest "reasonable and prudent alternatives" that will avoid the jeopardy and adverse modification prohibitions (ESA § 7(b)(3)(A)). Thus, section 7 consultations rarely result in the termination of a proposed project. However, they can delay projects and result in mitigating actions that were not part of the original plan.

Although the USFWS has no authority to prevent other agencies from taking actions that will jeopardize a species, an action agency generally will not proceed with the action if the USFWS issues a jeopardy opinion because the action agency is aware that it may be subject to litigation. If the action agency wishes to proceed with an action despite a USFWS finding of jeopardy, it may seek an exemption for the action from the Endangered Species Committee, or God Squad as it has come to be known (ESA §§ 7(e), (g), (h)).

***Section 9*—Taking.** The second legal mandate—the prohibition against taking an endangered species—applies not only to federal agencies but also to "any person subject to the jurisdiction of the United States" (ESA § 9(a)(1)). While the section applies of its own force only to endangered species, section 4(d) of the Act authorizes the Secretary to impose the same prohibitions to protect species listed as threatened. Under this delegation of authority, the Secretary has authorized a general rule applying the section 9 prohibitions to threatened as well as endangered species unless a regulation is adopted specifically exempting the threatened species (50 CFR § 17.31 [1992]). The USFWS had adopted special provisions applicable to the taking of grizzly bears (50 CFR § 17.40(b)(1)(i)(B)-(F) [1992]).

The ESA contains an all-encompassing prohibition of conduct that harms an endangered species: it is illegal for any person subject to the jurisdiction of the United States to take an endangered species within the United States, its territorial seas, or upon the high seas (ESA, § 9(1)(B)-(C)). The ESA not only prohibits actions that result in the death of an identifiable member of the species, it also prohibits a wide range of non-lethal conduct because take is defined very broadly as meaning to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such activity (ESA § 3(19)). As inclusion of the terms harass and harm demonstrate, the definition was drafted in the broadest possible manner to include every conceivable way in which a person can take or attempt to take any fish and wildlife (S. Rep. 307, 93rd Cong., 1st Sess. 7 [1973]). Indeed, the drafters intended the definition of take to be sufficiently broad to allow the regulation of the activities of birdwatchers where they might disturb birds and make it difficult for them to hatch or raise young (H.R. Rep. 412, 93rd Cong., 1st Sess. 11 [1973]). Thus, a person may take a species without actually killing it. The court did not require dead snail darters floating in the impoundment behind Tellico Dam to determine that a taking had occurred (see *TVA v. Hill*, 437 U.S. 153, 165-66, 184-85 [1978]; *Palila v. Hawaii Dept. of Land and Nat. Res.*, 649 F. Supp. 1070, 1076 n.22 [D. Hawaii 1986], *aff'd*, 852 F.2nd 1106 [9th Circ. 1988]).

One way to indirectly take a species is to adversely modify its habitat. For example, the Hawaii Department of Land and Natural Resources, which managed a state game preserve to produce feral goats and mouflon sheep for hunting, was held to be taking the endangered Palila, a small finch, because the grazing habits of the sheep and goats prevented the regeneration of the mamane trees that were the bird's food source. In requiring the state to remove the sheep and goats, the District Court offered a discussion of harm as the term

is used in the taking prohibition: "[a] finding of harm does not require death to individual members of the species; nor does it require a finding that the habitat degradation is presently driving the species toward extinction. Habitat destruction that prevents recovery of the species by effecting essential behavioral patterns causes actual injury to the species and effects a taking under Section 9 of the Act" (*Palila v. Hawaii Dept. of Land and Nat. Res.*, 649 F. Supp. 1070, 1076 n.22 [D. Hawaii 1986], *aff'd*, 852 F.2d 1106 [9th Cir. 1988]).

A similar result was reached in a challenge to U.S. Forest Service timber harvest policies. The court concluded that the even-aged management program that the agency employed was taking the red-cockaded woodpecker: "It is uncontested that a severe decline in the population of woodpeckers has occurred in the past ten years. Harm does not necessarily require proof of the death of specific or individual members of the species...but as the numbers show themselves, large percentages of the few remaining birds have died" (*Sierra Club v. Lyng*, 694 F. Supp. 1260, 1270-71 [E.D. Texas 1988]).

The crucial point is that while the death of an individual member of an endangered species is clearly a taking, a taking may also occur from conduct that does not actually cause an identifiable death. Activities that adversely effect normal behavioral patterns of the protected species are also prohibited. Habitat modification that precludes the recovery of the species may itself be a taking. The USFWS has incorporated these principles into its regulatory definition of harm as "an act which actually kills or injures wildlife [and which] may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering" (50 CFR § 17.3 [1992]).

The Circuit Court of Appeals for the District of Columbia has recently rejected this interpretation of harm in *Sweet Home Chapter v. Babbitt* (17 F.3d 1463 [D.C. Cir. 1994]). The court held that the agency's definition of harm as habitat modification was inconsistent with the identifying characteristic of the other terms in the statutory definition of take, which the court saw as "the perpetrator's direct application of force against the animal taken."

The USFWS has announced that it will appeal *Sweet Home* to the United States Supreme Court. In the interim, the USFWS will continue to follow the Ninth Circuit Court of Appeals holding in *Palila v. Hawaii Dept. of Land & Natural Resources* in Idaho and the other states within the Ninth Circuit.

Federal lands. The mandates of both sections 7 and 9 are applicable to federal land-use activities. Thus, during the recovery of the grizzly bear, actions on federal lands are subject to two distinct restrictions. First, the agency must not authorize, fund, or carry out any activity unless it can insure that the action is not likely to jeopardize the continued existence of a listed species. Second, the agency and its personnel may not engage in actions that take a listed species, including adverse modification of habitat that would preclude recovery.

State and Private Lands. These two categories of land ownership are treated together because the ESA does not distinguish among non-federal lands.

As previously noted, both the section 7 prohibition on jeopardizing listed species and the section 9 prohibition on taking endangered species apply to any action "authorized, funded, or carried out" by a federal agency (ESA § 7(a)(2)). If the proposed use of the state or private lands requires federal authorization or involves federal funding, the section 7 mandate is applicable. Similarly, the section 9 taking prohibition is fully applicable both to the state and its employees and to private entities.

The Endangered Species Act and private property taking by the federal government.—The Fifth Amendment to the United States Constitution limits the range of constraints that may be imposed by governments on the use of private property. Despite the amendment's phraseology, the Supreme Court has applied the taking

prohibition to state-owned as well as privately-owned property (e.g., *United States v. 50 Acres of Land*, 469 U.S. 24, 31 [1984]; *Block v. North Dakota ex rel. Board of University & School Lands*, 461 U.S. 273, 291 [1983]). As a general matter, "while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking" (*Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 415 [1922]). How far is "too far" has presented problems for the past 70 years because it involves an essentially case-by-case factual inquiry (*Penn Central Transportation Co. v. New York City*, 438 U.S. 470 [1987]). A taking determination does not have clear rules, but as long as the owner retains some economic use it can be said that the government has not taken land simply because it prevents the most economically advantageous use of the land (e.g., *Keystone Bituminous Coal Ass'n. v. DeBenedictus*, 480 U.S. 470 [1987]). The Supreme Court's most recent takings case reaffirms this position (*Lucas v. South Carolina Coastal Comm'n*, 112 S. Ct. 2886 [1992]). Thus, restrictions on the use of land to prevent the taking of a listed species are unlikely to result in a taking of property by the government in a legal sense, unless the property owner loses the full economic value of the land.

A second point on takings is particularly relevant to predators such as grizzly bears. The prohibition against taking a listed species does not result in a compensable taking of property by the government even if the listed species destroys the property. For example, Richard Christy grazed sheep on leased land adjacent to Glacier National Park in Montana. In July 1982, grizzly bears began nightly raids on his flock, resulting in the loss of about 20 sheep. On 9 July 1982, Mr. Christy shot and killed a grizzly bear. For taking a listed species, he was assessed a civil penalty of $2,500. His challenge to the constitutionality of the penalty was rejected by the Ninth Circuit Court of Appeals. Noting that the ESA merely operates to bar certain means of defending property from grizzly bears, the court held that the statute, as applied to prevent Mr. Christy from killing grizzly bears in defense of his property, did not deprive Mr. Christy of his property without due process of law (*Christy v. Hodel*, 857 F.2d 1324, 1329n.4, 1331 [9th. Cir. 1988], *cert. denied sub. nom. Christy v. Lujan*, 490 U.S. 1114 [1989]).

Thus, as a general matter, the fact that a state or an individual is prohibited from making some uses of the land, even if those are the most economically advantageous uses, does not necessarily mean that property rights have been taken.

The Interagency Grizzly Bear Committee

As with many grizzly bear policies and procedures, the Interagency Grizzly Bear Committee (IGBC) originated with the controversy surrounding the management of grizzly bears in Yellowstone National Park. Authority for interagency cooperation in listed species conservation is provided in sections 4(f)(2), 6, and 7 of the ESA. The first interagency effort was begun in 1973, with the creation of the Interagency Grizzly Bear Study Team upon the recommendation of the National Academy of Sciences (1974). The study team was originally composed of researchers from the National Park Service, the U.S. Forest Service, and the USFWS, closely cooperating with researchers from Wyoming, Montana, and Idaho (Mattson and Craighead 1994). Its mission was to bring objectivity to grizzly bear research and management in Yellowstone National Park (National Academy of Science 1974). Since 1973, the study team has been reduced to two permanent National Park Service research biologists based at Montana State University in Bozeman, and 8-10 seasonal biologists each year (Mattson and Craighead 1994). These individuals are now part of the National Biological Survey.

The IGBC began as the Interagency Grizzly Bear Steering Committee, which was instituted in 1975 to provide direction for the study team (Strickland 1990, Mattson and Craighead 1994). The steering committee was composed of representatives from the USFWS, National Park Service, U.S. Forest Service, and the

States of Idaho, Montana, and Wyoming.

In 1983, the steering committee was disbanded and replaced with the IGBC. A memorandum of understanding recommended that higher-level administrators with decision-making authority make up the new committee. Primm (1992) and Mattson and Craighead (1994) stated that this move was in response to a crisis, predicated by two consecutive years of high grizzly bear mortality in the Yellowstone population and the preliminary results of a computer simulation study suggesting that the population was still declining and could become extinct in 20 to 30 years (Primm 1992). An alternative interpretation is that with the signing of the original recovery plan in 1982, the Grizzly Bear Recovery Coordinator, who was hired in 1981, realized that high-level interagency cooperation was needed in order to implement the recovery plan. In addition, the steering committee was focused primarily on Yellowstone and the recovery plan dealt with all grizzly bear ecosystems (C. Servheen, pers. comm.).

The IGBC is currently made up of the regional directors of the USFWS and National Park Service, the Montana Director of the Bureau of Land Management, three regional foresters of the U.S. Forest Service—Region 1, Northern Rocky Mountains; Region 6, Pacific Northwest; and Region 4, Southern Rocky Mountains—and the directors of the Fish and Game Departments or equivalents of British Columbia, Idaho, Montana, Washington, and Wyoming (Appendix 1). A chairperson and vice-chairperson are elected from among these members every two years.

A number of subcommittees, working groups, and ad-hoc task forces also operate under the direction of the IGBC. These units are composed of mid-level state and federal agency management personnel as well as management and research field biologists. These people usually have extensive experience in the area of concern or the issue under investigation. Appendices 1-4 list the current membership, as of early 1994, of the IGBC and ecosystem subcommittees that occur in Idaho.

The IGBC currently has subcommittees for each grizzly bear ecosystem as well as a Research Subcommittee. A public information task force was established in 1984 and became the Information and Education Subcommittee in 1986 (Strickland 1990). In September 1993, the Northwest Ecosystems Management Subcommittee was dissolved and three separate subcommittees were established for the North Cascades, Bitterroot (Appendix 2), and combined Selkirk-Cabinet/Yaak Ecosystems (Appendix 3).

Working groups and task forces are often assembled to deal with specific issues as they arise. For example, before it was disbanded the Northwest Subcommittee created two working groups to prepare chapters for the North Cascades, and Bitterroot Ecosystems for the revised grizzly bear recovery plan. These working groups have become ecosystem subcommittees.

Examples of the types of issues that task forces deal with include: [1] supplemental feeding of grizzly bears in Yellowstone National Park (Strickland 1990), [2] access management (Interagency Grizzly Bear Committee 1994), [3] Yellowstone livestock depredations (see Chapter 4, page 52), and [4] cumulative effects modeling (see page 38, this chapter).

Interagency Grizzly Bear Guidelines

The interagency grizzly bear guidelines (Mealey 1986) are broad, generalized instructions on how to manage timber, range, wildlife, recreation, mineral, watershed, and special-use programs in relation to grizzly bear conservation on federal lands. The guidelines were originally approved in 1978 (Mealey 1988) and originated in informal protocols that federal agencies developed under the consultation requirements of section 7 of the ESA. The guidelines are intended to streamline the section 7 consultation process.

The IGBC adopted the guidelines and submitted them to the USFWS for section 7 consultation in 1979 (Mealey 1986). Although the USFWS approved the guidelines in a 1979 biological opinion, the agency concluded that

section 7 consultation on specific actions and management plans would continue to be required. The latest revision of the guidelines occurred in 1986 (Mealey 1986, 1968).

In practice, the guidelines are incorporated as proposals for projects develop. This may result in modification of the project or the inclusion of conservation measures to increase its compatibility with grizzly bears so that the project will obtain a no-jeopardy opinion from the USFWS during section 7 consultation.

Bear Management Units (BMUs). These are subdivisions of each grizzly bear ecosystem that have been proposed as the basis for management decision making for such considerations as habitat evaluation, cumulative effects analysis, and population monitoring (USFWS 1993*c*, Mattson 1993).

A recovery zone has been identified within each grizzly bear ecosystem; each zone was divided into BMUs by the IGBC subcommittee for each ecosystem with subsequent approval by the IGBC. A BMU is about 100 square miles, roughly the size of an average adult female home range (USFWS 1982, Mattson 1993). BMUs have been defined by the distribution of bears within a recovery zone and their affinity to an area based on information produced by radio-collared bears. Each BMU must have the capability to support grizzlies and therefore must contain all seasonal habitat characteristics (i.e., spring range, summer range, and denning sites). The BMUs in Idaho are shown in Chapter 4 (see Figures 4 through 6).

Some BMUs have been subdivided into subunits. BMU subunits often define seasonally important habitats that may require special attention, but in general, subunits are inadequate to satisfy all of the annual needs of grizzly bears (Mattson 1993). Some subunits have been further divided into bear management analysis areas (BMAAs), which were defined to make it easier to apply cumulative effects analysis. BMAAs generally include a single watershed; BMU subunits encompass several watersheds.

Recovery zone and BMU boundaries are flexible. As new information becomes available, boundaries may be changed. Boundary changes are to be based on the best biological data and must meet certain criteria (USFWS 1993*c*). The expansion of a recovery zone should be based on data indicating that a significant number of female grizzly bears are being attracted to that area from the current recovery zone. This movement should be due to concentrations of moderate to high quality foods or other resources outside the current recovery zone. A recovery zone may be decreased if the best biological data warrants such a change, but no specific criteria have been developed, such as a lack of use by grizzly bears for a specified period of time (USFWS 1993*c*, see Chapter 4, page 49)).

Management Situations. Each BMU is assigned to one of the five management situations described in the interagency grizzly bear guidelines (Mealey 1986). A management situation defines the areas management considerations and directions (Mealey 1986, Table 6). In some BMUs, subunits are assigned a different management situation because BMU boundaries and management situation boundaries were derived independently; the first is based on biology, the later on administrative concerns. The classification of BMUs into a management situation is based on two factors: [1] the status of grizzly bears in the area, and [2] the importance of the habitat to grizzly bears in relation to human developments and administrative boundaries, including those with private and state lands (Table 3). In a few instances, guidelines specific to an ecosystem or smaller area, such as a national forest, have been developed (USFS 1984*a*).

As indicated in Chapter 4 (see Figures 4 through 6) most BMUs in Idaho are designated management situation 1, where management actions and programs are to favor grizzly bears and eliminate land uses that can not be made compatible with grizzly bears (Table 3). However, the Lakeshore BMU in the Selkirk Ecosystem of Idaho has been assigned to management situation 3. Guidelines for management situation 3 habitat are to minimize and discourage use by bears and there are no

Table 3. Grizzly bear management situations, defining conditions, and major management directions as specified in the interagency grizzly bear management guidelines.

Management Situation	Defining Conditions			Management Directions			
	Population	Habitat	Development Affects	Habitat	Bear-human Conflicts	Land-uses	Nuisance Bears
1	Bears present, population center, natural & free-ranging	Critical, key areas, needed for recovery	Likely	Maintain-improve	Minimize	Favor bear, must be compatible	Removed as last resort
2	Sometimes present	Available, not needed for recovery	Likely	Maintain potential to become situation 1	Minimize	Make compatible if possible	Removed
3	Sporadic use	Developed high human use	Likely	Not a concern	Minimize, discourage bear use	Not a concern	Removed
4	No use	Potential suitability, needed for recovery, reintroduction possible	Likely	Maintain-improve	Not a concern	Possible, only non-degrading uses	Not a concern
5	None-rare	Conditions unknown	None	Not a concern, maintenance optional	Minimize	Not a concern	Removed

restrictions on land uses due to grizzly bear considerations (Figure 5, Table 3).

Cumulative Effects Analysis and Modeling

The regulations implementing section 7 of the ESA require the assessment of the additive or cumulative impacts of all actions on a listed species (50 CFR, § 402.14(g)(3)). A cumulative effects analysis was required by a Department of Interior Solicitor's opinion in 1978; the analysis essentially tracked the NEPA regulatory definition of a cumulative effect. This includes past, present, and future actions, as well as those of private landowners and state agencies (Rohlf 1989). Many projects have a relatively small impact on a listed species when considered individually. However, as projects increase in number and as implementation strategies overlap in time and space, their cumulative effects may jeopardize the existence of a listed species.

Technically, the effects of proposed actions and all past actions by federal agencies are to be considered during section 7 consultation. The cumulative effects analysis was intended to address the effects of actions on state, private, and other non-federal lands during section 7 consultation. In practice, considerations overlap in space and time to such a large extent that the section 7 consultation and cumulative effects analysis merge.

A cumulative effects analysis is performed by the agency proposing the project. It estimates the existing amount of a particular resource important to the species, the amount of "cushion" in that resource base that could be "consumed" by an action without jeopardizing the species, the amount of the resource cushion that has been or is being consumed by past and current projects, and the amount of that cushion that would be impacted by the proposed action (Rohlf 1989). If the resource will be consumed in excess of the cushion, a jeopardy opinion will be issued unless the agency can demonstrate how it will replenish the resource base and increase the cushion sufficiently to allow for the proposed action.

For grizzly bears, secure or effective habitat (see sidebar 1) is the resource most often subjected to a cumulative effects analysis (Christensen 1982, Weaver et al. 1986, USFWS 1993*c*). These analyses are the method used to monitor grizzly bear habitat (USFWS 1993*c*, Mattson 1993).

Accurate cumulative effects analysis is complex and the data requirements extensive. For such analysis to be practical, the use of a computer model is required. Habitat maps and estimates of the variables employed in the model must be continuously updated. The software for the model has been finalized. Each ecosystem eventually will have coefficient estimates specific to the conditions in that area.

In general, the grizzly bear cumulative effects model is composed of three submodels: habitat, displacement, and mortality (Figure 4, USFS 1986). The habitat submodel is based on the mapping and ranking of grizzly bear habitat components based on their importance to bears on a seasonal basis. The displacement submodel considers the type of human activities occurring in grizzly bear habitat and the relative impact of an activity on grizzly bears and their habitat. The submodel seeks to

Sidebar 1. What is secure grizzly bear habitat?

Because grizzlies can be displaced from seasonally important areas by human presence and they also suffer direct mortality due to humans, secure habitat is an area where the risk of displacement and human-caused mortality is low. These are generally inaccessible areas with low open road and trail density (less than 1 mile per square mile) or are roadless. To achieve standards for secure habitat, the Forest Service restricts motorized use of roads yearlong or seasonally. Recent studies have demonstrated that grizzlies may even avoid roads without motorized use, so requirements to reclaim roads in some areas are currently being negotiated. Occasionally, private landowners and state land management agencies cooperate in road restriction programs.

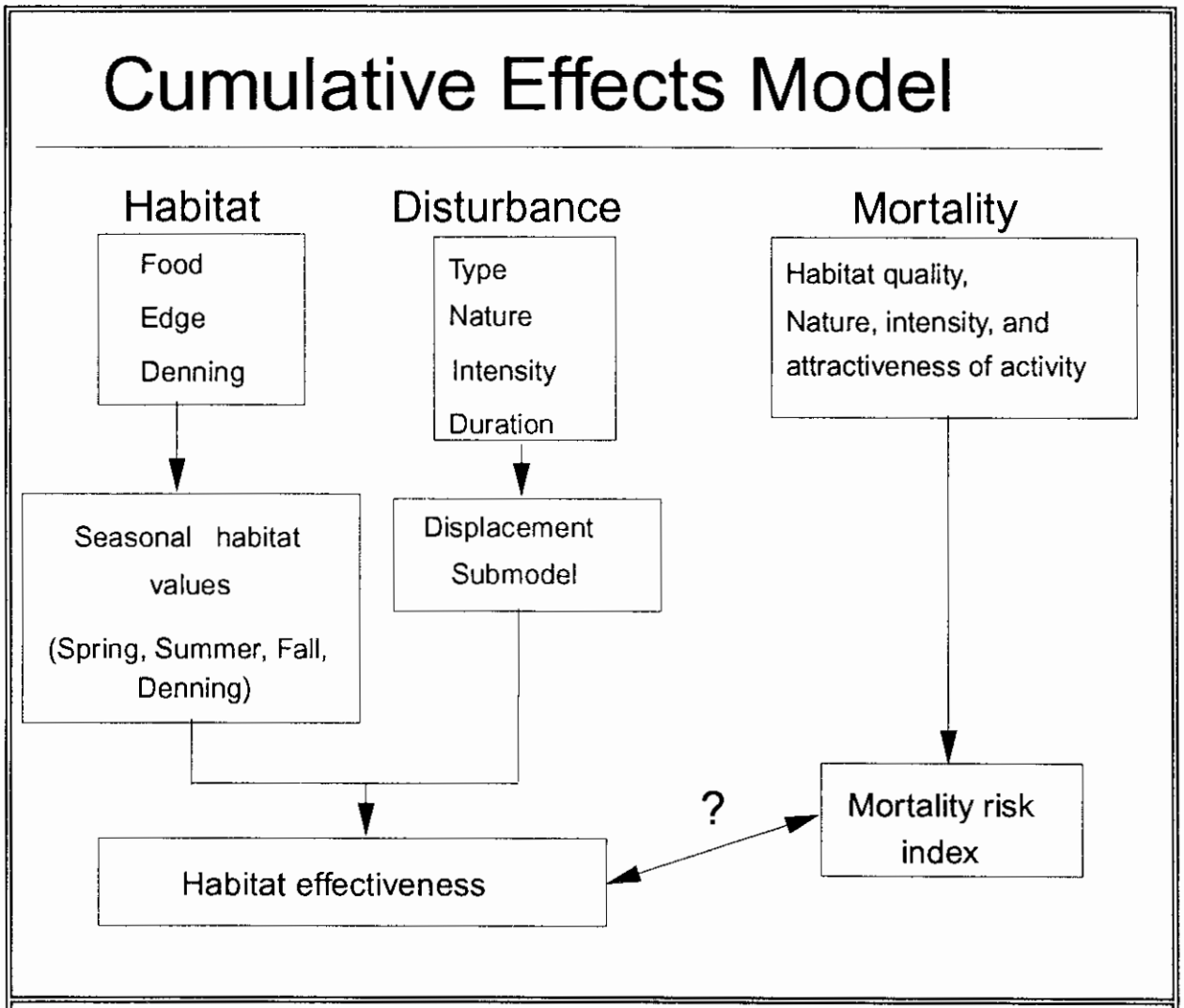

Figure 4. The grizzly bear cumulative effects model, submodels, and their interactions.

estimate the amount and type of habitat components that are consumed by an activity. The habitat and displacement submodels are combined to estimate the amount of effective or secure habitat in an area. If habitat effectiveness falls below a threshold level, then actions must be taken to increase the amount of effective habitat. Threshold values have yet to be determined (Mattson and Knight 1991, also see Chapter 5, page 67).

Human-caused mortality of grizzly bears is one of the most serious problems that grizzlies face in the lower 48 states. The risk of mortality associated with specific actions was also part of the initial cumulative effects analysis. However, mortality risk is difficult to model because it varies with the type of activity, the intensity of the activity, whether the activity is attractive to bears, and the amount of cover provided by the habitat types in the area. These factors interact and the model produced a ranking of activities by their risk of mortality. Presumably, if this rank exceeded a specified level, measures must be taken to lessen that risk. More recent efforts in cumulative effects modeling have dropped the mortality submodel because there was no logical link to the habitat and displacement submodels, and it resulted in a dimensionless index with little meaning (D. Mattson, pers. comm.).

The major difficulties with cumulative

effects analysis include accurately estimating the coefficients used in the ranking procedures, estimating threshold levels for habitat effectiveness and mortality risk, and determining the proper scale for analysis (USFS 1986, Mattson and Knight 1991, Mattson 1993). Although the model software is functional, the model has been applied in only a very few instances. Furthermore, the database needed to estimate the model coefficients and to determine threshold levels is still incomplete for all grizzly bear ecosystems and ecosystem-wide applications are therefore still not feasible. The effort needed to correct current cumulative effects analyses deficiencies is large, but these tasks are not insurmountable. A basic problem appears to be confusion as to what constitutes a cumulative effects analysis and the role that the cumulative effects model plays in that analysis (Mattson and Knight 1991).

Cumulative effects analysis as practiced today on Idaho national forests simply involves seeking to maintain the forest standard for secure habitat in a BMU. When a project is proposed, the current level of secure habitat (past and present activities) is estimated and the effects of the proposed project (future activity) is evaluated. In addition, habitat quality (in a qualitative sense), mortality risk, and other variables also enter into the analysis. This is not really a cumulative effects analysis, but is instead an analysis of incremental changes (Mattson and Knight 1991).

A comprehensive cumulative effects analysis has yet to be applied to any grizzly bear ecosystem. The lack of data to accurately estimate model coefficients, determine threshold levels, and integrate mortality risks, habitat components, and population viability estimates makes cumulative effects analysis currently unworkable. Despite the mandate of the regulations implementing the ESA, it may be many years before this situation is rectified.

Chapter 4. Grizzly Bear Management—Idaho

Grizzly bears have existed in three areas of Idaho (Cabinet/Yaak, Selkirk Mountains, and Yellowstone Ecosystems) since their listing as a threatened species in 1975. The Bitterroot Ecosystem is also considered to be a grizzly bear recovery area by the IGBC despite the lack of recent confirmed grizzly bear sightings. This chapter is organized around these four grizzly bear recovery areas in Idaho. The status of grizzly bears and their habitat, as well as management protocols, successes, and problems associated with each of these areas are described in this chapter.

Cabinet/Yaak and Selkirk Mountains Ecosystems

These two ecosystems will be discussed jointly because of their close proximity and similarities in grizzly bear status, available habitat, and management programs. We begin, however, with a summary of the current situation in each area in terms of grizzly bear status, area involved, and management authorities.

The extent of the Canadian portion of the Cabinet/Yaak Ecosystem has not been determined. However, about 50% of the United States portion is in Idaho, with the remainder in Montana (Figure 2). The Idaho portion contains three complete BMUs, more than half of another, and smaller portions of another (Figure 5). Although these eight areas are on the Idaho Panhandle National Forests (IPNF), headquartered in Coeur d'Alene, the IPNF has sole responsibility for only the Boulder, Grouse, North Lightning, and Scotchman BMUs. The other BMUs are managed jointly with the Kootenai National Forest headquartered in Libby, Montana. The Sandpoint Ranger District of the IPNF is responsible for the North Lightning and Scotchman BMUs and shares responsibility for the Grouse BMU with the Bonners Ferry Ranger District, which also oversees the Boulder BMU. Each of the BMUs managed by the IPNF in this ecosystem is approximately 100 square miles (64,000 acres); all of these BMUs are classified as management situation 1 habitat (see Table 3).

The most recent estimate suggests that the Cabinet/Yaak Ecosystem south of the Kootenai River contains about 15 grizzly bears. Grizzlies also occur north of the Kootenai River but a population estimate is unavailable (USFWS 1993*c*). A population augmentation program was begun in 1990. Four females from Canada have been released into the Cabinet Mountains of Montana (Kasworm et al. 1993, C. Servheen, pers. comm.). One bear died of unknown causes in July 1993 and one lost its radio collar. Monitoring efforts in this ecosystem have been limited (USFWS 1993*c*), and no information on the distribution of grizzly bears by BMU is available. No illegal killing of grizzly bears has occurred in the United States portion of the ecosystem since 1991, and the current mortality target for the area is zero. There is an active grizzly bear research program in this area conducted by the USFWS.

As with the Cabinet/Yaak, the portion of the Selkirk Mountains Ecosystem that occurs in Canada is undefined. Of the United States portion, about one half occurs in Idaho and the remainder is in Washington (Figure 6). The Idaho portion is managed by the IPNF. There are four BMUs east of Priest Lake managed by the Bonners Ferry Ranger District, and five BMUs west of the lake managed by the Priest Lake Ranger District. Both ranger districts share responsibility for the Blue Grass BMU. All of the western BMUs, except Lakeshore, have portions in Washington and are co-managed with the Sullivan Lake Ranger District of the Colville National Forest (Figure 6). All of the BMUs in the Selkirk Ecosystem are classified as management situation 1 habitat, except that the Lakeshore BMU has been classified as situation 3 habitat (see Table 3). The Lakeshore BMU was recently separated from the Kalispell Granite BMU because of the amount of land development associated with Priest Lake.

The USFWS estimates that there are currently 26 to 36 bears in about one-third of the Selkirk Ecosystem, including a portion of

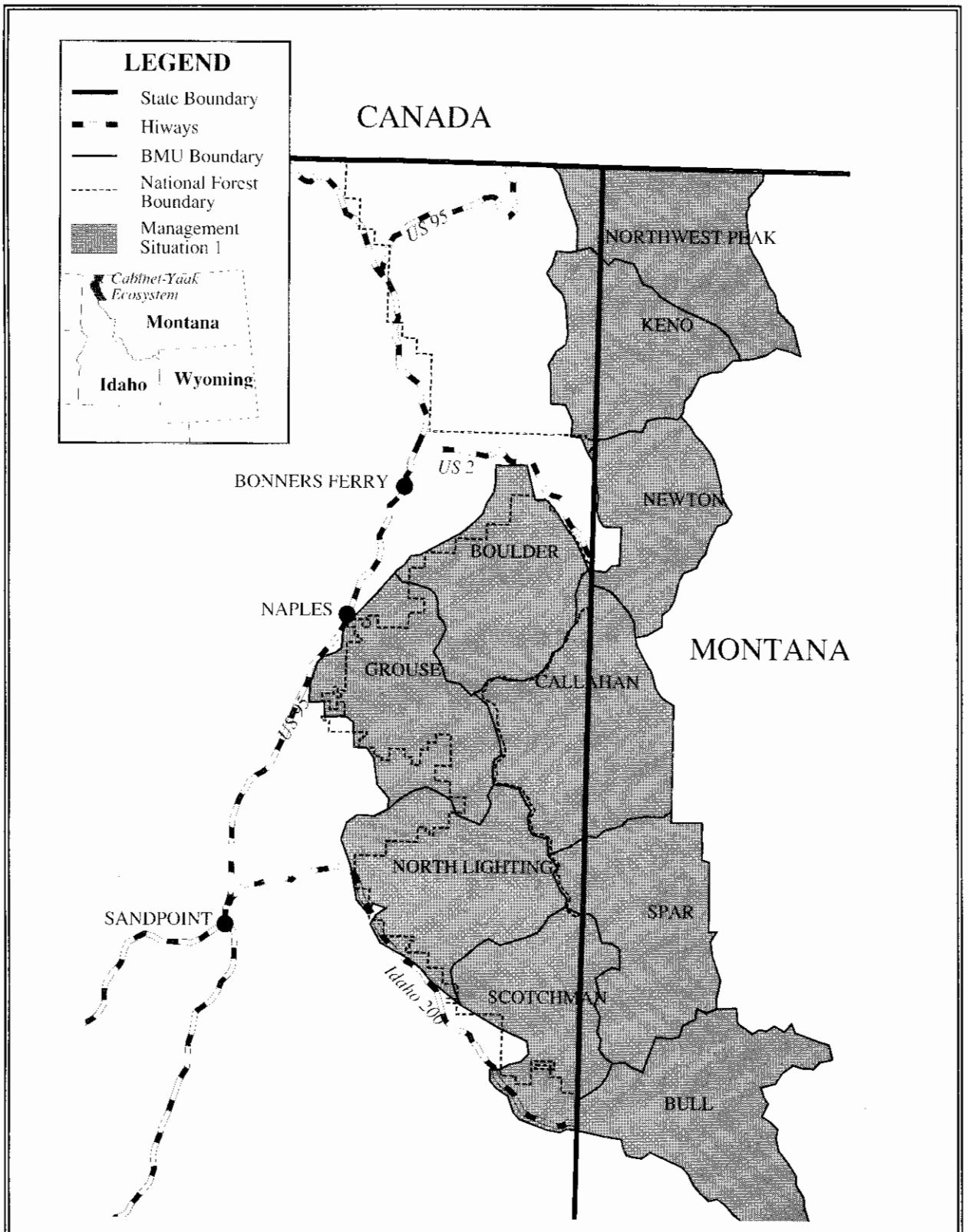

Figure 5. Bear management units and management situations in the Idaho portion of the Cabinet/Yaak Ecosystem.

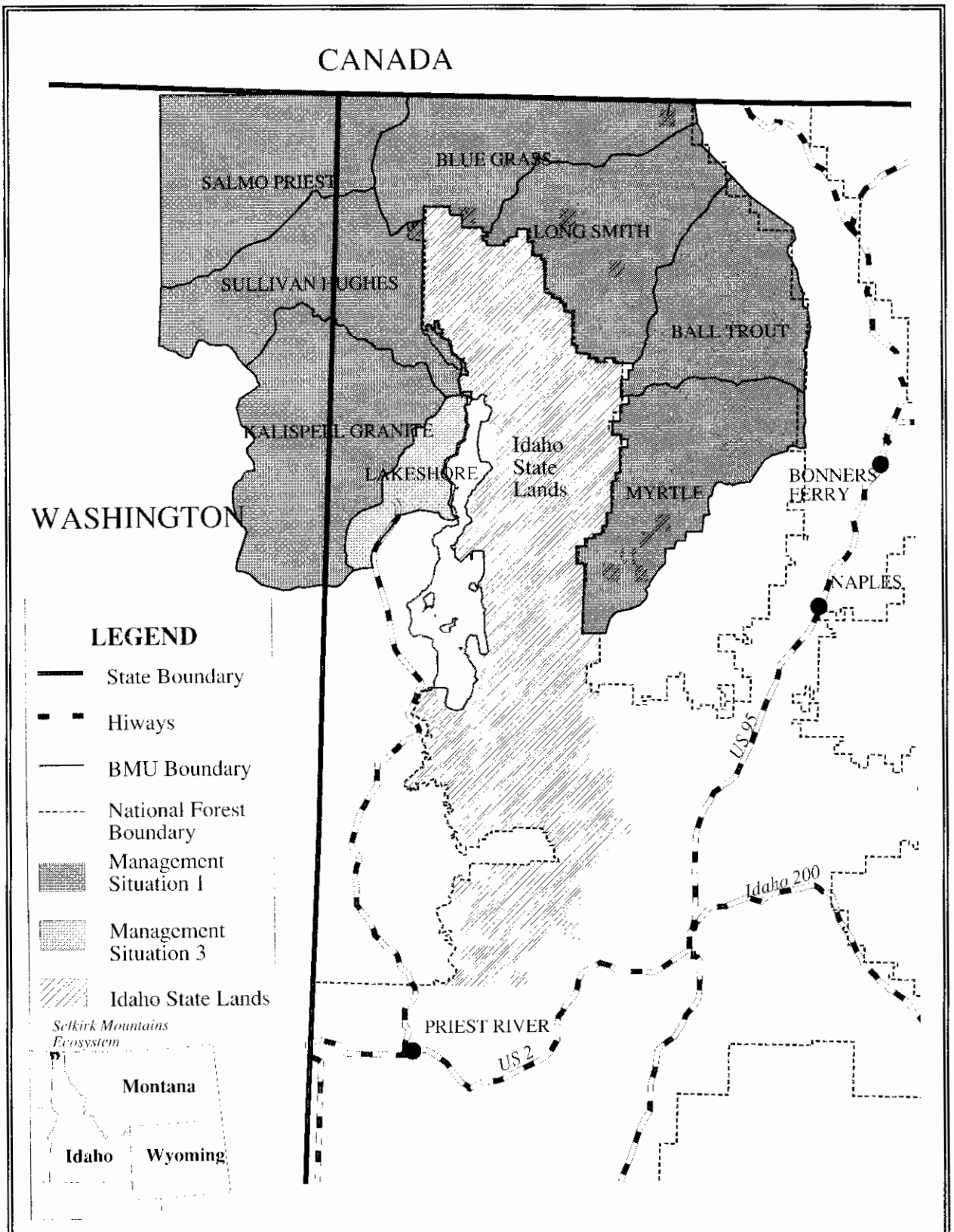

Figure 6. Bear management units and management situation in the Idaho portion of the Selkirk Mountains Ecosystem.

Canada (USFWS 1993*c*, Wielgus et al. 1994). Little information on the distribution of females with cubs among BMUs is available. Current annual mortality targets are zero (USFWS 1993*c*). There is currently an active grizzly bear research program conducted by the Idaho Department of Fish and Game in this ecosystem (Wakkinen 1993).

The United States portion of both the Cabinet/Yaak and Selkirk Ecosystems are currently below the minimum population goal of 90 bears (USFWS 1993*c*). The Canadian portions of these areas are integral to the survival of grizzly bears in these ecosystems (USFWS 1993*c*). In recognition of this fact, cooperative agreements between the IGBC and the British Columbia Ministry of Environment, Forestry, and Parks have been developed (Interagency Grizzly Bear Committee 1989). In addition, British Columbia wildlife officials are members of the IGBC and the appropriate grizzly bear ecosystem management subcommittees. Although Canada does not have any national legislation comparable to the ESA, it is a signatory to a number of international treaties protecting endangered species (Boardman 1992, Birnie and Boyle 1992). Furthermore, grizzlies have been classified as vulnerable by the Committee on the Status of Endangered Wildlife in Canada (Wielgus et al. 1994). Given the Canadian federal structure it may well be that the provincial level is the most important for wildlife conservation efforts.

Management guidelines used by the IPNF for management situation 1 habitat call for the existence of at least 70 square miles (44,800 acres), or 70% of a BMU, as secure habitat at all times (USFS 1987). When a project is proposed in a BMU, the amount of secure habitat is determined as well as the effects of the project on the amount of secure habitat as a pseudo-cumulative effects analysis (see sidebar 2). Maintaining secure habitat consists of road use restrictions and other methods to manage human access and activities. The lack of a cushion in secure habitat for grizzly bears in the BMUs managed by the IPNF can result in scheduling conflicts.

General Management Considerations. Most of the BMUs of the Cabinet/Yaak and Selkirk Ecosystems managed by the IPNF meet or are slightly above the standard for secure habitat at any time. Through access restrictions and the careful scheduling of activities, managers are able to accommodate many projects. For example, a proposed timber sale in a BMU may require restricting motorized access on an open forest road in another portion of the BMU. This road restriction adds to the secure habitat base and allows the new activity to proceed, since the access road for the proposed timber sale subtracted from the secure habitat base.

Another option used frequently by the IPNF is to harvest the trees in winter when grizzly bears are inactive. Winter logging with snow roads not only maintains the secure habitat base, but does not lead to displacement of grizzly bears or direct mortality. In addition, the use of snow roads also helps prevent soil erosion, maintains water quality, and meets road density standards. The snow road option is not always available because of weather and specific site conditions. Snow roads are also costly to maintain and cannot support some types of equipment. Generally, winter logging in these areas can be more costly.

Access restrictions can effect the public and agencies alike. The U.S. Forest Service is allotted 15 days per year for operation of motor vehicles on restricted roads. The 15-day guideline was implemented by the U.S. Forest Service to assist in the evaluation of disturbance factors for assessing cumulative effects. Access may also be seasonally restricted if, for example, the road goes through important spring habitat. As a result, the U.S. Forest Service has 15 days of vehicle access to prepare an area for a timber sale or other activity. Such tight scheduling may not provide sufficient leeway for equipment failures, inclement weather, personnel sick leave, etc., and what would otherwise be a small problem can become a major obstacle. If project preparation is not completed within the 15-day limit, personnel must hike or use horses or mountain bikes. These access restrictions can result in increased costs to the

Sidebar 2. Grizzly bear cumulative effects analysis example.

Cumulative effects analysis is an assessment of the total effects or "load" on a system or organism resulting from spatial and temporal crowding of disturbances, often as a consequence of human activities (Mattson and Knight 1991).

In most cases, cumulative effects analysis for grizzlies centers on secure habitat. Some National Forests have adopted standards for secure habitat in a BMU. For example, the Idaho Panhandle National Forests habitat security standard is 70 square miles or 70% for the larger BMUs. Most BMUs in Idaho are at or below the standard, so when a project is proposed in a BMU, a number of actions are also proposed that will be implemented along with the project. Many of the actions involve restricting motorized use of roads to maintain or increase the "cushion" of secure habitat. This is not a true cumulative effects analysis, but an analysis of incremental changes in secure habitat. Currently, cumulative effects analysis is hampered by a lack of data for some cumulative effect model coefficients and to set thresholds for habitat, populations, and mortality risk.

U.S. Forest Service because it takes longer to do the job without vehicle access and overtime is often involved. However, motorized access may be permitted after other reasonable means of traveling or scheduling have been eliminated. The 15 days applies only to administrative use and can be made available to other users, including contractors, researchers, and Idaho Department of Fish and Game personnel.

Scheduling can also be a problem at the project planning and implementation level. Many planned activities in a BMU must wait until current ongoing projects are completed. In addition, projects that occur in two adjacent BMUs may be delayed due to activity in only one of those BMUs. Delays can have a ripple effect, delaying the start of other projects, sometimes for years. However, scheduling requirements may have a positive side. Maintaining secure habitat may have resulted in timber harvesting at a slower rate than would have otherwise been the case. As a result, local timber mills may experience a less erratic timber supply from national forests (W. Wakkinen, pers. comm.).

Another general management problem related to habitat security occurs in BMUs with mixed land ownership. First, in relation to habitat security guidelines, state and private lands have first priority for producing goods and services and any loss of secure habitat in a BMU due to activities on private or state lands has to be made up by the U.S. Forest Service. Second, the U.S. Forest Service cannot restrict motorized travel on a road that accesses a private or state inholding. Mixed land ownership in grizzly bear habitat thus compounds management problems.

The need to maintain secure habitat within the Cabinet/Yaak and Selkirk Ecosystems increases management difficulties and costs. This, of course, simply reflects the fundamental policy decision embodied by the ESA—the preservation of endangered and threatened species is one of the costs of doing business in the habitat of those species. In economic terminology, the ESA has forced land management agencies, businesses, organizations, and individuals dependent upon resource use in grizzly habitats to internalize what previously had been an external cost.

Timber Management. The Grouse BMU in the Cabinet/Yaak Ecosystem provides an excellent example of cooperation between the U.S. Forest Service and timber interests in meeting grizzly bear habitat security. Fifty-four percent of this BMU is national forest land (Fig. 5), the rest is industrial timberland ($\approx$29%) and state endowment lands ($\approx$17%). The private timber company was willing to restrict motorized road use on their lands to add to the habitat security base in that BMU. The added security has made it possible for the Forest Service to offer some additional timber

in that area for which the company could bid (S. Jacobson, pers. comm.). The Idaho Department of Lands had little incentive to join the program, but is also party to the agreement. Federal monies, made available through section 6 of the ESA, were used to pay for the installation and maintenance of gates on roads on state and private lands.

Despite the difficulties posed by grizzly bear management, it appears that most people have been able to adjust. For example, timber supplies to local mills have changed only slightly despite the measures needed to conserve grizzly bears (C. Roady, pers. comm.). Operating costs have increased, but quantifying costs and apportioning them to grizzly bear management versus maintaining water quality, old-growth, and other wildlife species is very difficult. Furthermore, since road restrictions on the IPNF also help the Forest Service achieve a number of other management goals, they should not be attributed solely to grizzly bear protection.

As projects are proposed and planned, they are tailored to grizzly bear needs by following the broad directions in the interagency grizzly bear guidelines and incorporating a number of area-specific protocols (Table 4). In addition, there are opportunities to recommend a number of grizzly bear conservation measures as part of each project. A sampling of these from the Sandpoint Ranger District is presented in Table 7. In addition, there may be a general trend to avoid some types of activities in BMUs if other options are available. For example, from 1986 to 1991, 64% of the timber sales for which biological evaluations had been prepared were not in a BMU, even though 60% of the suitable timberlands on the district are in BMUs (R. Steinhorst, pers. comm.). This is supported by the data in Table 5 for the Bonners Ferry Ranger District. However, this analysis is complicated by the fact that the endangered woodland caribou and additional sensitive and candidate species also occur in these areas.

Recreation Management. An emerging issue is conflict between recreational uses and grizzly bear needs. Recreational uses involve different types of potential conflicts. Human recreation such as huckleberry picking, fishing, hiking, and trail riding may displace bears from important habitats. Stocking of fish in high mountain lakes by the Idaho Department of Fish and Game has resulted in greater numbers of people in different areas of grizzly bear habitat than before.

Recreational pursuits can also result in grizzly bear mortalities. Big game hunting is probably the most significant recreational threat to grizzly bears. Grizzly bears are occasionally mistaken for black bears and killed by hunters (Knick and Kasworm 1989, Wielgus et al. 1994). Grizzly bears are also killed when attracted to hunting camps by game and other foods. In addition, surprise encounters between hunters and grizzly bears can be deadly to both; often the bear is shot, particularly when the hunter feels threatened. There are currently few hunting restrictions in these BMUs and many managers contend that the backlash from restrictions would be detrimental to grizzly bear recovery. However, relatively simple measures such as using sealed bear-proof containers such as steel panniers, and erecting poles to hang game and food at camps helps decrease the attractiveness of hunting camps to grizzlies.

No hunting guides and outfitters currently operate in the BMUs on the Sandpoint District. There are outfitters operating in BMUs on the Bonners Ferry and Priest Lake districts. An argument in favor of guided hunts is that they provide the opportunity for the guide to educate hunters about grizzly bear behavior, hunter responsibilities, and proper conduct while in grizzly bear habitat. In addition, guided hunters are less likely to maliciously or mistakenly kill a grizzly bear and outfitter camps are more likely to meet sanitation guidelines.

Idaho regulations do not allow the use of dogs or bait stations for black bear hunting in the Cabinet/Yaak or Selkirk BMUs.

Road Restrictions. The motorized road-use restriction program on the IPNF has generated high levels of frustration. Road restrictions deny easy access to areas traditionally used for

Table 4. Examples of U.S. Forest Service projects, conditions, and conservation measures in grizzly bear habitats on the Idaho Panhandle National Forest.

Project or Permit	Area and Conditions	Conservation Measures
Placer mine	North Lightning BMU, from June-October, 2 days/week only	Work behind closed gate, vehicle entry at start and end, periodic inspections, pack in-pack out garbage weekly, vacate area if bear present, possible permit cancellation in order to resolve human-bear conflicts
Guide and Outfitter permit for day and overnight trail rides	North Lightning and Scotchman BMUs, from mid-May to mid-September, 5-day maximum, dispersed camping, use only marked trails, restrict number of trips, close one trail	Client bear education, proper food storage and handling, pack in-pack out garbage in sealed containers, no pets, fishing cleanliness, no firearms, prepare annual reports, immediate notification of bear-human incident, possibility of temporary permit cancellations to solve problems
Blue Sugar timber sale	Scotchman BMU, 10 acres, entry between 16 November and 14 March, access by snow road	None proposed
Lower Cochrans timber sale	North Lightning BMU, 3,600 acres in group selection or commercial thin, 0.5 miles of new road, BMU below security standard	To meet habitat security standard: restrict access on 7 system roads or portions thereof, 2 nonsystem roads, and all but 2 trails to motorized vehicles, provisions to cancel contract. These actions resulted in 73.3 square miles of secure habitat
Trail #554 reconstruction	North Lightning BMU, 45 day project, use some mechanized equipment, summer/fall habitat	Place signs at trailhead and destination lakes with information about grizzlies and proper behavior in bear country

hunting, berry picking, fishing, firewood gathering, and the like. Many people feel these restrictions infringe on their personal freedoms and are too extensive. As taxpayers, they argue that they have a right to drive on the gated roads. This argument ignores the fact that roads associated with timber sales are often paid from funds generated from previous timber sales, rather than tax receipts.

It should be noted that road restrictions effect only motorized access; access on foot, horseback, or bicycle is not restricted. Snowmobile use is often permitted since grizzlies are inactive during the winter. Furthermore, roads are gated or blocked for reasons other than grizzly bear management. For example, road use is restricted during spring break-up to maintain the road base and water quality, and roads are gated during fall to limit hunter access and regulate the harvest of deer and elk. In fact, many motorized travel restrictions on the IPNF are to manage for elk security. In addition, road use restrictions provide security for many species of concern including wolverine, lynx, and fisher—all three are U.S. Forest Service sensitive species or USFWS candidate species.

Road use restrictions or access management programs need to be put into perspective. The IPNF currently has almost 8,890 miles of

Table 5. Number of projects on the Bonners Ferry Ranger District of the Idaho Panhandle National Forest that were to occur in grizzly bear management units (and required biological evaluations) or outside those units, 1986 to 1991.

	In BMU[1]			Outside BMU
	Effect		No Effect	-
Type of Project	**Mitigated**	**Withdrawn**	-	-
Timber Sale	32	-	-	57
Timber stand improvement	16	2	-	5
Recreation	7	-	3	10
Other[2]	6	-	14	17
Subtotal	61	2	17	-
Total	80			89

[1] Projects planned in a bear management unit (BMU) were determined to either have an effect on grizzly bears or not. That effect was either mitigated or the project was withdrawn. In general, an effect determination usually involved losses of secure habitat.
[2] Includes activities such as livestock allotment improvements and minerals prospecting.

inventoried roads. However, only 1,700 miles (19%) have motorized use restricted yearlong with an additional 1,660 miles (18%) with some type of seasonal restriction. This provides over 5,500 miles (62%) of unrestricted motorized access on IPNF lands (D. Wright, pers. comm.).

The effectiveness of some methods of barring motorized access is questionable. Gates across roads are often vandalized, with methods ranging from shooting off the lock to the complete dismantling of a gate with a metal cutting torch. All-terrain vehicles (ATVs) and motorcycles can go around some gates and some individuals have gone so far as to dig out the roadway to get an ATV under a gate. Under such conditions, a road-gating program can be very expensive and time-consuming and the effectiveness of restrictions on road use is directly tied to the level of monitoring and maintenance.

Because of the presumed ineffectiveness of road-use restrictions, some groups are suggesting that the U.S. Forest Service needs to reclaim roads in some areas. This is one issue in a pending lawsuit involving grizzly bear management programs on the Flathead National Forest in Montana (see Chapter 5, page 68). However, there is no agreed-upon measure of effectiveness or standard by which effectiveness can be measured. The IPNF suggests that their road-gating program keeps at least 90% of motorized humans off gated or barriered roads (D. Wright, pers. comm.).

Human-caused mortality is a major grizzly bear management problem throughout their range (Peek et al. 1987, USFWS 1993*c*). In small populations, such as in the Selkirk and Cabinet/Yaak Ecosystems, the loss of even one bear can substantially inhibit recovery efforts (Knick and Kasworm 1989, Wielgus et al. 1994). Greater enforcement and public education efforts have significantly reduced this problem in those areas. For several years prior to incidents in 1991 and 1993 no illegal mortalities occurred in the United States portion of these ecosystems. In the opinion of many people involved with grizzly bear

management in the Cabinet/Yaak and Selkirk Ecosystems, the biggest barrier to recovering grizzly bears is direct human-caused mortality. The primary management tool to effectively reduce human-caused grizzly mortality is to restrict motorized access to grizzly habitat. To the extent that road use is restricted solely for grizzly bear management, which is not always the case, this suggests that if people would stop killing grizzlies more roads could remain open to unrestricted motorized use.

Yellowstone Ecosystem

Of all the areas that support grizzly bears in the United States, the Yellowstone Ecosystem is the most isolated, the most studied, and perhaps the most controversial (Craighead 1979, Shaffer 1992). Events in this area have influenced the management of grizzly bears throughout the United States. Grizzly bear management in Yellowstone involves three state wildlife agencies, five national forests, and two national parks (Appendix 4). The Yellowstone Grizzly Bear Ecosystem includes approximately six million acres, with about 5% in Idaho managed by the Targhee National Forest (Figure 7). Three BMUs, or portions thereof, occur in Idaho and are classified as either management situation 1 or 2 habitat (see Table 3). In contrast to the Cabinet/Yaak and Selkirk Ecosystems, some BMUs contain both management situation 1 and 2 habitat.

Delisting Proposal. The latest USFWS estimate suggests that there are a minimum of 272 grizzly bears in the Yellowstone Ecosystem (C. Servheen, pers. comm.). In addition, Eberhardt et al. (1994) estimated that the Yellowstone population has increased at an average rate of 4.6% over the last 17 years. However, the authors advised that caution be applied to the interpretation of this result due to the wide 95% confidence interval of zero to nine percent. Grizzlies in the Yellowstone Ecosystem are very close to meeting the population recovery goals contained in the revised recovery plan (USFWS 1993*c*, Table 2). The average annual count of females with cubs from 1987 to 1992 was 21. Female human-caused deaths have averaged two per year, or less than 30% of all mortalities, and all human-caused deaths averaged four per year, or less than 4% of the minimum population estimate. And of the 18 BMUs, 16 contained female grizzlies with young. The Yellowstone subcommittee of the IGBC (Appendix 4) is currently developing a draft interagency conservation strategy in order to meet the regulatory requirements for delisting. The committee estimates that the draft document will be ready for review by the end of 1995 (B. Barbee, pers. comm.).

Two of the three BMUs in Idaho (Henry's Lake and Plateau) have not been occupied by grizzlies for nearly a decade. This fact is contrary to one provisional goal in the recovery plan for the distribution of bears in an ecosystem—two adjacent BMUs cannot be unoccupied. In 1993, the Interagency Grizzly Bear Study Team, U.S. Forest Service, USFWS, and Idaho Department of Fish and Game began a five-year study of these BMUs to assess their suitability as grizzly bear habitat. Questions about the suitability of these BMUs as valid portions of the recovery area have arisen because timber harvesting and associated activities and other developments in these BMUs may have reduced their potential as grizzly bear habitat. Or perhaps they may have never been very good habitat.

The Yellowstone National Park portion of the Plateau BMU is very low quality grizzly habitat and is largely unsuitable (D. Mattson, pers. comm.) However, the USFWS argues that the Targhee National Forest portion of that BMU previously supported grizzlies and was good habitat (USFWS 1994). However, grizzlies may have been attracted to this area because of past sheep grazing that no longer occurs (S. Mealey, pers. comm.).

The removal of the Plateau and Henry's Lake BMUs from the recovery zone would result in the Yellowstone population meeting the distributional goal for recovery. If these two BMUs are dropped from the recovery area, the addition of another two would perhaps offset potential criticisms (D. Mattson, pers. comm.).

The potential delisting of Yellowstone

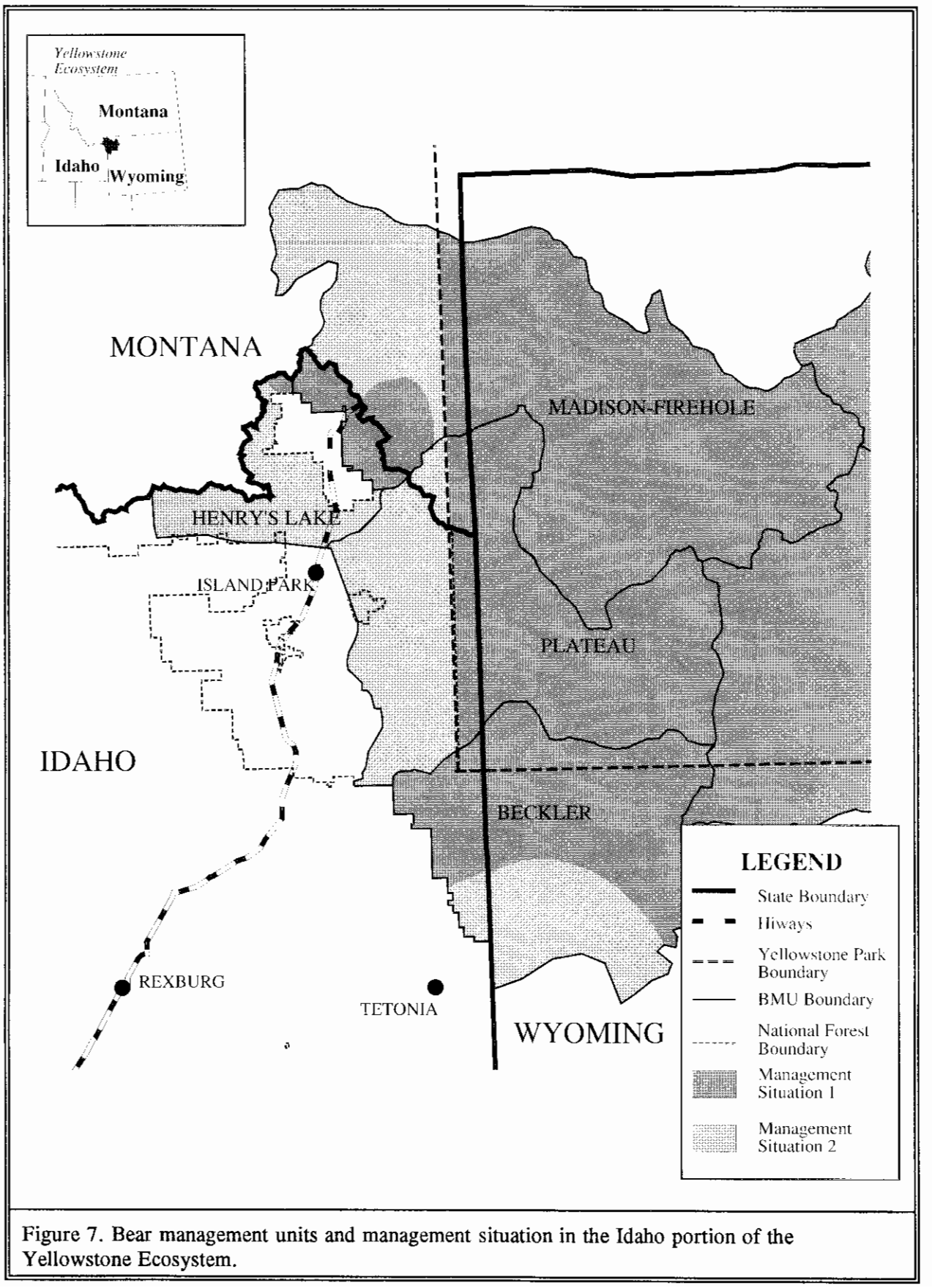

Figure 7. Bear management units and management situation in the Idaho portion of the Yellowstone Ecosystem.

grizzly bears is controversial (Keiter 1991). Within the scientific community there are currently two different views of the conditions that need to be addressed to promote the recovery of grizzly bears and of the methods that should be used to assess population status and trends (Mattson and Craighead 1994). One view is based on short-term population trends, habitat stability, current indices for population monitoring, and habitat protection by the U.S. Forest Service and National Park Service. The other view suggests that more accurate population measures are needed, that long-term needs be addressed, and that the higher estimates of minimum viable populations be set as a recovery goal. The latter view raises issues of global climate change and subsequent habitat modification, genetic diversity and the isolation of the Yellowstone grizzlies, and habitat linkages to other ecosystems (Mattson and Reid 1991, Shaffer 1992). In addition, more direct measures of population status and trend, such as mark and recapture methods, are recommended (Mattson and Reid 1991, Mattson and Craighead 1994), as are the establishment of habitat protection standards in the recovery plan.

A number of environmental and animal protection groups are opposed to delisting grizzly bears in the Yellowstone Ecosystem. They often cite the long-term uncertainty concerns of biologists, but these groups have other agendas as well. For example, the Fund for Animals is primarily concerned about the potential hunting of grizzly bears following delisting.

All the available evidence points to an increasing grizzly population in the Yellowstone Ecosystem. This evidence includes population trend estimates (Eberhardt et al. 1994), counts of females with cubs, distribution of family groups, documented mortalities (USFWS 1993*c*), and recent livestock depredations (see page 52). However, whether this recent increase represents a recovered population is debatable. The 1982 recovery plan stated that the grizzly population during the period from 1959 to 1967 was self-sustaining (USFWS 1982). During that period the grizzly population in Yellowstone probably ranged from 229 (Craighead et al. 1974, Craighead 1979) to 301 (USFWS 1982). The current minimum population estimate is 272. However, genetic concerns and random events that effect populations have added uncertainty to defining how many individual bears represent a recovered population.

Habitat Security. Grizzly bear management in the Idaho portion of the Yellowstone Ecosystem is similar to that in the Cabinet/Yaak and Selkirk Ecosystems. Human-induced mortality is a major problem and providing grizzly bears with secure habitat is the most direct solution to that problem.

The Targhee National Forest currently uses a standard of 50 to 60% of a BMU in secure habitat (T. Kaminski, pers. comm.) and seeks to maintain 50% conifer cover in management situation 1 habitat (USFS 1984*b*). However, managing for habitat security in some areas has been related to the miles of open road per square mile in a BMU, rather than the percentage standards used in other areas. Yellowstone National Park has not adopted a secure habitat standard. Ultimately, road density and the 50 to 70% secure habitat standard may translate into the same amount of unrestricted roads and secure habitat in a BMU; it is likely that both the Idaho Panhandle (IPNF) and Targhee National Forests will adopt a road density standard in the next forest plan (T. Layser, pers. comm.).

The Targhee National Forest and IPNF differ fundamentally in a way that also relates to habitat security for grizzly bears. The habitats on the IPNF are much more productive than those on the Targhee. As a result, grizzly bears need more area to meet their requirements on the Targhee, and BMUs therefore should be larger. The average BMU in the Yellowstone Ecosystem is 125 square miles, as compared to 100 square miles in the Cabinet/Yaak and Selkirk Ecosystems.

The amount of horizontal and vertical vegetation cover provided by a habitat type influences the amount of secure habitat and other requirements of grizzlies. Dense

vegetation growth allows grizzly bears to quickly lose line of sight with humans and their activities. In addition, grizzlies appear to prefer forested areas for both security and thermal cover (Blanchard 1983). Vegetation cover should be greater in the more productive habitats of northern Idaho as compared to Yellowstone.

All BMUs on the Targhee National Forest are also at minimum levels of secure habitat for grizzly bears. Thus, projects in BMUs are constrained by the secure habitat standard, resulting in situations comparable to those described for the Cabinet/Yaak and Selkirk Ecosystems. Many scheduling difficulties are a reflection of past activities; that is, the level of past activities was not balanced against projected future activities and the needs of grizzly bears (Orme and Williams 1986). This is contrary to the objectives of cumulative effects analysis. Many projects and their impacts may pre-date the 1975 listing of grizzly bears and the development of cumulative effects analysis as described in Chapter 3.

Timber Management. The timber program of the Targhee National Forest received formal section 7 consultation under the ESA by the USFWS in the late 1970s. In 1978 the USFWS issued a no jeopardy opinion provided two management actions were adopted: [1] maintain or decrease the miles of open road that existed in 1978, and [2] harvest beetle-killed lodgepole pine in a manner that decreased the risk of a large wildfire while meeting the needs of grizzly bears (Orme and Williams 1986). Until recently, the last formal consultation between the Targhee National Forest and the USFWS concerned the preparation of the original forest plan (USFS 1984*b*).

Unlike the IPNF, where standards and guidelines for threatened and endangered species appear in the forest plan, the Targhee National Forest had published a separate management plan for threatened and endangered species detailing standards for secure habitat for grizzly bears. The Targhee forest plan stated only that secure habitat would be provided. The biological opinion by the USFWS on the forest plan focused on providing secure habitat for grizzly bears through implementation of the interagency grizzly bear management guidelines.

Livestock Grazing Management. The grazing of domestic sheep and cattle in areas occupied by grizzly bears preceded the creation of the Targhee National Forest. In contrast to the IPNF, deaths related to livestock operations have been the source of problems for grizzly bears in management situation 1 habitat; sheep grazing has caused more problems than cattle (Knight and Judd 1983). When grizzly bears were listed in 1975 there were 11 sheep allotments and four cattle allotments in areas that became management situation 1 habitat (Orme and Williams 1986). Currently, sheep grazing does not occur in management situation 1 habitat, although some cattle use continues. While the decline in sheep grazing is due largely to economic forces, sheep and grizzlies are basically incompatible. This has resulted in the closing of some allotments, the redrawing of boundaries to avoid areas of conflict, and the imposition of a number of other management directions to decrease the risk of human-caused grizzly bear mortality associated with sheep grazing (Orme and Williams 1986).

Cattle grazing and grizzly conservation are more compatible. However, recent events in Wyoming illustrate some problems. In 1993 one operator in one allotment lost about 56% of their calves—most of them to grizzly bears—when calf losses are usually about 2%. This allotment borders the southeast portion of the Yellowstone recovery zone near Togwotee Pass, Wyoming. The IGBC is currently evaluating solutions to this problem (J.G. MacCracken, pers. observ.). In addition, the Wyoming Game and Fish Department is conducting a research project to estimate the demographics of depredating bears. Preliminary results indicate that they are subadult males using roads as travel corridors. Cattle depredations in this area also suggest that the Yellowstone population is expanding and that the recovery zone population is close

to the area's carrying capacity (P. Petera, pers. comm.). Wyoming officials thus suggest that grizzly bear management in the Yellowstone Ecosystem is entering a new era.

Future Direction. The management of grizzly bears on the Targhee National Forest is in a state of flux. Research projects, biological opinions from ESA section 7 consultations, and court decisions are changing the way grizzlies are being managed on the national forests.

Plateau BMU.—The Targhee National Forest and the USFWS have carried on an active dialogue, or informal consultation, since May 1992 regarding land management activities on the national forest portion of the Plateau BMU (USFWS 1994). The Plateau BMU is about 455,000 acres (710 square miles) and 40% occurs on the Targhee, with most of the remainder in Yellowstone National Park and a small portion on the Gallatin National Forest. Although grizzly bear sightings and documented mortalities indicated that grizzlies once occupied this area, none have been confirmed since 1985. During the last 20 years, extensive clear-cutting of lodgepole pine and associated road building and human access have made the area unsuitable for grizzly bears. In addition, the decline in sheep grazing in the area may have removed the major attraction for grizzlies (S. Mealey, pers. comm.).

The recent consultations between the Targhee and the USFWS resulted in the forest preparing a grizzly bear management strategy for their portion of the Plateau BMU (USFS 1993). The strategy seeks to restore the Plateau BMU as suitable grizzly habitat within 11 years by [1] increasing thermal and hiding cover, [2] reducing total road densities, [3] providing secure habitat, and [4] reducing habitat fragmentation. The strategy divides the BMU into three zones: core, security, and outside the security zone. The core zone is nested within the security zone and both encompass about 87,145 acres (136 square miles). The area outside the security zone is about 77,087 acres (120 square miles).

The core zone is to serve as a grizzly bear refuge and management activities are to be prohibited during the period of bear activity from 1 April to 14 November. The goal for total road density is zero, but snowmobile use would be permitted from 15 November to 30 March.

The security zone is also to serve as a predictable refuge for grizzlies and is intended to provide connectivity over much of the BMU. Management activities are permitted if they maintain or enhance habitat quality. Total road densities are not to exceed 0.8 miles per square mile and open road densities 0.6 miles per square mile (see Chapter 5, page 67 for road classification definitions).

The remainder of the BMU (outside the security zone) is to provide for seasonal foraging and dispersal of grizzlies while minimizing mortality risks. Restoration of grizzly bear habitat is the primary management emphasis. Road density standards are the same as for the security zone.

In January 1994, the Targhee National Forest requested formal consultation on the strategy by the USFWS. The USFWS released a biological opinion on the strategy in February 1994 (USFWS 1994) and concluded that implementation of the strategy would not jeopardize the continued existence *and* recovery of the Yellowstone grizzly population, but the amount of time between implementation of the strategy and realization of the strategy's goals would result in a short-term incidental take of grizzly bears.

In the incidental take statement of the biological opinion, the USFWS set three nondiscretionary terms and conditions: [1] immediate implementation of the strategy, [2] compliance with suggested monitoring procedures, and [3] compliance with suggested reporting procedures to keep the USFWS current on the status of habitat restoration and other activities. The biological opinion also made a number of conservation recommendations such as suggesting that new roads be single purpose roads only, and that the forest manage for red squirrels since their middens provide a source of whitebark pine nuts for grizzly bears.

The Targhee National Forest's grizzly bear

management strategy for the Plateau BMU and the terms, conditions, and conservation measures of the subsequent biological opinion by the USFWS will significantly change management of the area. However, the Forest Service recently announced that it will delay implementation of the strategy for up to two years due to extreme opposition by local residents. The delay will allow for the preparation of an EIS on the strategy as part of the scheduled revision of the forest plan, which might help to clear up the misconceptions held by the public (*High Country News* 1994*a*). This action appears to be in conflict with the first provision of the incidental take provisions of the USFWS biological opinion as listed above.

Other Targhee National Forest BMUs.—The Henry's Lake BMU is also managed by the Targhee National Forest and the subject of the five-year evaluation study. This BMU is generally regarded as high quality grizzly bear habitat moderately impacted by human activities, but somewhat isolated from the rest of the Yellowstone Ecosystem (Figure 7). Most of the BMU is classified as management situation 2 habitat (see Table 3) and it is the smallest BMU in the Yellowstone Ecosystem.

The Beckler BMU, with about 25% in Idaho, consists of both management situation 1 and 2 habitat. This BMU is moderately productive and relatively undeveloped. It is also well connected with the rest of the Yellowstone Ecosystem. It is probably the best grizzly habitat in the Yellowstone Ecosystem that occurs in Idaho.

Bitterroot Ecosystem

This area was originally called the Selway-Bitterroot Ecosystem, but in 1986 Selway was dropped and it became the Bitterroot Ecosystem. Both terms refer to the same general area of central Idaho and western Montana. In this section the terms are used in the chronological sequence used by the USFWS to describe the area.

Much of the Selway-Bitterroot area has a long history of administrative protection. It was designated a primitive area by the Forest Service in 1936 and was one of the original nine wilderness areas created with the passage of the Wilderness Act in 1964 (MacCracken et al. 1993). The area also has a long history of consideration as grizzly bear habitat. The 1975 decision listing the grizzly bear stated that the Selway-Bitterroot area might contain grizzly bears (Servheen et al. 1991). In March 1980, a grizzly bear recovery plan workshop was held in Missoula, Montana, and the 14 participants decided that the Selway-Bitterroot Wilderness and adjacent areas should be part of the original recovery plan (Jonkel 1981). A delineation of the actual area involved in the Selway-Bitteroot Ecosystem was not made in the original plan.

The decision to recover grizzlies in this area was based on the following conclusions: [1] there was ample evidence grizzly bears were at one time numerous throughout the area (Wright 1909, Moore 1984), [2] the habitat in the area appeared to be comparable to wilderness areas in Montana supporting grizzly bears, [3] the legal protection afforded the Selway-Bitterroot Wilderness and its closeness to occupied grizzly bear habitat (37 miles to the Cabinet/Yaak Ecosystem and 45 miles to the Northern Continental Divide Ecosystem) gave it significant potential as a recovery area, and [4] there were dozens of unconfirmed grizzly bear sightings in the area.

The original grizzly bear recovery plan reviewed the Selkirk, Selway-Bitterroot and North Cascades Ecosystems in one chapter (USFWS 1982, p. 102-103). The primary objectives of the original recovery plan for those areas were to: [1] determine the present status of grizzly bears, [2] determine the space and habitat needed in each area to support a viable population, and [3] determine a course of action to refine recovery plans for these areas (USFWS 1982). Findings relative to these objectives are provided in the following subsections.

Present Population Status. Craighead et al. (1982) briefly discussed the Selway-Bitterroot area, noting that it was largely undefined, but likely included about 3 million acres (4,688 square miles). They also stated that evidence

suggested the existence of a small, remnant population of grizzly bears in the area.

To meet the original recovery plan's first objective for the area, Melquist (1985) conducted an evaluation of the status of grizzly bears north of the Lochsa River on the Clearwater National Forest (Figure 8). This was the portion of the Selway-Bitterroot Ecosystem that had the greatest number of reported grizzly bear sightings. A number of ground and aerial surveys during that study failed to confirm the presence of grizzly bears. Melquist (1985) also examined all the reported grizzly bear sightings for the area and developed a rating scheme as to their probable accuracy. Of 88 grizzly bear sightings reported between 1900 and 1984, 16% were classified as probable, and 49% as highly possible. Only 2% were classified as confirmed sightings. The most recent confirmed sighting reported by Melquist (1985) was in 1956, but this record has recently been revealed to be a black bear (W. Moore, pers. comm., see Table 6). Melquist (1985) concluded that the circumstantial evidence he reviewed indicated that a few grizzly bears probably occupy portions of the Clearwater National Forest and adjacent areas, at least temporarily. In addition, Melquist (1985) was the first to suggest a boundary for the area: the Clearwater National Forest, the Selway-Bitterroot Wilderness, and the Salmon River Breaks Primitive Area (Figure 8).

In 1990, the Idaho Department of Fish and Game (Servheen et al. 1990) started another project to evaluate the status of grizzly bears in the drainage of the North Fork of the Clearwater River (Figure 8). This survey used automated cameras at bait stations to photograph visits by wildlife. The survey was repeated in 1991 (Kunkel et al. 1991) with stations established at more remote locations in the area. Although numerous pictures of black bears, elk, and other wildlife were taken, grizzly bears were not photographed at any of the stations. Past unconfirmed grizzly bear sightings and the relatively small area and short period of time covered by the survey led Kunkel et al. (1991) to conclude that grizzly bears may still be present despite their failure to capture any on film.

Despite the conclusions in Idaho Department of Fish and Game reports about the possible existence of a small number of grizzly bears, the lack of recent confirmed sightings or sign in the Selway-Bitterroot Ecosystem suggests that grizzlies no longer occupy the area. This is the official stance of the USFWS and Idaho Department of Fish and Game and is a prerequisite of any reintroduction of grizzlies to the area as an experimental-nonessential population (see page 62).

Space and Habitat to Support a Viable Population. Biologists began evaluating the potential of the Selway-Bitterroot Wilderness as grizzly bear habitat in the late 1970s (Scaggs 1979). The initial effort focused on the vegetation that could serve as grizzly foods in a 40-square-mile area straddling the Idaho-Montana border about 40 miles south of Lolo Pass. Based on the presence and distribution of food plants, Scaggs (1979) concluded that the study area was good potential grizzly bear habitat.

Efforts to meet the second objective of the original recovery plan began with a study of the habitats of the Selway-Bitterroot Wilderness (Butterfield and Almack 1985). This initial study classified the habitats of five sub-areas in the wilderness, and identified the plant species in those habitats and their potential as grizzly bear foods. Butterfield and Almack (1985) also evaluated the area in relation to the seven criteria that Craighead et al. (1982) identified as important in grizzly bear recovery: [1] space—grizzly bears need lots of room, [2] isolation—few human settlements or activities, [3] sanitation—little to no access to garbage or other foods associated with humans, [4] denning areas, [5] safety—low risk of human-caused mortality, [6] vegetation types—habitat diversity, and [7] food. They concluded that the Selway-Bitterroot Wilderness provided for a wide range of grizzly bear requirements and met all seven criteria. However, they also noted that the wilderness area was intermediate in size compared to the other grizzly bear recovery areas. Based on that fact, they suggested that

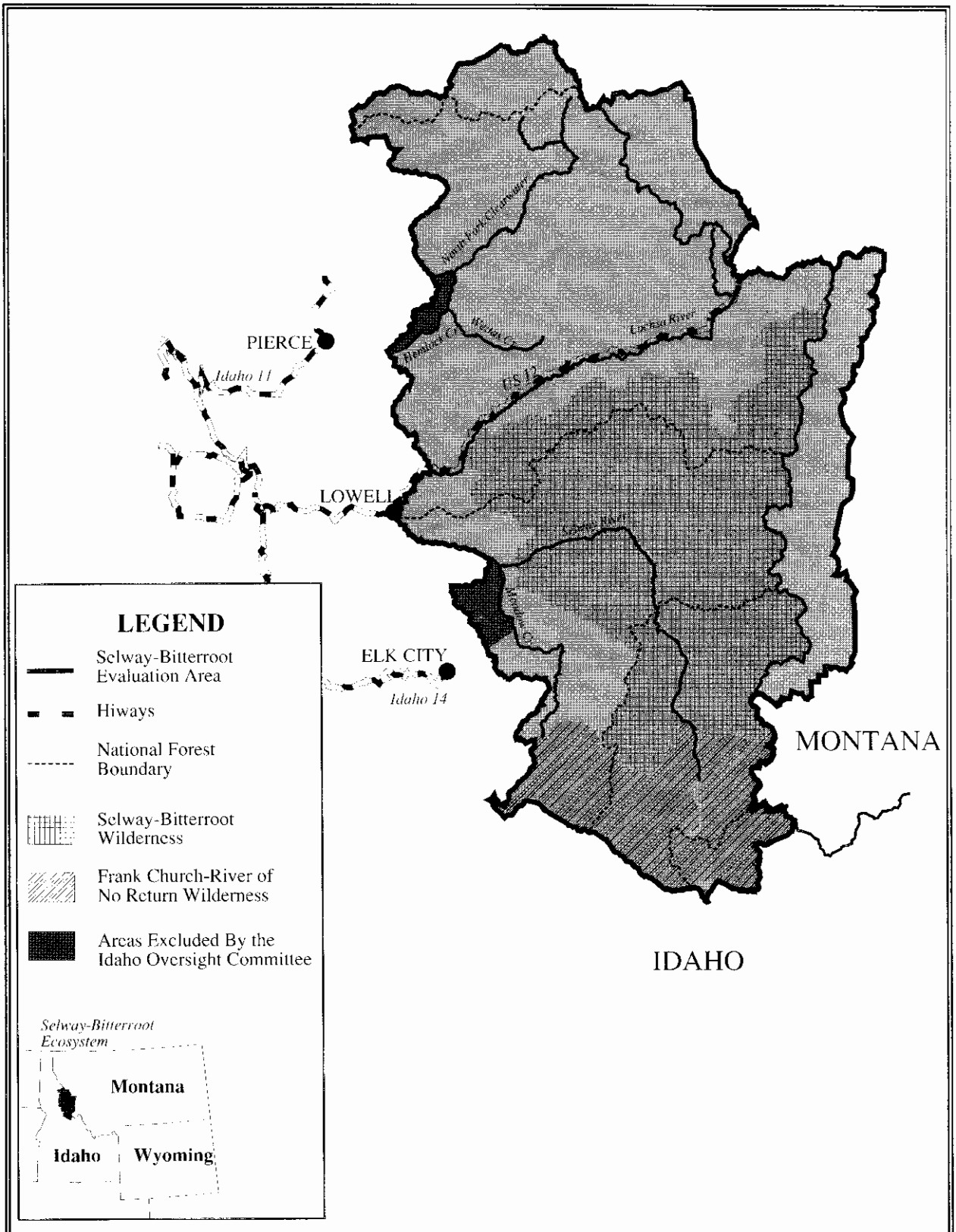

Figure 8. Bitterroot Ecosystem of Idaho and Montana, illustrating the evaluation area and some proposals for a recovery zone.

Table 6. Reported public sightings of grizzly bears in the Bitterroot Ecosystem by decade and likelihood of the sighting being a grizzly bear.

	Classification[a]			
Decade	**Confirmed**	**Probable**	**Highly Possible**	**Possible**
1900-1909	1	-	-	-
1910-1919	-	-	-	-
1920-1929	-	-	1	-
1930-1939	-	-	-	2
1940-1949	-	-	1	-
1950-1959	1[b]	2	4	2
1960-1969	-	-	4	4
1970-1979	-	6	17	15
1980-1987		10	19	4

[a] Source: Melquist (1985) with updates by Groves (1987).

[b] This record is attributed to William "Bud" Moore who was District Ranger on the Powell Ranger District, Clearwater National Forest. However, Mr. Moore recently indicated that this record was really a black bear that he killed in 1955 (Moore, pers. comm., 21 July 1994).

the Selway-Bitterroot Wilderness should be the core of a larger, but undefined Bitterroot Grizzly Bear Ecosystem (Butterfield and Almack 1985). Some observers feel that the actual boundaries of this grizzly bear ecosystem should be defined only after grizzlies are reestablished.

As the final step in the Bitterroot Ecosystem evaluation process, Davis and Butterfield (1991) conducted an analysis of the entire area using a geographic information system (GIS) and synthesized the results of the previous studies. Data that formed the basis for their GIS analysis were boundaries for U.S. Forest Service administrative units, wilderness areas, land ownership, roads, trails, hydrology, elevation, aspect, slope, potential spring bear habitat, and vegetation cover on the land.

A preliminary working boundary for the Bitterroot Ecosystem, called the evaluation area, was drawn and included about 3.5 million acres (5,414 square miles). About 49% of the Bitterroot evaluation area (1.6 million acres) was outside the Selway-Bitterroot and Frank Church-River of No Return Wildernesses (Figure 8). Apparently, this boundary was not based solely on biology but was the result of compromises among two regional offices of the U.S. Forest Service, the three or four national forests involved, and the USFWS (J.M. Peek, pers. comm.).

Davis and Butterfield (1991) concluded that the resources and conditions in the Bitterroot evaluation area were adequate to meet the seven requirements of Craighead et al. (1982) for grizzly bear recovery. However, they noted that grizzly bear recovery in the area would probably be driven more by the need to minimize human-caused mortality than on habitat availability and quality.

Following Davis and Butterfield's (1991) analysis, the Northwest Ecosystems Management Subcommittee put together a technical review team to assess the evaluation studies that had been completed for both the Bitterroot and North Cascades Ecosystems (Servheen et al. 1991). The team drew several conclusions: [1] both areas were adequate to support a population of 200 to 400 grizzly bears each, [2] grizzly bears had historically occupied both areas prior to unlimited killing by humans, [3] these areas were the last intact large ecosystems in the lower 48 states that could support grizzly bears as well as provide an opportunity to maintain and enhance the biodiversity of the region, and [4] the Bitterroot occupied a crucial position in the potential linkage of the Cabinet/Yaak, Yellowstone, and Northern Continental Divide Ecosystems. The technical review team recommended that grizzly bear recovery be pursued in both areas, agreeing with Davis and Butterfield (1991) that recovery was probably dependent more on minimizing human-bear conflicts than on habitat availability and quality. In December 1991, the IGBC issued a position statement saying that they had adopted the review team's recommendation and would pursue grizzly bear recovery in the Bitterroot and North Cascades Ecosystems.

Some people have suggested that the loss of the once-abundant chinook salmon runs in the Bitterroot Ecosystem significantly reduced the area's suitability for grizzly bears (Davis et al. 1986). Historical accounts indicated that grizzly bears fed extensively on these fish (Wright 1909, Moore 1984). There is little doubt that the restoration of those fish populations would enhance the area's ability to support grizzly bears. Nonetheless, the technical review team (Servheen et al. 1991) concluded that even with the loss of those fish the area was suitable as a grizzly bear recovery area. Others have suggested that the large increase in deer and elk populations in this area over the last few decades may more than offset the loss of salmon.

The amount of low-elevation spring habitat was another serious consideration in the Bitterroot Ecosystem evaluation. The data gathered in those studies indicated that there was limited, but adequate, spring range available. The technical review team noted that special management of these areas may be needed in order to minimize human-grizzly bear conflicts. For example, spring road-use restrictions and the relocation of garbage dumps and other sanitation measures may be necessary for low elevation portions of the ecosystem not in the wilderness areas.

In September 1993, the Northwest Ecosystems Management Subcommittee of the IGBC was dissolved and three separate subcommittees for the Bitterroot, North Cascades, and combined Selkirk-Cabinet/Yaak Ecosystems were established. The Northwest Ecosystems Management Subcommittee felt that recovery efforts in the Bitterroot and North Cascades had advanced to the point where this was justified, that each area had unique characteristics and problems requiring independent evaluation, and that the workload for the Northwest Ecosystems Management Subcommittee was becoming overwhelming. The current membership of the Bitterroot Ecosystem Management Subcommittee is presented in Appendix 2.

Recovery Plan Actions. The next step in the recovery process for the Bitterroot Ecosystem was the development of an ecosystem-specific recovery plan as part of the revised grizzly bear recovery plan (USFWS 1993*c*). A draft Bitterroot Ecosystem grizzly bear recovery chapter was released in August 1993. A two-month public comment period generated more than 800 comments. Of these, 171 were generally either for or against the draft chapter with 60% opposed and 40% in favor. The rest of the comments dealt with very specific issues such as road restrictions, which agency personnel said were not easily interpreted as being either for or against grizzly recovery in the area. Groups that favored the proposal included conservation organizations, professional resource managers, and government agencies; those opposed included commodity interests and groups promoting multiple use of federal lands.

A Bitterroot Ecosystem grizzly bear

recovery chapter was presented at the December 1993 meeting of the IGBC in Denver, Colorado. Acceptance of the chapter was delayed because of disputes over the recovery area boundaries, the details of reintroduction programs, and uncertainty on how to resolve these disputes. These concerns have been addressed and the Bitterroot Ecosystem chapter of the grizzly bear recovery plan was approved by the IGBC in July 1994.

In 1993, the Idaho Legislature created a Grizzly Bear Management Oversight Committee (Idaho Code § 36-716) to provide input to grizzly bear recovery programs in Idaho. This committee is composed of representatives of a variety of interest groups. It recently released a position statement on grizzly bear recovery in the Bitterroot. In February 1994, the IGBC adopted the eight points of the position statement of the Idaho Grizzly Bear Management Oversight Committee as their official position for grizzly bear recovery in the Bitterroot Ecosystem (Table 7). This action resolved many of the problems that surfaced during the December 1993 meeting in Denver, Colorado.

The Bitterroot Ecosystem is different than the other five grizzly bear recovery areas because there is no confirmation of the presence of grizzly bears. The final Bitterroot Ecosystem chapter and the IGBC's current position suggests that reintroducing bears to the area as an experimental population under section 10(j) of the ESA is the preferred course of action. Because this is a major federal action and other alternatives exist, NEPA analysis and documentation will be required (see Chapter 2, page 28). Furthermore, the chapter suggests that the exact boundaries of the recovery area will be determined through the NEPA process. How soon the NEPA process will be initiated and what agency will prepare the documents is currently undecided. However, the IGBC agreed to attempt to secure funding from the USFWS in Fiscal Year 1995 to begin preparation of the EIS (J.G. MacCracken, pers. observ.).

Recovery alternatives.—The EIS for the recovery of grizzly bears in the Bitterroot is likely to focus primarily on alternative boundaries for the recovery zone and alternative methods for establishing a grizzly bear population. The expectation is it will take two years to complete the draft EIS, incorporate public comments, and have the final EIS approved (H. Pollard, pers. comm.).

Recovery zone boundaries.—The location of the exact boundaries of the Bitterroot grizzly bear recovery zone have generated controversy and are undecided. There are currently at least six different positions or proposals for the recovery zone and at least five are likely to be alternatives in the EIS.

One alternative will no doubt be the evaluation area defined by the Northwest Ecosystems Management Subcommittee in 1986 (Figure 8). Those boundaries were used in the evaluation studies by Davis and Butterfield (1991) mentioned earlier and were the basis for the subsequent recommendation by the technical review team to pursue grizzly bear recovery in the Bitterroot Ecosystem. That recommendation was adopted by the IGBC.

The Idaho Grizzly Bear Management Oversight Committee had modified the boundary of the Bitterroot evaluation area by moving it to the east, away from the towns of Pierce and Elk City, Idaho (Figure 8). This modified boundary is likely to be one of the alternative recovery zones in the EIS.

A number of other interest groups have proposed that only the Selway-Bitterroot and the Frank Church-River of No Return Wildernesses be the recovery zone (see page 63). Such an all-wilderness recovery zone may also be an alternative in the EIS.

An important long-term consideration in defining a Bitterroot recovery zone is the status of experimental-nonessential bears (see next section) that may eventually move outside the recovery zone. In the short-term, most proposals call for capturing bears and returning them to the wilderness areas. If movement outside the recovery zone reflects natural dispersal because the recovery zone has reached its carrying capacity, then a different set of issues arises. Because it is unlikely that this will occur within the next 50 years, it is

Table 7. The eight points of the Idaho Grizzly Bear Oversight Committee's position statement adopted by the Interagency Grizzly Bear Committee as its official position on the recovery of grizzly bears in the Bitterroot Ecosystem.

1. The U.S. Fish and Wildlife Service proceed with the National Environmental Policy Act process and preparation of an Environmental Impact Statement.
2. The preferred alternative should be the reintroduction of an experimental-nonessential population.
3. The actual reintroductions be confined solely to the Selway-Bitterroot Wilderness Area.
4. No land-use restrictions specific to grizzly bears be applied outside the Selway-Bitterroot Wilderness. Existing restrictions for other species will be considered adequate for grizzlies outside the wilderness.
5. Management of problem grizzly bears will follow existing nuisance bear guidelines contained in the interagency grizzly bear guidelines.
6. A wide array of boundaries for the recovery area should be considered in the environmental impact statement to explore the relationship with experimental-nonessential status.
7. The State of Idaho should be an integral partner in the development of the environmental impact statement.
8. The U.S. Fish and Wildlife Service should immediately seek funding to initiate the National Environment Policy Act process.

primarily a theoretical issue. Nonetheless, it was a topic of discussion at the December 1993 IGBC meeting and was one reason for the delay in accepting the final chapter for the Bitterroot Ecosystem (J.G. MacCracken, pers. observ.).

At the 1993 winter IGBC meeting, a Department of the Interior solicitor stated that the status of a member of an experimental-nonessential population that left the recovery zone would change from experimental-nonessential to threatened. The individual bear would, therefore, come under the full protection of the ESA and the regulations adopted for other grizzly bear ecosystems. This interpretation argues for making the recovery zone extremely large in order to maintain the experimental-nonessential status for bears dispersing from the Selway-Bitterroot Wilderness. This legal aspect may result in a recovery zone alternative in the EIS that encompasses most of central Idaho and southwestern Montana.

The USFWS questions whether the Selway-Bitterroot Wilderness is large enough to support a viable population of grizzly bears. In their assessment of the wilderness area, Butterfield and Almack (1985) stated that it met the seven criteria of Craighead et al. (1982), but also noted that the Bitterroot Ecosystem was probably a much larger area. Based on Davis and Butterfield (1991), the final chapter for the Bitterroot Ecosystem states that on average the area is capable of supporting one grizzly bear for each 20 square miles of habitat. The Selway-Bitterroot Wilderness is about 1544 square miles and thus should be able to support about 77 bears. This is less than a population of 90 bears that the USFWS uses for the Selkirk and Cabinet/Yaak Ecosystems. Although the Frank Church-River of No Return Wilderness

probably is less suitable as grizzly habitat, its inclusion would result in a recovery zone of sufficient size to support a population of more than 90 grizzly bears. Although the USFWS did not study the Frank Church-River of No Return Wilderness due to lack of funds, the northern portion, or Salmon River Breaks, of the wilderness area was included in the Bitterroot evaluation area of Davis and Butterfield (1991).

Population establishment and status.—Alternatives for the establishment of a grizzly bear population in the Bitterroot Ecosystem and the subsequent status of that population under the ESA are the same as those for wolf recovery in central Idaho identified by Wise et al. (1991): [1] natural dispersal from existing populations and maintaining threatened status, i.e., a no-action alternative, [2] reintroduction by moving bears from other populations to the Bitterroot Ecosystem and classifying them as either an experimental (ESA, § 10(j)) or a nonexperimental population, or [3] enactment of special federal legislation dictating how and when grizzly bears will be reestablished and defining their legal status. Arguments for and against these alternatives are similar to those for wolves, as discussed by Wise et al. (1991).

It is unlikely that natural dispersal of grizzly bears to the Bitterroot Ecosystem will result in a viable population any time soon. There are a number of hazards a dispersing bear would have to successfully negotiate, such as interstate highways, agricultural areas, and roaded national forest areas. It could be argued that reports of grizzly bear sightings in the Bitterroot area suggest that natural dispersal is occurring. However, the lack of recent confirmed sightings despite concerted efforts to find them suggests several possibilities: either not enough bears exist to initiate reproduction and establish a population, or the bears moving into the area quickly die, or the bears do not remain in the area, or the reported sightings are not accurate. The adoption of the natural dispersal alternative is likely to result in a prolonged recovery program with a small chance of success in comparison to the other alternatives. It is however, probably the least expensive alternative in terms of attempting to establish a population.

The likelihood of Congress passing special legislation dealing with grizzly bear recovery in the Bitterroot Ecosystem is remote, based on a similar effort with wolves. Senator James McClure (R-ID) introduced a bill in 1990 dealing with wolf recovery procedures in central Idaho that did not pass (Wise et al. 1991). Congress did pass a compromise measure that created a federal Wolf Management Committee, whose work was considered during the preparation of an EIS for wolf recovery in Yellowstone and central Idaho that was completed in 1994.

Although the reintroduction of grizzly bears to the Bitterroot Ecosystem is probably the quickest route to establishing a population, even this approach will be a slow and gradual process. Dr. J.M. Peek of the University of Idaho simulated population growth for grizzly bears using different reintroduction scenarios (Figure 9). The major assumption of this analysis was that no bears died during the 50 years of simulation. This assumption is unrealistic, but provided for maximum population growth in the shortest period of time. Under the most aggressive management scenario it would take 13 years before the population reaches 100 individuals and about 25 years before the population reaches 280 bears, the estimated carrying capacity for the Bitterroot evaluation area (Figure 9). Under the most realistic scenario of releasing two bears per year for 15 years, the population would not reach 100 bears for 20 years, and 280 bears for 46 years. Any mortality of female bears, which is highly likely to occur, could easily double these time projections. In addition, the number of bears available for reintroduction to the area is unknown. Grizzly bears for a reintroduction effort will probably come from Canada or the Northern Continental Divide Ecosystem and limited opportunities, budget constraints, and chance events in trapping and moving efforts could significantly influence the number of bears translocated and thus effect the subsequent growth of the population.

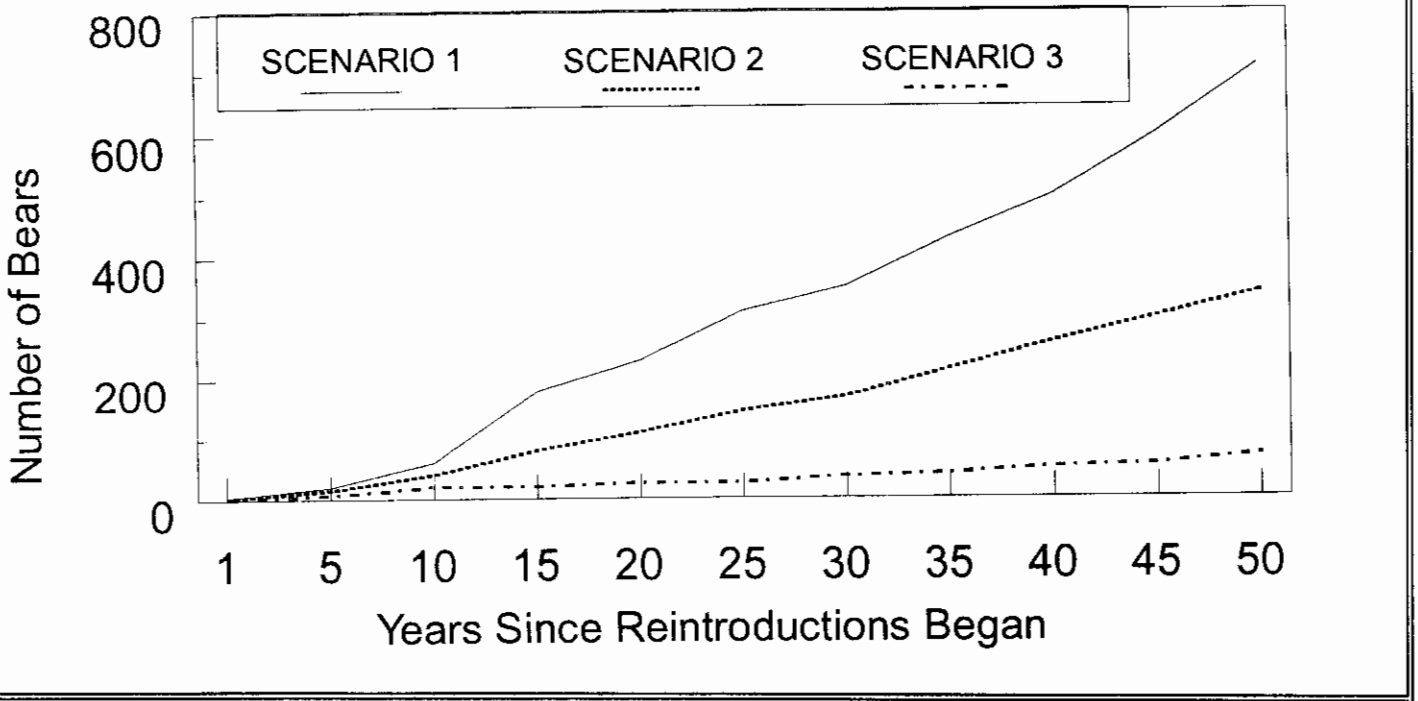

Figure 9. Simulated population growth for grizzly bears reintroduced to the Bitterroot Ecosystem under three different scenarios over a 50-year period.

Note: Population growth was estimated with the Leslie matrix model and was based on three assumptions: [1] no mortalities, [2] females breed first at six years of age, and [3] each breeding female produces two cubs every three years. Scenario one introduces 15 bears during the first five years, composed of 5 males and 10 females which represents the most optimistic outcome. Scenario two introduces two bears, each year for 15 years, composed of 3 males and 12 females which represents the most realistic outcome. Scenario three introduces six bears for five years, composed of one male and five females which represents a pessimistic, but also a realistic outcome.

Legal Status of Reintroduced Bears. The USFWS has four options under the ESA in designating the status of members of a species that are reintroduced into an area that the species formerly inhabited. Reintroduced grizzly bears could be classified as: [1] endangered, [2] threatened, [3] experimental-essential, or [4] experimental-nonessential. While there are areas of overlap and some ambiguity, the classification spectrum from endangered to experimental-nonessential represents decreasing levels of protection.

Because the naturally occurring populations of grizzly bears in the Cabinet/Yaak, Selkirk, Yellowstone, and Northern Continental Divide Ecosystems are classified as threatened, classification of a reintroduced population as endangered is technically possible but highly improbable. Therefore, only the final three potential classifications will be discussed.

Threatened.—The USFWS could classify any bears reintroduced into the Bitterroots as threatened. If it were to do so, the Bitterroot population would be legally identical to existing, naturally-occurring populations in the adjacent ecosystems.

Under this scenario, the protection mandates of sections 7 and 9 of the ESA would apply as previously discussed. However, as with all threatened distinct population segments, under the ESA the USFWS is authorized to establish regulations on takings that would apply specifically to the Bitterroot population.

Experimental-essential.—In 1982, Congress sought to facilitate the reintroduction of listed species into areas from which they had been

extirpated by creating a new category: the experimental population. The two defining characteristics of an experimental population are that animals are released under the authorization of the USFWS and that the area is "wholly separate geographically from nonexperimental populations of the same species" (ESA § 10(j)(1)). Before releasing animals, the agency is required to determine whether the experimental population "is essential to the continued existence of" the species. If the population is determined to be essential, it "shall be treated as a threatened species" (ESA § 10(j)(2)(C)).

In situations where species are listed as endangered, designating members of an experimental population as threatened is the most important source of increased management flexibility. As noted, the ESA's takings prohibitions do not automatically apply to threatened species; the USFWS has the authority to develop protective regulations that are less restrictive than the statutory prohibitions applicable to endangered species.

Since the naturally-occurring populations of grizzly bears are already classified as threatened, the experimental-essential status would itself result in no change in the protection mandated under either section 7 or section 9. It is unlikely that bears reintroduced into the Bitterroot Ecosystem would be classified as essential since the USFWS has defined that term to cover only those experimental populations "whose loss would be likely to appreciably reduce the likelihood of the survival of the species in the wild" (50 CFR § 17.80 [1993]). Because existing populations of bears are classified as threatened, it is unlikely that any bears reintroduced into the Bitterroot Ecosystem would satisfy the definition of essential.

Experimental-nonessential.—Classifying the Bitterroot bears as an experimental-nonessential population is the most likely alternative. This status would reduce the protection accorded the population under section 7 but would have no automatic effect on protection against takings under section 9.

Individuals in an experimental-nonessential population would be treated for most purposes under section 7 as though the species had been proposed for listing (ESA § 10(j)(2)(C)(i)). The ESA accords proposed-but-not-yet-listed species (i.e., candidate species) only very limited protection. The Act does not require an action agency to insure that its proposal does not jeopardize a candidate species and it is not prohibited from proceeding with the proposed action during the conference period (ESA § 7(a)(4)). Since the ESA contains no prohibition on jeopardizing the continued existence of a candidate species, the protection under section 7 is substantially reduced. For example, courts have refused to halt projects that significantly effect proposed but not listed species (*Enos v. Marsh,* 769 F.2d 1363, 1368-69 [9th Cir. 1985]; *Wilson v. Block*, 708 F.2d 735, 750-51 [D.C. Cir.], *cert. denied,* 464 U.S. 956 [1983]).

Designation of an experimental population as nonessential does not itself effect the section 9 prohibitions on takings. As with all other distinct population segments of threatened species however, the USFWS has the authority to develop regulations on takings specifically covering the Bitterroot bears (ESA § 4(d)).

Interest Group Positions on the Bitterroot Recovery Program. The Resource Organization On Timber Supply (ROOTS) is a local forest products industry representing both management and labor. Although generally opposed to grizzly bear reintroduction to the Bitterroot Ecosystem, ROOTS has stated that if the IGBC insists on recovering grizzly bears in the area, the recovery zone should be confined solely to the Selway-Bitterroot Wilderness. Furthermore, ROOTS suggests that the reintroduced population be classified as experimental-nonessential (D. Johnson, pers. comm.). On 26 January 1994, Rep. Larry LaRocco (D-ID) endorsed the ROOTS position.

The Blue Ribbon Coalition, an off-road vehicle organization, stated that they would support the reintroduction of grizzly bears into the Bitterroot Ecosystem on three conditions: [1] the population were limited to wilderness areas and were classified as experimental-nonessential, [2] bears moving outside the

wilderness area were returned, and [3] any other bears found in the area automatically become part of the experimental-nonessential population. They also suggested that population goals be set at the minimum viable population number, that recovery areas be evaluated for spring forage, and that the Frank Church-River of No Return Wilderness be studied for inclusion in the recovery area.

The Defenders of Wildlife and the National Wildlife Federation support the Bitterroot reintroduction. The Northern Rockies Chapter of the Sierra Club also supports it, and suggested that the recovery zone be confined to the Selway-Bitterroot and Frank Church-River of No Return Wildernesses and that translocated bears be classified as experimental-nonessential. The Sierra Club recognized that the area north of the Lochsa River probably contains the best habitat, but stated that the political ramifications of including this area might be detrimental to recovery.

Other environmental groups have suggested that the Secretary of the Interior withdraw the revised grizzly bear recovery plan and start over. These groups include the Greater Yellowstone Coalition, the Wilderness Society, the Northern Plains Chapter of the Sierra Club, and the National Audubon Society. These groups support larger recovery areas that include linkage zones connecting the various grizzly bear ecosystems, and they also suggest that all grizzly populations be classified as endangered. At this point, withdrawal of the grizzly bear recovery plan would significantly delay restoration of grizzlies to the Bitterroot Ecosystem. Recovery actions are dependent on the approval of a recovery plan, and without an approved plan, the NEPA process and translocations cannot proceed.

An exceptional degree of consensus exists among the local and state-wide groups that have taken positions on the Bitterroot grizzly bear recovery program (Table 8). Many groups support the classification of reintroduced bears as experimental-nonessential. The primary disagreement is where the boundaries of the recovery area should be. Some observers feel the Selway-Bitterroot Wilderness may not be large enough to support a viable population of grizzly bears.

Because there are various recommendations for a recovery zone, the following approach may be acceptable at this point in time: [1] designate a core restoration area, e.g., the Selway-Bitterroot Wilderness, to be the focus of reintroduction efforts over the next 20 years, and [2] designate a larger preliminary recovery zone. The sole purpose of the preliminary recovery zone would be to insure that grizzly bears that wander outside the core restoration area would still be classified as experimental-nonessential. The preliminary recovery zone could be either the Idaho Grizzly Bear Management Oversight Committee's modification of the Bitterroot evaluation area, or an area including both the Selway-Bitterroot and Frank Church-River of No Return Wildernesses in their entirety, or an even larger area—for example, all of Idaho from Interstate Highway 90 south to the Snake River Plain, and most of Southwestern Montana, bordered by Interstate Highways 90 and 15.

Because an experimental population must be wholly separate from other populations, there is a legal limitation on how large the recovery area may be. The preliminary recovery zone therefore cannot overlap any areas containing members of naturally-occurring populations. In addition, the IGBC has adopted the position that no land-use restrictions specific to grizzly bears be applied outside designated wilderness areas. Because reintroduction efforts as well as the grizzly bear recovery plan are reviewed at five-year intervals, these recovery area designations should be modified as bears establish habitat use patterns and the population increases.

In the debate over the recovery area boundaries it should be noted that by the time grizzly bears fill any of the proposed recovery areas and bears begin dispersing to warrant consideration of boundary expansion, the population may have met the criteria for delisting. Thus the issue might never arise. Furthermore, ESA what-if games are largely external to the present problems and probably

Table 8. Positions of groups or individuals on grizzly bear recovery in the Bitterroot Ecosystem, in relation to population status and recovery zone boundaries.

Group/Individual	Population Status	Recovery Zone
Blue Ribbon Coalition	Experimental-nonessential	Wilderness Areas only
Idaho Oversight Committee (created by legislature)	Experimental-nonessential	Selway-Bitterroot Wilderness as core, explore other options through Environmental Impact Statement
Interagency Grizzly Bear Committee	Experimental-nonessential	Selway-Bitterroot Wilderness as core, explore other options through Environmental Impact Statement
Northern Rocky Mountains Chapter, Sierra Club	Experimental-nonessential	Selway-Bitterroot and Frank Church River of No Return Wilderness
Rep. Larry LaRocco (D-ID)	Experimental-nonessential	Selway-Bitterroot Wilderness only
ROOTS (Resource Organization on Timber Supply)	Experimental-nonessential	Selway-Bitterroot Wilderness only
U.S. Fish and Wildlife Service	Experimental-nonessential	Bitterroot Evaluation Area, or to be determined through Environmental Impact Statement
Wild Forever[1]	Threatened or Endangered	Larger than Bitterroot Evaluation Area, including linkage zones to other grizzly bear ecosystems
Defenders of Wildlife	Experimental-nonessential	Central Idaho wilderness areas and surrounding federal lands

[1] Wild Forever is a collaborative grizzly bear project of the Greater Yellowstone Coalition, Northern Plains Region of the Sierra Club and the National Audubon Society.

add little information that might help solve future problems. Given the need to periodically assess experimental population reintroductions and to review and revise the grizzly bear recovery plan, these considerations can be dealt with when and if they come to the forefront. Such long-term issues should not significantly effect current recovery program efforts. This generalization also applies to many other contentious issues such as ecosystem linkages and viable population estimates that some insist should influence grizzly bear recovery.

There will very likely be a Bitterroot Ecosystem EIS prepared in the near future. Another question that may be addressed in that process is how the recovery area will be managed following its designation and prior to the delineation of BMUs. Currently, the area appears to fit management situation 4 guidelines (see Table 3) where bears do not exist, but the area is suitable for and identified as necessary for recovery. Management directions for situation 4 habitat call for maintaining or improving the habitat. Once bears become established, areas appropriate for management situation 1 or 2 classification will become apparent.

Chapter 5. Other Management Considerations

There are a number of other issues in grizzly bear management that are being evaluated outside of Idaho and may become applicable to Idaho populations in the future. These issues include wildlife corridors or ecosystem linkages, road density, management following delisting, risk to humans, and recent litigation. These issues are examined in this chapter.

Ecosystem Linkages

Isolated populations of wildlife are exposed to three types of unique risks: [1] loss of genetic diversity, [2] susceptibility to short-term catastrophic events (such as fire, earthquake, and volcanic activity), and [3] long-term systemic changes such as global climate change with attendant vegetation shifts. Providing habitat corridors to link isolated populations has been suggested as a potential solution. Critics of the revised grizzly bear recovery plan cite the lack of protection for potential linkage zones as a major shortcoming, despite the fact that the USFWS is conducting a five-year study of the concept (USFWS 1993*c*, Servheen and Sandstrom 1993).

Isolated populations are presumed to inbreed, resulting in lowered reproductive output and survival (Wright 1977) and loss of genetic diversity that may compromise an organism's adaptability to adapt to environmental change (Franklin 1980). These presumed genetic risks are largely the product of theory and based on computer simulations. Some of these concerns invoke evolutionary time-frames and subjective estimates of the probability of chance events. Futhermore, the relationship between genetic diversity and short-term population fitness in wild animals is largely unknown (Hendrick and Miller 1992, Caro and Laurenson 1994, but see O'Brien et al. 1990). Empirical studies have not yet demonstrated that these genetic risks apply to most wildlife populations. Nonetheless, a lack of cause and effect evidence does not mean that genetic problems do not occur.

Genetic diversity concerns influence the management of endangered species throughout the United States. The USFWS tries to protect as many organisms and habitats as possible. There are two ways to alleviate these genetic risks: [1] by providing protected habitat linkage zones to facilitate movements of grizzly bears between ecosystems, and [2] by periodically capturing and relocating bears (USFWS 1993*c*).

Ecosystem linkages may also be effective in reducing the effects of both short-term catastrophic events and long-term environmental changes. However, landscape-scale linkages and wildlife corridors are a relatively new but rapidly developing area of conservation biology (Noss and Harris 1986, Simberloff and Cox 1987, Noss 1987, Soulé and Gilpin 1991, Hudson 1991). There are more questions about ecosystem linkages than answers. For example, will animals actually use the linkage zones? Only research can provide an answer, and there may be better uses of scarce research funds than testing such a hypothesis when the establishment of wildlife corridors promises disruptive land-use changes and an alternative method is available to diminish genetic risk.

Providing effective linkage among the various grizzly bear ecosystems requires extensive analysis and monitoring and would also be difficult. To design an efficient and effective linkage system requires information on habitat selection by grizzlies, the resources in the zones, and the risks associated with the linkage zones. Because grizzly bears need some insulation from human contact, linkage zones would have to be subject to little human use or occupancy. Although grizzly bears can cover long distances in a short period of time (Miller and Ballard 1982), narrow travel corridors have many potential drawbacks (Simberloff and Cox 1987) and larger linkage zones of up to 100 square miles may be needed to allow for gradual movements over a number of generations (see Section II in Hudson 1991). In addition, if mortality rates are higher in linkage zones, the zones may act as population sinks, and in reality impede true recovery.

Although it would be possible to design a linkage system, relocate people, reroute or reconstruct highways to facilitate movement (or assume that grizzlies will successfully cross these obstacles), restrict motorized use of some roads on public lands, and limit human access, political realities likely preclude the adoption of such a scheme at this time. It may be that human settlement and activities have progressed to the point that adequate habitat linkages no longer exist. Political realities are, of course, subject to change.

Ecosystem management programs, the assumed future direction in federal land management, would probably benefit and be more feasible with the retention of large areas of refugia and connectivity. Providing ecosystem linkages suggests a number of possible population structures for grizzlies: [1] a single population with grizzlies permanently occupying the linkage zones as well as the ecosystems, or [2] one of four metapopulations with varying amounts of dispersal from neighboring ecosystems (Hanski 1991, Harrison 1991, 1994, Hansson 1991). Proponents of ecosystem linkages have not identified which type of population structure they are advocating. As noted, a metapopulation structure may be able to persist as long with fewer individuals than a single population (see Chapter 2, page 24), but letting some local populations go extinct and counting on recolonization is perhaps biologically and politically risky. However, there may not be enough habitat, even with ecosystem linkages, to support enough grizzlies to maintain a single population encompassing all the ecosystems.

Although the USFWS is currently beginning a five-year assessment study of potential linkage zones among the various grizzly bear ecosystems (USFWS 1993*c*, Servheen and Sandstrom 1993), the agency currently appears to favor the capture and translocation alternative for grizzly bears over the ecosystem linkage approach. The agency is currently augmenting the Cabinet/Yaak population with bears from Canada to boost that population (Servheen et al. 1987, Kasworm et al. 1993) and suggests that the results of these efforts can be used to develop an augmentation program for increasing genetic diversity in the Yellowstone Ecosystem, which it has suggested is in the greatest need of augmentation for genetic reasons (USFWS 1993*c*.). Simberloff (1988) stated that the available research indicated that dispersal by a relatively small number of individuals was adequate to offset many of the negative effects of isolation on wildlife populations.

Roads and Grizzly Bears

Several studies suggest that roads either have a direct, negative impact on grizzly bears or facilitate a variety of indirect, negative impacts (Elgmork 1978, Schallenberger 1980, Mattson et al. 1987). These include lethal encounters with humans, habitat modification, displacement from high quality habitat, and behavioral changes. Due to these conclusions, management of grizzly bear habitat is tied to minimizing open roads, restricting motorized use of roads, and maintaining roadless areas.

Access Management Task Force. Because of the importance of the management of motorized access to grizzly bear recovery, the IGBC created an access management task force and it released a draft report in July 1994 (Interagency Grizzly Bear Committee 1994). The purpose of access management is to minimize human-grizzly interactions and thus grizzly mortalities, minimize the displacement of grizzlies from important habitat, minimize habituation to humans, and provide secure habitat. The task force developed road classification definitions and standardized the procedures used to estimate the effects of motorized access on grizzlies within recovery zones. These procedures include standard methods to measure road densities and define area boundaries within which road density will be measured, and insuring that these standards are compatible with the cumulative effects model.

The access management task force defined **roads** as routes greater than 500 feet long that can be driven with a passenger car or pickup truck. An **open road** has no restrictions on

vehicle use, whereas a **restricted road** has vehicle use restricted seasonally or yearlong by means of a physical obstruction. A **reclaimed** or **obliterated road** is a road that has been treated in such a manner so as to no longer function as a road or trail. A **Trail** is any access route that does not qualify as a road. An **open motorized trail** has no restrictions on motorized use and a history of use by motorcycles, all-terrain vehicles, or 4-wheel drive vehicles. A **restricted motorized trail** is a trail on which motorized use is restricted seasonally or yearlong.

The access management task force also has standardized analysis areas (i.e., BMUs or BMU subunits) and required GIS technology for calculating road densities. The task force has asked the ecosystem management subcommittees to define ecosystem-specific road density categories and acceptable threshold levels of motorized access, based on a percentage of an analysis area that would be in each road density category.

Another important aspect of the task force recommendation is the identification of core areas for female grizzlies in each analysis area. Core areas are free of motorized use during the time of year when grizzlies are not denning. They are also free of roads or trails that receive high intensity non-motorized use and cannot be within 0.3 miles of any open road or motorized trail. Once established, core areas are to remain for at least 10 years.

The access management task force report was accepted by the IGBC at the 1994 summer meeting in Powell, Idaho (J.G. MacCracken, pers. observ.). The IGBC called for the recommended procedures to be developed. The effects of these procedures on access management in relation to current practices are unknown and will be ecosystem-specific. However, not all management agencies have a GIS in place and until they do, current procedures will continue to be used. The setting of threshold levels for road densities will have the greatest effect on how this process translates into on-the-ground access management. These thresholds will be different for each ecosystem and possibly each BMU within an ecosystem.

The task force also recommended that the term closed road be abandoned since it was inaccurate and misleading. A closed road or area means that all access, whether on foot or mechanical, is denied to everyone without specific authorization to enter the area.

Lost Silver Timber Sale Opinion. A recent biological opinion on a timber sale in grizzly bear management situation 1 habitat on the Flathead National Forest in Montana may have a more immediate impact on the management of roads and secure grizzly bear habitat. Through a number of informal and formal consultations with the USFWS, the Flathead National Forest had set road density standards of one mile of open road per square mile in management situation 1 habitat and two miles of open road per square mile in management situation 2 habitat. These standards were incorporated into the Flathead National Forest Plan and amendments (USFWS 1989).

In 1991, the Flathead National Forest submitted a biological assessment to the USFWS on the Lost Silver Timber Sale. Originally, the USFWS concurred with the U.S. Forest Service findings of no adverse effect on grizzly bears. However, during December 1992, the Montana Department of Fish, Wildlife, and Parks submitted a report on grizzly bears, road densities, and timber management based on a research project that encompassed the Lost Silver Timber Sale (Mace and Manley 1993). The study documented that most grizzly bears avoided roaded areas even if motorized use of the roads was restricted; bears were being displaced from seasonally important, high quality habitat. The Forest Service and USFWS reinitiated formal consultation on the Lost Silver Sale, and in September 1993 the USFWS determined that the project did not result in jeopardy, but that it did cause the incidental take of grizzly bears through habitat modification and displacement from high quality habitat. Based on Mace and Manley's (1993) report and the road density and secure habitat situation, the USFWS concluded that the sale would result in increased direct mortality to grizzly bears, direct habitat loss,

potential increased habituation of grizzlies, displacement from critical feeding sites, and habitat fragmentation.

Therefore, the USFWS developed incidental take conditions allowing the U.S. Forest Service to proceed with the sale. The incidental take conditions and the alternatives suggested by USFWS to avoid an illegal taking focused on road densities. The conditions and alternatives require the Forest Service to reduce the total road density, to reclaim some roads, and to gate others (USFWS 1993*b*). An initial U.S. Forest Service analysis indicated that 47 miles of roads will have to be restricted and 115 miles of roads will have to be reclaimed to meet the new standards; the agency concluded that the standard could not be met in one BMAA.

A forest industry trade association has expressed concern about the effects of this biological opinion on the Flathead National Forest and its potential impact on other grizzly bear ecosystems (Intermountain Forest Industry Association 1993). To what degree the recommendations of the USFWS biological opinion on the Flathead and those of the Access Management Task Force of the IGBC are comparable, and if and how differences will be reconciled is unknown.

Management Following Delisting

Once a species is listed, the ESA requires the USFWS to recover and delist the species. Delisting may not however, provide much regulatory relief because one of the requirements for delisting a grizzly population is the approval of an interagency conservation strategy to guide management following delisting (USFWS 1993*c*). The USFWS does not want to have to relist a species.

The grizzly bear populations in the Northern Continental Divide and Yellowstone Ecosystems are close to meeting the population goals for delisting (USFWS 1993*c*). The remainder of this section describes the strategy for management that will follow delisting in the Northern Continental Divide Ecosystem, if and when it occurs.

A draft conservation strategy for the Northern Continental Divide Ecosystem was released in May 1990; a draft strategy for the Yellowstone Ecosystem will probably be completed within the next two years. The Northern Continental Divide draft strategy provides some insights into how grizzly bears may be managed following delisting (Montana Department of Fish, Wildlife, and Parks 1990).

One assumption is that once delisted, grizzly bear populations would be under the jurisdiction of state wildlife management agencies. This assumption does not appear to be entirely true. For example, although the Northern Continental Divide Ecosystem is wholly within Montana, the draft strategy establishes a management committee of 10 signatories from a variety of federal, state, and tribal agencies. Although there are numerous laws and regulations providing authority for the involvement of the various agencies, the primary incentive to enforce the strategy is the requirement that the agreement be in effect before delisting can occur. The potential for emergency relisting under the ESA if the population and habitat declines is also an incentive to enforce the strategy. If and when the population is delisted, a new Northern Continental Divide Ecosystem Management Committee will be assembled. It is to be composed of high-level administrators from state, tribal, and federal agencies as well as members-at-large from Canadian government agencies and firms owning industrial timberlands. This committee will assume the functions of the IGBC, and report to the Director and the Commission of the Montana Department of Fish, Wildlife, and Parks.

Although grizzly bear habitat management under the draft strategy largely remains the domain of the U.S. Forest Service and National Park Service, habitat monitoring will continue to use a cumulative effects model. The Montana Department of Fish, Wildlife, and Parks will develop plans for monitoring grizzly bear populations and habitat. Population trends will continue to be assessed using counts of females with cubs, distribution of those females among BMUs, and limits for annual human-caused mortalities. Guidelines

will be set to trigger emergency relisting under the ESA if estimates of these indicators fall below specified levels.

The draft strategy suggests that the state will eventually divide the ecosystem into management zones. At present, however, the draft strategy does not change the current management situation 1, 2, and 3 designations (see Table 3). In addition, the draft strategy defers to agency and tribal land use management plans in implementing resource-use activities. The draft strategy also adopts the guidelines of the Montana Department of Lands for grizzly bear management on state lands and sets objectives for cooperation with private and tribal lands within grizzly habitat. Two tribes have lands in the area: the Blackfeet and Confederated Salish and Kootenai Tribes. Both have responsibility for grizzly bear management on their lands.

The draft strategy replaces the ESA section 7 consultation requirements with a less stringent consultation requirement. The consultation will be similar to the process used in meeting ESA mandates for candidate species. The consultations will be advisory in nature and are not intended to prohibit projects on public lands, but to insure that those projects do not result in a relisting of the population.

In summary, it appears that the interagency conservation strategy for the Northern Continental Divide Ecosystem will keep in place many of the regulations and guidelines that currently operate to effect grizzly bear conservation under the ESA. The ultimate authority however, will shift from the IGBC and the USFWS to a new Northern Continental Divide Ecosystem Management Committee and the Montana Department of Fish, Wildlife, and Parks Director and Commission. Except for the tribes, interagency consultations will become a state process that is solely advisory in nature. The potential relisting of the population under the ESA and return to federal control if the population and habitat indicators fall below specified levels are the primary incentives to comply with the strategy.

This strategy is currently being revised. The Northern Continental Divide Ecosystem Management Subcommittee of the IGBC expects to complete the final interagency conservation strategy before the end of 1995. Presumably, conservation strategies for other ecosystems will be very similar to the one being developed for the Northern Continental Divide Ecosystem.

Risk of Human Injuries From Grizzly Bears

Grizzly bears injure and kill people (Herrero 1985, 1990). This fact generates opposition to the recovery of grizzly bears. Fear of injury and death however, are often exaggerated by a lack of knowledge of bear behavior, of situations that provoke attack, of injury rates per bear encounter, and of how to respond to grizzly bears when encountered.

Grizzly bears injure humans, but infrequently. Herrero (1990) has estimated injury rates due to grizzly bears for Canadian and United States national parks from 1980 to 1985, distinguishing between all park visitors and those that ventured into the backcountry. For seven parks that had data for all visitors, the average injury rate was one in 1,078,967 visitors. For six parks that had data on backcountry campers, the average injury rate due to grizzly bears was one in 498,961 visitors. Obviously, visitors to North American national parks have a low risk of injury by grizzly bears. This data does not however, provide information on the likelihood of encountering a grizzly bear or of an encounter resulting in an attack.

Such information on backcountry users was collected at Glacier National Park from 1980 to 1987 by Nadeau (1987). He defined a grizzly-human confrontation as being within 100 feet of a grizzly, and the encounter resulting in the bear fleeing or charging, the bear approaching out of curiosity, or the observer climbing a tree or playing dead. The chance of being involved in a confrontation with a grizzly was about one in 400, and was highest in May (one in 100) and lowest in October (one in 1000). The chance of a confrontation resulting in injury to the person was about eight in 100, with the highest rate in September (29 in 100) and lowest in May,

August, and October (one in 100). Futhermore, injuries or confrontations were greatest in low-use areas (i.e., off-trails) and least on high-use trails.

Nadeau (1987) also found that no particular age or sex of bear—females with cubs, adult males, subadults—was more likely to be involved in a confrontation or human injury, and that confrontations were equally likely at any time of the day. His results also supported the idea that when grizzlies are habituated to humans and encounter humans in a predictable manner, such as on high-use trails, grizzlies are less likely to attack. Herrero (1989, 1990) agreed with Jope's (1982) and Nadeau's (1987) suggestion that grizzly bears that encounter people on trails in a predictable manner are less likely to attack. This indicates that habituated but non-food-conditioned bears may be compatible with humans in predictable settings, such as the tightly regulated viewing of grizzlies fishing for salmon at McNeil River Falls in Alaska.

Other studies have focused on encounters in developed campground situations. In 1971, Craighead (1979) noted that 101 grizzly-human encounters were reported in Yellowstone National Park's Lake Campground. Despite this evidence of high incidence of grizzly-human encounters, Herrero (1985) reported only 13 injuries in all of Yellowstone from 1970 to 1979. These encounters and injuries occurred shortly after garbage dumps in Yellowstone were closed. In the 1970s many Yellowstone Park grizzlies had become habituated to humans and food-conditioned, making them exceptionally dangerous.

Managers place bears in one of three categories that relates to their probability of being involved in a bear-human encounter and of attacking the human during that encounter (Herrero 1985, Mattson 1993). The category of bears creating the lowest risk of either encountering or attacking a human includes bears that are wary of humans and avoid areas of human activity. In Glacier National Park, this lowest-risk category consisted of adult females with cubs (Nadeau 1987). Bears habituated to humans are the second category, characterized as having a higher rate of encountering humans, but only a moderate risk for attack. The third category is bears habituated to humans and food-conditioned. Bears can learn to associate humans with a source of food, and these bears present the largest risk because they do not fear people and may seek people to obtain food. However, grizzlies rarely prey on humans as a food source (Herrero 1989, 1990). Since this classification was developed in national parks, its application is unclear for lands outside of national parks where grizzly bears that encounter humans may end up being shot (Herrero 1985, 1989).

Are menstruating women more susceptible to grizzly bear attacks? The limited data on this suggests that there is no correlation between menstruation and attacks (Herrero 1985). Experiments with black bears indicated that the bears ignored human menstrual odors regardless of season, age or sex of the bear, or the bear's reproductive status (Rogers et al. 1991).

Grizzly bear attacks are often associated with attempts to obtain food. The most important single safety measure is to keep a clean camp and to store food in bear-proof, sealed containers. A number of publications are available containing suggestions on how to handle food in grizzly bear habitat (USFS, no date, Center for Wildlife Information no date, Interagency Grizzly Bear Committee, no date). In addition, Herrero (1985) discussed the topic in detail.

In summary, the chance of being confronted by a grizzly bear ranges from one in 400 to one-in-a-million depending on area and season. These estimates are from national parks where bears may be habituated to humans and food-conditioned. On other lands where hunting is allowed and human-bear encounters can result in bears being shot, grizzly bears may in general be more wary and occur at lower densities, so the risk of an encounter and then attack is presumably even less. To further decrease this risk, people should stay on well-used trails, make plenty of noise, avoid areas where surprise encounters can occur, and be alert when bears may be present (Herrero 1985). The available data and experiments

with black bears indicate that women are not at greater risk of attack than men.

Recent Lawsuits and Court Decisions

In 1989, four environmental groups sued the Flathead National Forest, challenging the provisions of the forest plan and accompanying EIS on grizzly bear habitat management and timber sales (*High Country News* 1993*a*). On appeal, the Ninth Circuit Court of Appeals held that the Forest Service had acted illegally in concluding that the maximum timber harvest figure—the "allowable sales quantity" or ASQ—would not jeopardize threatened grizzly bears within the Flathead National Forest. The agency's own evaluation had concluded that a cut of between 93 and 97.2 million board feet per year was the maximum that could be achieved without adverse impact; an average annual ASQ of 100 million board feet, as identified in the forest plan, thus was arbitrary and capricious (*Resources Limited, Inc. v. Robertson,* 8 F.3d 1394 [9th Cir. 1993]).

On 20 July 1993, a coalition of environmental groups filed three suits against the Gallatin and Targhee National Forests, citing excessive road densities and failure to conduct section 7 consultations for some timber sales in the Yellowstone Ecosystem (*High Country News* 1993*b*). The groups stated that road densities exceeding one mile per square mile of habitat should be considered an incidental take. Road densities on both forests exceed that level. The U.S. Forest Service has negotiated a settlement and it has been upheld.

As noted in Chapter 2, the Sierra Club Legal Defense Fund filed suit in late 1993 challenging the USFWS decision not to change the status of some grizzly populations from threatened to endangered. A change in status would require the designation of critical habitat for the effected populations and the preparation of an EIS. The suit is pending in September 1994.

On 16 March 1994, the Sierra Club Legal Defense Fund, representing 20 environmental groups, gave notice that they intend to file suit against the USFWS over the revised grizzly bear recovery plan (*High Country News* 1994*b*). Reasons for the suit are the same as those presented in Chapter 2 justifying requests that the plan be withdrawn and revised. The suit was filed after the 60-day notice of intent and is currently in the discovery phase where attornies gather pertinent information, in this case under the Freedom of Information Act. There have been no settlement discussions yet, and there does not appear to be an identifiable basis for settlement at this time (C. Servheen, pers. comm.). The complaint lists three causes for the suit: [1] the USFWS failed to consider the five listing/delisting criteria in setting recovery goals, [2] that recovery criteria are arbitrary and capricious, and [3] that site-specific management actions need to be specified in the recovery plan. A major issue that may be settled by this litigation is the purpose of recovery plans. The plaintiffs are suggesting that recovery plans become decision documents that allocate resources and thus would be subject to NEPA. This contrasts with the USFWS view that recovery plans provide only biological advice and opinion and suggest management strategies for projects on federal lands, or those using federal resources, or requiring federal permits.

Chapter 6. Conclusions

Grizzly bear recovery, as with most imperiled species, presents problems that are complex, multi-dimensional, and interact with one another. Efficient and effective recovery policies cannot be identified and implemented until the policy problems are adequately defined and put into context (Dery 1985, Clark et al. 1991). Problem definition is a major component of policy analysis (Laswell 1971, Cubbage et al. 1993) and perhaps the most important part. What is the problem with grizzly bear recovery efforts? In a word, people. This is the case with all endangered species issues; indeed, it is why we have the Endangered Species Act.

In the broadest sense, grizzly bear recovery is hindered by increases in human populations; globally and nationally as well as within and immediately surrounding the designated recovery zones. The Northern Rocky Mountains and Pacific Northwest are two of the fastest-growing regions in the United States, resulting in more people in and around grizzly bear habitat. Large tracts of private farms and ranches have been and will continue to be subdivided for homesites and developed as shopping malls and industrial sites. Some of these areas were once used by grizzlies. These real estate developments increase land values that in turn may preclude opportunities to devote some of these areas to wildlife conservation, either as special management areas or possibly as ecosystem linkage zones. Along with more people comes the increased demand for resource use on public lands, some in grizzly bear habitat. These desires include a variety of recreation activities as well as firewood gathering. In the future, the desire to develop and use public and private natural resources can be expected to increase as the human population increases. All of this constrains the ability of federal lands in the region to support grizzly bears. The adoption of human population control policies in the near future is highly unlikely, but growth and development impacts on wildlife can be mitigated by careful planning.

Factors for Listing (and Delisting)

The Endangered Species Act (ESA § 4(a)(1)) mandates that five factors be evaluated when the USFWS makes its biological determination that a species is threatened or endangered. These factors need to be mitigated before a species can be delisted. In the case of grizzly bears, one of the most important factors is human-caused mortality. It is possible to reduce this factor to a level where the species can recover. Methods to do that involve providing adequate secure habitat for bears, which means hiding cover and limited road access to grizzly habitat.

Limiting the amount of roads in grizzly bear country upsets people accustomed to traditional access to public lands for recreation and resource commodity production. Thus grizzly bear recovery is particularly controversial in communities located near grizzly bears. Whether or not grizzly bear populations can be recovered is thus directly related to the attitudes of people in communities located near grizzly bear habitat.

Barriers to Recovery

Other barriers to grizzly bear recovery may not be directly related to the causes for listing species under the ESA. The analysis in this report has identified several barriers that can be lumped into five categories: scientific, management, legal, value/cultural, and institutional. Some of these barriers were also identified and discussed by Clark et al. (1991) and Clark and Minta (1994) in reference to Yellowstone grizzlies as a case study of ecosystem management implementation. Some of these barriers interact, adding further complexity to defining policy problems associated with grizzly bear recovery.

Scientific Uncertainty. Gathering information on grizzly bears is difficult and raises questions about the reliability of the information that can be collected. Therefore grizzly bear research and management is fraught with uncertainty.

One example of scientific uncertainty is the

current dispute over the monitoring methods used by the USFWS to assess recovery progress. Whether or not the chosen monitoring indices reflect population numbers and trends has not been evaluated to the degree necessary to either satisfy critics or allow proponents to express unequivocal support. Faced with high levels of uncertainty, scientists base recommendations on personal experiences and values. Some of these are professional and some are not.

Another example is the split in the scientific community over the effectiveness of the grizzly bear recovery plan. This dispute can be characterized in two ways. First, one group of scientists from the traditional discipline of wildlife biology supports the recovery plan, and another group of scientists from the relatively newer discipline of conservation biology does not support the plan. This may largely be a reflection of the different values of these groups, (see, for example, *Wildlife Society Bulletin* 17:335-365). The second characterization divides scientists into those doing active field work on grizzly bears and those whose experience with grizzlies is largely theoretical and based on applying whatever data is available to test theoretical ideas with computer simulation models. Field-based scientists generally support the plan, modelers and theoreticians are generally unsupportive. These scientific dichotomies can be attributed to professional experiences and norms. Researchers and managers actively working with grizzlies have much more at stake professionally and are less likely to act on suggestions or circumstantial evidence that might imply a need to change protocols. However, as with any categorization of humans, some scientists involved in the recovery plan debate do not readily fit these generalizations.

Another area of uncertainty involves the use of minimum viable population estimates for grizzly bears. The wide range in published estimates (from 40 to 3,800) is not particularly helpful. Taken as a whole, the results of such estimates are rather trivial; the more bears there are, the greater is the chance of their survival for longer periods of time. Many scientists are critical of approaches that seek to identify magic numbers and are more concerned with broader issues that may influence extinction rates, including habitat fragmentation, environmental change, and loss of genetic diversity as well as how these forces interact.

Uncertainty is also associated with the idea of connecting the various grizzly bear ecosystems to overcome habitat fragmentation. There are a number of questions that lack answers: Will grizzlies actually use the linkage zones? Will linkage zones act as population sinks, and in reality impede recovery? Will ecosystem connections result in a single large population or will the result be a classic metapopulation composed of several local populations or related variations? What policies will guide management reactions to extinctions of local or island populations within a well-connected metapopulation?

Genetic theory raises issues of inbreeding tolerance in wild populations. Many species have survived severe genetic bottlenecks created by low populations due to market hunting, fur trapping, and settlement of the western United States in the late 1800s to early 1900s. The potential for outbreeding depression suggests that optimum, as opposed to maximum, levels of gene exchange need to be determined.

All of the ideas and concepts mentioned above have a place in developing efficient and successful recovery plans. However, they raise the question of how much reliance should be placed on theoretical principles that are currently popular, but have not been tested (Doak and Mills 1994). Rigorously testing these principles with grizzlies requires spatial and temporal considerations that would be difficult to address. The only practical way to evaluate these principles is to implement them with an adaptive management approach (Walters 1986, Holling 1978). However the lack of an adequate and reliable monitoring program for grizzlies seriously constrains such an approach.

The revised grizzly bear recovery plan briefly discusses viable population analyses and genetic diversity concerns, as well as the

implementation of a five-year study of the potential for ecosystem linkages (USFWS 1993*c*). It is unknown whether a more thorough review of these subjects or a more detailed explanation of decisions regarding their application to grizzly bear recovery would have resulted in greater acceptance of the recovery plan. Some opponents of the grizzly bear recovery plan have a sense of urgency regarding the incorporation of these unproven scientific principles into grizzly bear recovery. Apparently, the fact that roughly 50,000 grizzly bears still roam the wilds of Canada and Alaska does not temper their concerns.

Management Uncertainty. Grizzly bear management programs and protocols on federal lands are in a state of flux due to recovery plan revisions, recent court rulings, out-of-court settlements, and new directives and standards resulting from ESA section 7 consultations between federal agencies. In addition, refinements in cumulative effects modeling, the revision of some national forest plans, and the recommendations of the IGBC access management task force will effect future grizzly management protocols. Uncertainty associated with these changing conditions can make project planning and implementation in grizzly country difficult and can cause people traditionally dependent on public lands and resources to become anxious and desperate.

Although it is a formidable task, perhaps the most effective approach to deal with such uncertainty is to create management and planning committees at a greater ecosystem scale. Such a committee would be composed of all interest groups and professional disciplines and given the assignment to develop a binding agreement, under an ecosystem management framework, that would provide a greater degree of stability and predictability than currently exists (Clark and Minta 1994).

Legal Uncertainty. Many legal issues concerning endangered species recovery remain unsettled. In the context of grizzly bears, the purpose and scope of the recovery plan may be the most important and far-reaching of these issues. If the recovery plan is to become a decision document that allocates resources, initiates agency actions, and sets standards and guidelines, then the NEPA process will apply and an environmental impact statement will be a necessary component of the plan. In addition, meshing the grizzly bear recovery plan with the national forest plans and the National Park Service and BLM planning procedures may be problematic. Which plan will take precedence? How can the ESA recovery plan override others if it is merely advisory? Other problems may surface as the recovery plan for one listed species conflicts with that of another. Which imperiled species shall prevail?

The ESA was due for reauthorization in 1992, and it is pending. The uncertain prospects for the Act following reauthorization are interesting, but not particularly germane to grizzly bear recovery. Three bills were introduced in 1993, but have yet to be scheduled for a committee hearing. Two of the bills would give economic considerations more weight in critical habitat designations (S1521 [Shelby, D-LA] and HR 1490 [Tauzin, R-LA]). The other (S 921 [Baucus, D-MT]) gives science a greater role in listing and recovery planning (*Public Lands News* 1993). In addition, the Secretary of the Interior announced changes in 1994 to the procedures the USFWS will follow in implementing the ESA that incorporates some of the provisions in these bills.

Value and Cultural Barriers. Interest groups with opposing values vie with each other to change natural resource policies to support their positions (Kellert and Clark 1991). Although federal agencies are required to listen to these competing views of how natural resources should be managed, their own professional value and bureaucratic cultural systems are sometimes disproportionately represented in policy decisions due to the lack of a public consensus on management directions or action.

Public attitudes regarding grizzly bear recovery vary at national, regional, state, and

local scales. Surveys at all but the local level often show a majority of the populace support protection for imperiled species. However, most local people oppose such special protection, and local support is crucial to the success of a recovery program (Reading et al. 1991). Local communities are impacted more than others by recovery efforts, and uncertainty about economic impacts, safety, and recreational opportunities create opposition. Fears of loss of livelihood and property, as well as possible attacks, can lead to deliberate killings of grizzlies. In addition, poaching grizzlies for valuable parts (hides, skulls, claws and paws, gall bladders, etc.) may be viewed as a means to offset perceived job losses or decreased economic opportunities from protection and recovery actions. Therefore concerted efforts need to be made to address the concerns of local communities in recovery planning.

Values based in culture are difficult to change. Not long ago people living in or near grizzly bear recovery zones made a collective effort to eliminate large predators from those areas (Curlee et al. 1994). Religious teachings have been used to further justify promoting the welfare of humans over other animals. In such a cultural context, grizzly bear recovery efforts make little sense. Some people adhering to these values may be willing to tolerate recovery efforts, others may use all the legal opportunities afforded them to stop recovery programs, and still others will apply the three "S" method for dealing with predators: shoot, shovel, and shut-up. Information that would allow recovery teams to predict how cultural attitudes might influence the success of recovery efforts would be valuable, as it would suggest specific groups that could be targeted for education programs or law enforcement efforts.

As we have noted, some people who generally favor endangered species recovery oppose current grizzly recovery efforts because they believe protection for the bears or their habitats is inadequate and time is running out for grizzlies. In addition, grizzly bear protection and recovery may be seen by some people as a surrogate for wilderness designation, or a way to halt activities such as timber harvesting, livestock grazing, and mining. Some people believe these activities are doing irreparable harm to natural systems and may regard such actions as irresponsible and immoral. The grizzly bear is a powerful symbol for such causes.

Satisfying all of the competing interests engaged in the grizzly bear debate may be impossible. Culture-based barriers to recovery can be overcome by explicitly identifying the root causes of opposition, accurately determining the actual impacts of recovery actions, and thoroughly distributing that information. Successful recovery thus involves targeting education and law enforcement efforts, providing for meaningful involvement of local people in recovery planning, and streamlining communications channels between the public and federal officials in charge of recovery programs. An example of success in the last two categories is the consensus in Idaho on grizzly bear recovery procedures for the Bitterroot Ecosystem.

Institutional Barriers. A number of federal and state land management agencies, state, county, and city governments, research institutions, and private corporations have a stake in grizzly bear recovery policies. Each of these institutions has a defined mission, cultural-value base, and mode of doing business that may not be compatible with planned recovery actions or the other institutions. These barriers further complicate the organization and implementation of recovery programs (Reading et al. 1991).

The establishment of the IGBC and other agency coordination efforts in the Yellowstone area (Mealey 1988) is perhaps the most significant development toward breaking down bureaucratic barriers among the various management agencies involved in grizzly bear recovery. Real progress in addressing the barriers to grizzly recovery has been made. Since the inception of the IGBC in 1983, grizzly bear mortalities have declined, two populations appear to be increasing and are close to meeting recovery goals, monitoring

and research programs have been established in each grizzly bear ecosystem, grizzlies have been translocated to the Cabinet/Yaak Ecosystem, recovery programs for the Bitterroot and North Cascades Ecosystems are moving forward, and an information and education subcommittee has developed a number of products and formed cooperative agreements. In the near future, the IGBC will hire an information and Education Specialist/Executive Assistant, whose mission will enhance public relations and thus the effectiveness of the recovery program.

Although the IGBC is a positive development and could serve as a model for other efforts, there are a number of institutional issues that still impede grizzly recovery efforts. Federal and state agencies are not efficiently organized to deal with ecosystem-wide issues that require interagency cooperation, creating reliable knowledge, or using all of the avialable knowledge efficiently (Clark et al. 1991, Clark and Minta 1994). Clark and Westrum (1989) suggested that endangered species recovery programs may require a different agency structure, staffing, and creative environment. The official involvement of non-government organizations (NGOs), perhaps with representation on the IGBC, could help identify and alleviate points of controversy. Mealey (1988) made similar observations about coordinated management efforts for wilderness areas in the Yellowstone region.

City, county, state, and national policy-makers can have a considerable influence on recovery policies (Clark and Minta 1994). Some observers feel that recovery teams need to have a degree of autonomy and freedom from politics to perform efficiently (Clark and Westrum 1989). Other observers believe that allowing resource managers and scientists to make decisions that effect the lives of others without adequately involving those effected in the decision process is the tragic flaw in natural resource management agency philosophy (Freemuth and Cawley 1993). In a democracy, elected officials have a responsibility to redress what their constituents perceive as imbalances in natural resource management, including the mandated recovery process for threatened and endangered species. Lacking public consensus, elected officials will be influenced by their own values, just as resource managers are.

Most biologists chose their profession because of a greater interest in natural systems than human enterprise. A cultural norm of biologists is to regard politics as "a risk to be avoided and a constraint or obstacle to be overcome" (Clark and Minta 1994, p.126). Only after years of on-the-job-training do some biologists develop an appreciation for the importance of the policy process and the knowledge necessary to overcome political obstacles. Although recovery teams may need some insulation from politics, they all need a "policy orientation" in their work (Clark et al. 1992). Only through an adequate understanding of the policy process can biologists positively influence site-specific policies designed to recover imperiled species. If scientists and resource managers are sensitive to the needs of effected local interests, controversy can be reduced along with the need for political intervention.

Clark and Minta (1994, p.114) presented a "problem map" that identified a few of the major elements that were impeding the realization of ecosystem management in the Yellowstone area, and it seems highly relevant to grizzly bear recovery. The problem map was used to suggest four factors that needed improvements in order to solve the problem: people, agencies, the policy process and science and management. As illustrated above, these factors are also important in grizzly bear recovery.

Peoples' attitudes towards and acceptance of grizzly bear recovery can be improved through education based on conclusive facts. The impacts of grizzly recovery on traditional land uses and local economies do not seem to fit the worst-case scenarios that are often presented as fact. There is a degree of compatibility between grizzlies and humans, and it is largely a function of human attitudes that can be strongly influenced by knowledge.

Agencies may have to abandon the pattern of incrementally building on past operating

procedures in order to meet new challenges that arise in the policy arena. For example, the Wyoming Game and Fish Department, a long-standing member of the IGBC, advocates the delisting of grizzlies in Yellowstone because the agency perceives delisting as the only alternative for dealing with recent increases in livestock predation due to an increasing grizzly population (J. G. MacCracken, pers. observ.). In addition, the five-year evaluation study approach of the USFWS to new ideas in grizzly recovery could be replaced with an adaptive management philosophy—monitoring the effects of a policy change after it has been made—rather than studying it before a change is considered.

Grizzly bear research and management is currently tailored to addressing specific issues in a specific ecosystem. This has resulted in a fragmented, piece-meal approach to dealing with the very broad questions that apply to all grizzly populations. An example is the effects of roads on grizzlies. Generating reliable knowledge that could confidently be applied to all grizzly bear ecosystems will require a study design, using experimental as well as observational approaches, that treats the ecosystems as replicates. This will require prioritizing management questions and research projects, standardized methodology, and a high degree of cooperation among agencies and landowners.

The grizzly bear compendium (LeFranc et al. 1987) was the first step in synthesizing the large amount of research data available on grizzly bears. Additional data have been collected and more efficient methods such as computerized databases for storage and retrieval could be developed to make new data more readily available. This would also facilitate using existing data to test management hypotheses.

A thorough understanding of the policy process and a complete definition of the policy problems are needed to formulate and implement the most effective grizzly bear recovery program possible. Policy problems are usually narrowly defined and dealt with one at a time. For example, human-caused mortality, habitat loss, and genetic diversity are treated in isolation with little recognition of the possible interactions of these problems. The potential for a single solution to several problems is largely ignored.

The development of recovery plans for species listed under the ESA is a difficult task. In the case of the grizzly bear, the duty has fallen on the grizzly bear recovery coordinator. The revised recovery plan went through extensive agency and public review. Presumably, representatives of the IGBC membership helped shape its content from the start. Instead of the one-person enterprise it is now, recovery planning could be approached as an interagency, interdisciplinary, and inter-interest group process. Such a process could avoid some pitfalls and delays that were a factor with the first revision of the grizzly bear recovery plan. Furthermore, incorporating the ideas of Scott et al. (1994) for a two-tiered approach to recovery planning might also be helpful. This involves identifying short- and long-term biological goals and explicitly recognizing social and economic constraints.

Clarifying and strengthening the legal status of recovery plans might be helpful. Currently, an approved recovery plan is required to implement a recovery program, but a plan is only advisory and the ESA contains no binding directions for the implementation of a recovery plan. The process consists of vague guidelines in the recovery plan, which are translated into more specific standards and guidelines in such documents as national forest plans, and finally given concrete criteria at the project level. This may have resulted in an ESA section 7 consultation process that is more cumbersome than would have been realized under other planning alternatives. It is likely that at each step from the recovery plan to the project stage, some of the original intention of the plan was compromised. An interagency, multidisciplinary, and interest group planning process that was subject to NEPA and binding on all parties may be more efficient in the long run. With such a process it may be possible to avoid having courts make important biological and land-use management decisions.

Another barrier to recovering listed species is the financial commitment required. ESA

appropriations for the USFWS were authorized at $41,500,000 in 1992, less than 5% of the agency's annual budget. Yet the ESA is perhaps the most visible and controversial program in the USFWS. In addition, the majority of funds goes to only a small number of the 800 or so listed species. One of them is the grizzly bear. The USFWS (1993*c*) estimated that it will cost $26 million to recover the grizzly.

The Clinton administration's effort to reinvent the federal government resulted in most of the Department of the Interior's research programs coming under the direction of the new National Biological Survey. Although a controversial move, it was achieved relatively easily. The time may soon be approaching for a complete reorganization of the federal government land and resource management programs. This has been suggested several times in the past, most recently in the late 1970s. Now, as ecosystem management on federal lands takes shape and the focus shifts to the landscape scale and ecological processes, a single federal agency, organized around ecoregions (such as those suggested by Bailey 1980 and Omernick 1986) and greater ecosystems (Friedman 1988, Greater Yellowstone Coordinating Committee 1990) may be needed for ecosystem management and the ESA to succeed.

Chapter 7. Recovery Alternatives

The Idaho Forest, Wildlife and Range Policy Analysis Group (PAG) was reauthorized by the Idaho Legislature in 1994 (see Idaho Code § 38-714). The new legislation mandates that the PAG identify a range of alternative actions and analyze their relative merits. Identification of alternatives for grizzly bear recovery in Idaho was not part of the original concept of this analysis as conceived and suggested by the PAG Advisory Committee. Nonetheless, the information in this analysis, particularly the conclusions in Chapter 6, suggest several alternative courses of action that could be taken to meet the goal of protecting and eventually recovering the remaining populations of grizzly bears in the lower 48 states.

The ESA attempts to blend biology with the politics of land use. Grizzly bears test the compatibility of human needs with those of other species to an extreme, because the bears require space of a particular quantity and quality. The reason why populations of grizzlies in the lower 48 states are imperiled is because of human-caused mortality and land development that has fragmented grizzly habitat and driven the remaining bears into relatively undisturbed but isolated pockets. The attempt to recover these isolated populations under the ESA illustrates both the noble purpose of the Act, and its shortcomings. The ESA is a reactive, crisis-situation approach to saving imperiled species. This can be a difficult and costly strategy, especially when it is directed at distinct population segments of species that are threatened or endangered at the edge of their current range but abundant elsewhere, as is the case with grizzly bears.

Alternative Courses of Action

The six alternatives in this section suggest a wide variety of specific courses of action. It is not the PAG's role to advocate or recommend one alternative over another. The inclusion or exclusion of any particular alternative should not be construed as support or rejection of it.

[1] Delist all grizzly bears when the population segments in the larger ecosystems meet recovery goals. This is similar to the approach of the original recovery plan that was abandoned in favor of individual population recovery goals with the revised grizzly bear recovery plan.

The Yellowstone and Northern Continental Divide Ecosystem populations are very close to achieving the goals stated in the recovery plan. Interagency conservation strategies are being prepared for both populations as the final step towards delisting. Both the Bitterroot and North Cascades Ecosystems have adequate habitat to support 200 or more grizzlies (Servheen et al. 1991). Apparently, the United States portions of the Cabinet/Yaak and Selkirk Ecosystems are too small to support a self-sustaining population (see Table 2). Populations in the smallest ecosystems could be delisted when the last of the larger ecosystem populations are delisted. The protection of the few grizzlies inhabiting these areas would then be left to agencies other than the USFWS: the U.S. Forest Service under the mandate of the National Forest Management Act to maintain a diversity of species, the appropriate state wildlife agencies, and Canadian authorities for the portion of those populations that inhabit Canada.

Delisting does not automatically equate with extinction or extirpation. It is likely that state and federal agencies would adopt management programs designed to prevent a future re-listing. Some observers believe that the states would do a better job of protection than the USFWS.

[2] Revise the Endangered Species Act to require ecosystem protection. Although the ESA states that conserving ecosystems is a purpose of the Act (ESA § 2(b)), there is no process specified in the Act to actually do this. Furthermore, conserve has a specific definition in the Act that applies to species, not ecosystems (ESA § 3(3)).

Under an ecosystem management approach, grizzly bears could be viewed as an umbrella species (Noss 1991) whereby management for grizzlies would also benefit other species.

However, those relationships have not been defined or documented. Alternatively, comparisons of the ecological needs of the listed and candidate species in an area may lead to the identification and management of an optimum mix of species (W. Melquist, pers. comm.). Because some species may compete for space and food and some are predators and others prey, not all species will be accommodated at all times. For example, it may not be possible to recover grizzly bears, wolves, and woodland caribou in the Selkirk Ecosystem.

Under the ecosystem management approach, a biodiversity reserve system with connected core areas is envisioned, serving as a protected refuge for species such as grizzlies that require limited human access or undeveloped areas (Noss 1992). If a classic metapopulation structure can be achieved under such a reserve system, local extinctions of listed species may no longer be as great a concern as currently perceived (see Harrison 1994 for a critique of metapopulation theory and conservation planning).

The core refuge idea appears to have merit. The ecosystems in which the two grizzly populations are apparently increasing, Yellowstone and Northern Continental Divide, have land-use designations that could be described as a core refuge—specifically Yellowstone and Glacier National Parks. Intensively developed lands around the two parks are mitigated to some extent by a number of adjacent or relatively close wilderness areas serving as buffer zones. In contrast, both the Cabinet/Yaak and Selkirk Ecosystems lack a national park and only the Cabinet/Yaak Ecosystem has a designated wilderness area. However, in the Selkirk Ecosystem there are several roadless areas, some of which are being managed to maintain their wilderness attributes, thus are *de facto* wilderness areas.

Connecting fragmented grizzly habitats with ecosystem linkages will require some creative cooperative mechanisms between public agencies and private landowners, such as some type of incentive system. Several interest groups are actively working on incentive-based systems to encourage private landowners to participate in ecosystem management and thus avoid potential property takings problems. These groups include the Defenders of Wildlife and American Forests.

[3] Write special legislation for grizzly bears. This would recognize that the ESA and its goal of recovering small, isolated grizzly bear populations cannot be met, and that the National Forest Management Act is inadequate to protect grizzly bears that inhabit the national forests. Also, delisting the Cabinet/Yaak and Selkirk populations may require a legislative exemption from the ESA because these populations have been listed since 1975.

[4] Revise the Endangered Species Act to allow protection of distinct population segments in areas where recovery and delisting are highly unlikely. The ESA currently requires agencies to recover all listed species, not just protect them. The Act could be amended to recognize that some small, isolated populations currently cannot be recovered, but are nonetheless worthy of protection. The agencies could therefore protect these animals without attempting to recover them.

The approach currently practiced attempts to increase small grizzly populations by reducing human-caused mortality and setting recovery goals at levels consistent with available habitat. This does not seem to be working in the Selkirk or Cabinet/Yaak Ecosystems.

Our analysis indicates that the successful move towards recovery in the Yellowstone and Northern Continental Divide Ecosystems may be attributable to not only the large size of these areas, but the fact that each has a national park as a core zone, where road systems are limited and firearms are forbidden. Also, each of these two grizzly bear ecosystems is buffered by adjacent wilderness areas. These facts point to the North Cascades Ecosystem as a good candidate recovery area, and the Bitterroot Ecosystem as a possibility because of its size, but it lacks a firearm-free core zone. The Selkirk and Cabinet/Yaak Ecosystems are both at the southern extremity

of a much larger area in Canada (Figure 1) and may be too small (Table 2). Neither of these two areas have firearm-free zones.

This alternative would preclude these small populations from recovery planning, and would thus favor concentrating limited resources on populations where adequate habitat currently is available and the achievement of recovery goals is more feasible (Rohlf 1989). However, this would either require a change in the ESA or consideration of alternative 3 special grizzly bear legislation.

[5] Reverse the 1975 decision to list grizzly bear populations. This alternative recognizes the problems associated with the broad definition of species in the ESA. One of the reasons for delisting is that the original listing was in error (ESA § (50 CFR § 424.11(d)). Furthermore, with at least 16,000 grizzly bears in western Canada, and 32,000 to 43,000 grizzly bears in Alaska, it seems highly unlikely that grizzly bears will soon become extinct. The maintenance of 700 to 900, or even a few thousand bears in the lower 48 states probably would not significantly contribute to the persistence of the species in North America. However, this alternative ignores the basic tenets and definitions of the ESA and the various reasons for the 1975 listing decision, and may compromise the ability of the U.S. Forest Service to maintain a diversity of plants and animals as required under the National Forest Management Act.

[6] Continue on the current course. This maintains the flexibility the USFWS has to protect grizzly bears and promote their recovery in the lower 48 states. The USFWS has flexibility because under the ESA, interagency consultations under section 7 and section 9 prohibitions on taking are case-by-case inquiries. Furthermore, a recovery plan is considered advisory. Because of this flexibility, the USFWS probably could implement some version of any of the alternatives stated above, thus precluding the need to substantially revise the ESA. Recent moves by Secretary Babbitt to revise ESA implementation by the USFWS (e.g., peer-review of listing/delisting decisions, binding habitat conservation plans, etc.) attest to this flexibility (*Public Lands News* 1994).

Why Detour From the Current Course?

In a broad sense, this question can be applied to the whole idea of endangered species recovery. Some people contend that the ESA is a failure and unworkable (Bean 1991). As part of their assertions, these critics cite the growing list of endangered, threatened, and candidate species and the relatively few species that have had their status improved. The Act has been described as reactive, crisis-oriented, and too expensive. Other critics compare endangered species recovery to emergency room treatment. The patient is in trouble, and needs special intensive and rapid actions to keep the situation from worsening. Bean (1991) attempted to put these claims in perspective. Furthermore, if the ESA is inadequate to recover imperiled species, that is probably because protection standards are not stringent enough and financial resources are inadequate.

A more pro-active multi-species approach may be needed (Scott et al. 1993) and is currently being developed through both theoretical and applied programs in the USFWS. Presumably, these efforts will result in a land-use classification program—such as a biodiversity reserve system—that conserves some optimal mix of habits that promote some optimal amount of biological diversity. This approach might preclude the need to list individual candidate species and help insure the recovery of many listed species. However, the needs of some species will inevitably not be met. Because it would involve significant land-use changes, a biodiversity reserve system may not be implemented until some distant future date, if ever. Until effective, multi-species methodology can be developed, tested, and implemented, the current course of single-species programs is necessary to protect the most fragile components of biological diversity and promote their survival.

Specific to grizzly bear recovery, the current course is embodied in the 1993

revision of the grizzly bear recovery plan. As we noted, the plan is controversial among scientists and interest groups. To some, changing the current course would involve designating larger recovery zones, setting higher population goals for recovery, providing connectivity among the grizzly bear ecosystems, requiring more stringent habitat protection standards, and establishing an international treaty to help recover populations that range into Canada (Shaffer 1992). From a theoretical standpoint, these actions would greatly enhance the success of recovery programs and probably hasten the recovery process. However, there is a great deal of biological and political uncertainty associated with this approach that makes abandoning the current course and moving in this direction risky. As viable population analysis methods are refined and tested, metapopulation structures elucidated, habitat linkages evaluated, and baseline data on grizzly demographics, habitat selection, and estimates of the carrying capacity of the recovery zones gathered, these concerns can be incorporated into future revisions of the recovery plan.

To others, changing the current course involves movement in the opposite direction, with delisting and less intrusion of federal biologists into land-use decisions that effect resource-dependent communities.

One reason the ESA faces attack during reauthorization is that there are very few ESA success stories. As Bean (1991) pointed out, the status of about 60 listed species has been improved, and he cited 18 species that have either been taken off the list because they have recovered or their status has been improved from endangered to threatened. Grizzly bear recovery could be a great ESA success story that reauthorization proponents could emphasize. In the case of two grizzly bear populations—Yellowstone and Northern Continental Divide—momentum appears to be building to make this short-term success story a reality, despite considerable disagreement offered by some sectors of the public and the scientific community. For some, the grizzly bear is a powerful symbol of wild lands and wilderness, and advocates for expansion of the National Wilderness Preservation System may be expected to resist any attempt to delist grizzly bears. Delisting does not mean lack of protection for grizzly bears, as state agencies would assume the role of protector that federal agencies now perform.

Appendix 1. Membership of the Interagency Grizzly Bear Committee and current representatives.

Member	Current Representative	Address and Phone
U.S. Fish and Wildlife Service Region 6 Director	Ralph Morgenweck (Chairman)	Box 25486 Denver, CO 80025 303-236-7920
U.S. Fish and Wildlife Service Region 1 Director	Mike Speer	911 NE 11th Ave Portland, OR 97232-4181 503-231-6119
U.S. Forest Service Region 6 Regional Forester	John Lowe	333 SW 1ST Ave. Portland, OR 97208 503-326-2971
U.S. Forest Service Region 1 Regional Forester	Dave Jolly	P.O. Box 7669 Missoula, MT 59807 406-329-3511
U.S. Forest Service Region 4 Regional Forester	Dale Bosworth	324 25th St. Ogden, UT 84401 801-625-5352
U.S. National Park Service Rocky Mountain Region Director	Bob Baker	P.O. Box 25287 Denver, CO 80225 303-969-2500
Idaho Department of Fish and Game Director	Jerry Conley	600 S. Walnut, Box 25 Boise, ID 83707 208-334-5154
Montana Dept. of Fish, Wildlife and Parks Director	Pat Graham (Vice Chairman)	1420 E. Sixth Helena, MT 59620 406-444-2535
Washington Dept. of Wildlife Assistant Director	Dave Brittell	600 Capitol Way Olympia, WA 98501-1091 206-753-5700
Wyoming Game and Fish Department Director	Pete Petera	5400 Bishop Blvd. Cheyenne, WY 52006 302-777-4000
Montana Bureau of Land Management Director	Bob Lawton	222 N. 32nd St. Billings, MT 59107 406-255-2904
Ministry of Environment Wildlife Branch B.C. Canada	Bill Munro	Parliament Bldg. Victoria, B.C. V8V 1X5 604-387-9791

Appendix 2. Membership of the Bitterroot Ecosystem Management Subcommittee of the Interagency Grizzly Bear Committee.

Member	**Current Representative**	**Address and Phone**
Idaho Fish & Game Region 2 Supervisor	Herb Pollard (Chairman)	1540 Warner Ave. Lewiston, ID 83501 (208) 799-5010
Montana Dept. of Fish, Wildlife, and Parks, Region 2 Supervisor	Rich Clough	3201 Spurgia Rd. Missoula, MT 59812 (406) 542-5500
U.S. Fish & Wildlife Service Field Supervisor, Northern Idaho Field Office	Bob Hallock	11103 E. Montgomery Spokane, WA 99206 (509) 891-6839
Nez Perce National Forest Supervisor	Mike King (Vice Chairman)	Route 2, Box 475 Grangeville, ID 83530 (208) 983-1950
Clearwater National Forest Supervisor	Jim Caswell	12370 Hwy. 12 Orofino, ID 83544 (208) 476-4541
Idaho Panhandle National Forest Deputy Supervisor	Bill Damon	1201 Ironwood Dr. Coeur d'Alene, ID 83814 (208) 765-7223
Lolo National Forest Supervisor	Chuck Spoon	Fort Missoula Missoula, MT 59801 (406) 329-3834
Salmon National Forest Supervisor	John Burns	P.O. Box 729 Salmon, ID 83467 (208) 756-2215
Bitterroot National Forest Supervisor	Steve Kelly	1801 N. 1st Hamilton, MT 59840 (406) 363-7121

Appendix 3. Recommended membership of the recently formed Selkirk-Cabinet/Yaak Grizzly Bear Management Subcommittee, 10 December 1993.

Member	Current Representative	Address and Phone
Idaho Dept. of Lands Area Supervisor	Ray Greene	Cavanaugh Bay No. 132 Coolin, ID 83821 (208) 443-2516
Montana Dept. of Fish, Wildlife, and Parks Region 1 Supervisor	Dan Vincent	490 N. Meridian Rd. Kalispell, MT 59901 (208) 752-5501
Idaho Dept. of Fish & Game Region 1 Supervisor	Dave Ortmann (Vice Chairman)	2750 Kathleen Ave. Coeur d'Alene, ID 83814 (208) 769-1414
Washington Dept. of Fish and Wildlife Regional Manager	Bruce Smith	8702 N. Division Spokane, WA 99210 (509) 456-4082
Idaho Panhandle National Forest Supervisor	David Wright	1201 Ironwood Dr. Coeur d'Alene, ID 83814 (208) 765-7223
Kootenai National Forest Supervisor	Bob Schrenk (Chairman)	W. Highway 2, P.O. Box AS Libby, MT 59921 (406) 293-6211
Colville National Forest Supervisor	Ed Schultz	765 S. Main Colville, WA 99114 (509) 684-3711
Ministry of Environment and Parks Wildlife Biologist	Guy Woods	617 Vernon St. Fort Nelson, B.C. V1L 4E9 (604) 354-6333
U.S. Fish & Wildlife Service Field Supervisor, Northern Idaho Field Office	Bob Hallock	11103 E. Montgomery Spokane, WA 99206 (509) 891-6839

Appendix 4. Membership of the Yellowstone Ecosystem Management subcommittee.

Member	Current Representative	Address and Phone
Yellowstone National Park Superintendent	Mike Finley	Yellowstone National Park P.O. Box 168 Yellowstone Park, WY 82190 (307) 344-2002
Montana Dept. of Fish, Wildlife, and Parks Director	Bob Martinka	1420 E. 6th Ave. Helena, MT 59620 (406) 444-2535
Beaverhead National Forest Supervisor	Dick Owenby (acting)	420 Barrett St. Dillon, MT 59725 (406) 683-3900
Grand Teton National Park Superintendent	Jack Neckels	P.O. Box 170 Moose, WY 83012 (307) 734-3300
Beartooth Range District Custer National Forest District Ranger	Linda Ward-Williams	HC 49, Box 3420 Red Lodge, MT 59068 (406) 446-2103
U.S. Fish and Wildlife Service Assistant Field Supervisor	Dale Harms	100 N. Park, Suite 320 Helena, MT 59601 (406) 449-5225
Wyoming Game and Fish Department Deputy Director	John Talbott	5400 Bishop Blvd. Cheyenne, WY 82006 (307) 777-4501
Idaho Dept. of Fish and Game Regional Supervisor Upper Snake Region	Don Wright Vice-chairman	1515 Lincoln Idaho Falls, ID 83401 (208) 525-7290
U.S. Fish & Wildlife Service State Supervisor	Charles Lobdell	4696 Overland Rd., Rm. 576 Boise, ID 83705 (208) 334-1931
Bridger-Teton National Forest Supervisor	Ben Worthington (acting)	340 N. Cache Box 1888 Jackson, WY 83001 (307) 739-5500
Shoshone National Forest Supervisor	Barry Davis Chairman	808 Meadow Lane Cody, WY 83414-4516 (307) 527-6241
Idaho Dept. of Fish and Game Regional Wildlife Manager	Ted Chu	1515 Lincoln Idaho Falls, ID 83401 (208) 525-7290
Custer National Forest Supervisor	Nancy Carridon	P.O. Box 2556 Billings, MT 59105 (406) 657-6361

Appendix 4. Membership of the Yellowstone Ecosystem Management subcommittee.

U.S. Fish and Wildlife Service Field Supervisor	Chuck Davis	2617 E. Lincoln Way, #A Cheyenne, WY 82001-5662 (307) 772-2375
Clark Fork Ranger District Shoshone National Forest District Ranger	Kim Barber	1002 Road 11 Powell, WY 82435 (307) 754-7207
Gallatin National Forest Supervisor	Dave Garber	P.O. Box 130 Bozeman, MT 59771 (406) 507-6701
Montana Dept. of Fish, Wildlife, and Parks Regional Director	Steve Lewis	1400 S. 19th Bozeman, MT 59715 (406) 994-4042
Targhee National Forest Supervisor	Jerry Reese	420 N. Bridge St. Anthony, ID 83405 (208) 624-3151

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PERSONAL COMMUNICATIONS CITED

The individuals listed below provided information in the form of personal communications, and are cited in the report as (name, pers. comm.). These communications included information supplied through draft manuscript reviews, testimony at meetings, and direct conversations.

B. Barbee, Supervisor
Rocky Mountain Region
U.S.D.I. National Park Service
Denver, Colorado

D. Doak, Assistant Professor
Environmental Studies Board
University of California Santa-Cruz
Santa Cruz, California

H. Fischer, Regional Representative
Northern Rockies Office
Defenders of Wildlife
Missoula, Montana

E. O. Garton, Professor
Department of Fish and Wildlife Resources
University of Idaho
Moscow, Idaho

S. Jacobson
District Wildlife Biologist
Idaho Panhandle National Forests
Bonners Ferry, Idaho

D. Johnson, Representative
Resource Organization on Timber Supply
Lewiston, Idaho

T. Kaminski
Forest Wildlife Biologist
Targhee National Forest
St. Anthony, Idaho

T. Layser
District Wildlife Biologist
Idaho Panhandle Nation Forests
Priest River, Idaho

D. Mattson
Research Wildlife Biologist
National Biological Survey
Department of Fish and Wildlife Resources
University of Idaho
Moscow, Idaho

S. Mealey, Director
Upper Columbia River Basin Project
U.S.D.A. Forest Service
Boise, Idaho

W. Melquist
Endangered Species and Nongame Coordinator
Idaho Department of Fish and Game
Boise, Idaho

W. "Bud" Moore, District Ranger (retired)
Powell Ranger District
Clearwater National Forest
Powell, Idaho

P. Petera, Director
Wyoming Game and Fish Department
Cheyenne, Wyoming

J. Peek, Professor
Department of Fish and Wildlife Resources
University of Idaho
Moscow, Idaho

H. Pollard, Regional Supervisor
Idaho Department of Fish and Game
Lewiston, Idaho

C. Roady, Resource Manager
Inland Crown Pacific
Bonners Ferry, Idaho

C. Servheen
Grizzly Bear Recovery Coordinator
U.S.D.I. Fish and Wildlife Service
University of Montana
Missoula, Montana

R. Steinhorst, Timber Assistant
Bonners Ferry Ranger District
Idaho Panhandle National Forests
Bonners Ferry, Idaho

W. Wakkinen, Wildlife Research Biologist
Idaho Department of Fish and Game
Bonners Ferry, Idaho

D. Wright, Supervisor
Idaho Panhandle National Forests
Coeur d'Alene, Idaho

GLOSSARY

(Note: Terms in **boldface** within the definitions are also defined elsewhere in the Glossary.)

Accuracy. The degree of **bias** and **precision** of a measure in relation to a standard or actual value.

Adaptive management. A management approach that treats newly developed and untested protocols as a test of a hypothesis. Adequate monitoring is essential to determine if the protocol is having the desired outcome, and if not, the protocol is re-evaluated and modified or abandoned if necessary.

Anadromous fish. Species that ascend rivers from the ocean to breed.

Assumption. 1. The supposition that something is true, particularly when evidence is lacking as to reality. 2. When simplifications are necessary for purposes of learning, discovery, or problem solving.

Bear management analysis area (BMAA). An administrative division of a **BMU** that is smaller than a **BMU subunit** and designated to make **cumulative effects analysis** more practical.

Bear management unit (BMU). Approximate 100 square mile areas of each grizzly bear **recovery zone** that contain all the resources necessary to meet the annual needs of a grizzly, and are the spatial context in which management programs are applied.

BMU subunit. A biologically based division of a **BMU** that has unique characteristics, such as a seasonal food source, that may require different management emphasis than the other portions of a **BMU**.

Bias. The degree to which a measure is either consistently more or less than the actual value.

Biodiversity (biological diversity). The variety of life and its processes at genetic, individual, **population**, and **species** scales.

Biodiversity reserve system. A proposed federal land use classification with the protection of biodiversity as the primary objective, composed of a series of core reserve areas (e.g., **wilderness**, national parks) encompassing the **biological diversity** of a region, and connected to one another by **linkage** zones.

Biological assessment. A document prepared by a federal agency proposing an activity in the habitat of a listed **species**. During the ESA section 7 **consultation** process, federal agencies proposing an action must ask the USFWS if a **threatened** or **endangered species** is in the area of the proposed action. If such **species** may be present, the action agency "shall conduct a biological assessment for the purpose of identifying any endangered species or threatened species which is likely to be effected by such action" (ESA § 7(c)(1)).

Biological evaluation. See **biological assessment**, which is often synonymous. The U.S. Forest Service uses a biological evaluation in reference to **candidate** or **sensitive species**.

Biological opinion. A document prepared by the U.S. Fish and Wildlife Service, as part of a formal **consultation**, as a review of a **biological assessment** or **biological evaluation** in which a **jeopardy** or no-jeopardy, and possibly an **incidental take** finding is declared. The Endangered Species Act requires that promptly after conclusion of **consultation**, the USFWS shall provide a written statement setting forth the opinion as to whether a proposed action will **jeopardize** an **endangered** or **threatened species** or adversely modify its **critical habitat**. If a **jeopardy** or adverse modification is found, the USFWS shall suggest **reasonable and prudent alternatives** the action agency can take (ESA § 7(b)(3)(A)).

Buffer areas (zones). Areas surrounding **refuges**, national parks, and **wilderness areas** where human activities are allowed, but at a reduced level compared to adjacent areas of intensive management or activities.

Candidate species. The U.S. Fish and Wildlife Service (USFWS) maintains lists of rare **species**, some of which are candidates for listing, and all of which deserve considerations in land-use decisions (Coggins 1994). The two highest categories of candidate species are C-1, for which the USFWS has information indicating **listing** is likely and appropriate; and C-2, species for which the USFWS has information indicating review is warranted. See also **warranted but precluded**.

Carrying capacity (ecological). The natural limit of a **population** that is set by the resources in a specific area.

Coefficients (model). Numerical values that are usually constants in equations that estimate the value of another variable, usually by multiplying the constant by another variable that may take on many values (such as trees per acre) depending on the time and the area considered.

Computer models (simulations). Computer programs (or **computer software**) that attempt to mimic and shed light on natural processes through mathematical formulas. Because some processes or outcomes, such as the sex of offspring, can take different forms (i.e., male or female) these outcomes are randomly determined with an estimated probability. Random processes require that the program repeat itself a number of times (100 to 10,000) to stabilize the estimate of the mean of values that are randomized.

Computer software. A computer program that can be written in any number of computer languages that directs how the computer operates and the information that it generates and puts out.

Confidence interval. A statistical measure based on a sample. It depicts the range of values that the true value is expected to fall within; there is a specified probability (e.g., 95% chance) that the actual value is within that range.

Confrontation (human-grizzly). A human-grizzly **encounter** at 100 feet or less in which the bear flees, charges, or approaches out of curiosity, or the human climbs a tree or plays dead.

Connectivity (habitat). The degree to which large areas of a specific habitat (or land use classification) are linked to other areas of the same type. A function of both distance and the ability of species to cross areas of various habitats.

Conservation (conserve, conserving). As defined by the Endangered Species Act—to use, and the use of all methods and procedures which are necessary to bring any **endangered species** or **threatened species** to the point at which the measures provided pursuant to [the Act] are no longer necessary.

Conservation measures. Actions that are suggested as part of a **biological assessment** or **biological evaluation** of a proposed project that will help to mitigate those effects of the project on a **listed species**, e.g., requiring that loggers operating in grizzly habitat not bring firearms into the area.

Consultation (interagency). A process required by section 7 of the Endangered Species Act whereby federal agencies proposing activities in a **listed species** habitat confer with the U.S. Fish and Wildlife Service (or the National Marine Fisheries Service) about the impacts of the activity on the **species**. Consultations may be informal, and thus advisory, or formal, and thus binding.

Core area. An area of an animal's **home range** where it spends more than 50% of its time.

Corridor. See **linkage**.

Critical habitat. As defined by the Endangered Species Act—the specific areas within or outside the geographical area occupied by the **species**, at the time it is **listed**, on which are found those physical or biological features (I) essential to the **conservation** of the species and (II) which may require special management considerations or protection. Except in those circumstances determined by the Secretary, critical habitat shall not include the entire geographical area which can be occupied by the species.

Cumulative effects (analysis, model). The total effects of all projects in a **bear management analysis area** that overlap in time and space on a particular resource base. The analysis of cumulative effects is difficult, requiring the use of a **computer model**.

Delisting. The process for removing a species from the list of **threatened** or **endangered** species under the Endangered Species Act. Species can be delisted if they have gone extinct, recovered, or the original listing was in error.

Demography (demographic rates). The statistical study of **population** change and structure.

Dispersal. The act of leaving a birth area or **home range** and moving to a new area for an extended period of time.

Displacement. When human activities or **habitat modification** result in wildlife no longer using an area.

Distinct population segment. A population of a **(sub)species** that is separated from other like **populations**, and may be treated as a **species** under the Endangered Species Act.

Ecological processes. Simple and complex natural functions performed at the **ecosystem** level, such as the purification of water as it moves through stable substrates, the production of oxygen by plants, and the regulation of wildlife **populations** through interactions between predation, or changes in food supply, etc.

Ecoregion. A large geographic area that is relatively homogeneous in topography, climate, and vegetation.

Ecosystem. An interacting set of organisms and their environment that persist, sustain life, and are bounded (at various scales), naturally or for study and management purposes.

Ecosystem management. A resource management philosophy that focuses on landscape patterns and maintaining ecological processes while providing for human needs with an emphasis on the condition of the area following an activity.

Ecosystems (grizzly bear). Large areas (several hundred square miles) that currently harbor a **population** of grizzly bears, or are thought to be suitable for **reintroducing** grizzly bears.

Effective population size. 1. The number of males and females from each generation that survive to breed successfully. 2. The size of an **idealized population** which has the same amount of **inbreeding (genetic drift)** as the actual **population** under consideration.

Encounter (human-grizzly). Any instance in which either a human and grizzly bear are aware of the other or each other. See **confrontation**.

Endangered. Any **species** which is in danger of extinction throughout all or a significant portion of its range.

Endangered species committee ("God squad"). Composed of the Secretary of Agriculture, Secretary of the Army, Chairman of the Council of Economic Advisors, Administrator of the Environmental Protection Agency, Secretary of the Interior, Administrator of the National Oceanic and Atmospheric Administration, and an appointee in the effected state(s) made by the President to review applications for exemption of proposed federal activities from a **jeopardy** opinion or other Endangered Species Act provisions.

Environmental assessment (EA). A document prepared by a federal agency proposing a major action as a prelude to an **environmental impact statement.**

Environmental impact statement (EIS). A document prepared by a federal agency proposing a major action, as mandated by the National Environmental Policy Act, that describes the environmental impacts of the action, alternative actions, the preferred alternative, a listing (summary) of public comments, and a Record of Decision.

Experimental population. A class of **listed species** that were **reintroduced** into unoccupied, suitable habitat; classified as either essential or nonessential to the persistence of the **species**; must be physically separate from non-experimental **populations**; the designation is designed to allow for greater management flexibility.

Extirpate. The local disappearance of a **species**, as opposed to extinction, which is global disappearance.

Federal lands. Areas under the administration of a federal agency such as the U.S. Forest Service, National Park Service, Bureau of Land Management, and U.S. Fish and Wildlife Service.

Federal Register. A United States government publication where all major federal actions, rules, and regulations are announced.

Food-conditioned (bear). A grizzly or black bear that has learned to associate the presence of people and their activities or developments with food and may routinely seek food from these areas.

Forest plan. A document prepared under the National Forest Management Act by each national forest that generally describes how the resources in the forest will be managed for a 10-15 year period. The plans are subject to the National Environmental Policy Act and are accompanied by Draft and Final **Environmental Impact Statements** and a Record of Decision.

Fragmentation (of habitat). The dividing of large continuous areas of habitat by disturbances (usually man-made) in such a manner that the disturbed areas dominate that landscape and remnants of undisturbed habitat are surrounded by modified habitat.

Genetic bottleneck. A period of low **population** levels when inbreeding is likely to increase and **genetic diversity** to decline.

Genetic diversity (heterozygosity). The amount of variation in the genetic material of individuals in a **population**. Estimated as the number of positions on a chromosome (loci or genes) that have more than one (i.e., polymorphic) allele (gene form) relative to loci with only one allele.

Genetic drift. A reduction in **genetic diversity** (heterozygosity) due to random mating in small **populations** that are isolated with no exchange of individuals with other **populations**.

Geographic information system (GIS). Computer software and hardware that can store, organize, display, and manipulate spatial data such as vegetation, soil, elevation, and landownership maps.

Greater ecosystems. Relatively large areas with unique geological, biological, and management characteristics that fall somewhere between an **ecoregion** and conventual management units such as national parks, national forests, and **wilderness areas**. The Greater Yellowstone Ecosystem may encompass as much as 19 million acres, with Yellowstone National Park as its core.

Guidelines (management). Broad management directions. For example, the requirement to leave green trees in timber harvest areas to meet snag and woody debris requirements.

Habitat effectiveness. A measure of the degree to which a specific area at a specific time can meet the needs of a species.

Habitat modification (adverse). Altering the topography, drainage patterns, and vegetation of an area so that the area is unsuitable for some wildlife that was previously present.

Habitat selection. The comparison of **habitat use** by wildlife with the availability of those habitat types.

Habitat use. The occurrence of wildlife in specific habitat types.

Habituated (bear). A grizzly or black bear that has little fear of humans, their activities, or developments, and largely ignores people if they do not get too close.

Hibernate. A physiological state of some animals characterized by extremely reduced activity and metabolism in order to conserve body reserves to survive periods of unfavorable environmental conditions.

Home range. An area where an animal spends about 90% or more of its time during a specified time, such as winter, summer, or year-round.

Ideal(ized) population. From genetic theory, a population in which matings are random, there is no emigration or immigration, generations do not overlap, the numbers of breeding members are constant, and there is no selection or mutations.

Imperiled. Not an official status, but used to describe **listed species** under the Endangered Species Act, **candidate species** for listing, **sensitive species**, or other rare plants or animals that may be in danger of extinction.

Inbreeding. When close relatives reproduce, such as brother-sister or parent-child matings.

Inbreeding depression. When **inbreeding** decreases the proportion of beneficial genes or increases the proportion of harmful recessive genes, thereby reducing the offspring's ability to survive or reproduce.

Incidental take. The unintentional **taking** of a **listed species** due to an activity; usually identified in a **biological opinion**, which usually contains a number of **reasonable and prudent measures** that the action agency must follow to allow the activity to proceed. The USFWS may permit any **taking** otherwise prohibited if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity (ESA § 10(a)(1)(B)).

Injury rates. The number of human injuries caused by grizzly bears per number of visitors, or the number of **confrontations**; estimates are from national parks only.

Interagency conservation strategy. A document describing the regulatory mechanisms and agency protocols and structure that will guide the management of a **listed species** following **delisting**. Required before delisting can take place with the overall goal of avoiding a re-listing.

Interagency Grizzly Bear Committee (IGBC). A group of high-level administrators representing the federal and state agencies that are involved in grizzly bear recovery. The IGBC coordinates the agencies efforts in implementing the grizzly bear **recovery plan**.

Island biogeography (theory). A branch of ecological studies of animal and plant communities focused on extinction-colonization rates on oceanic islands and the number of species an island can support based on its land areas. The theory has been extended to habitat islands on mainland areas created by habitat **fragmentation** due to human activities.

Jeopardy. In relation to **consultations** under section 7 of the Endangered Species Act, an opinion by the U.S. Fish and Wildlife Service that a proposed activity is likely to impair the continued existence and **recovery** of a **listed species**. A jeopardy opinion generally halts the project until it can be modified and a no-jeopardy opinion is reached.

Landscape ecology. The study of ecological processes and spatial patterns at large scales in terms of area and time.

Linkage (habitat or ecosystem). A land classification scheme in which large, core protected areas (**wilderness**, national park) that are connected to each other by areas with similar or slightly lower protection standards.

Listed species. A **species** that has been classified as **threatened** or **endangered** by the U.S. Fish and Wildlife Service under the Endangered Species Act.

Listing. The process of designating a **species** as **threatened** or **endangered** under the Endangered Species Act.

Litigation. The process of contesting a situation in a court of law.

Mainland-island (core-satellite) population. Originally from **island biogeography** studies in which the **dispersal** of organisms from a core or mainland **population** is the source for colonists in island or satellite populations. Now considered a variation of **metapopulation** structure in which the mainland population's probability of extinction is near zero.

Major federal action. An action funded or carried out by a federal agency that meets one of the following criteria: has a significant effect in one of several contexts, has either a beneficial or adverse impact, may effect public health and safety, the action area has unique characteristics, the action is highly controversial, the effects are highly uncertain, the action may be precedent setting, the action may contribute to **cumulative impacts**, the action effects an historic site or a **listed species**, or the action violates an environmental law.

Management situations. The classification of portions of grizzly bear **recovery zones** into administrative units based on the importance of areas to grizzlies and humans and the degree of development.

Mandates (legal). Specific, unambiguous directions given in laws or **regulations**.

Metapopulation. As originally developed, a **population** composed of smaller distinct local populations that occasionally went extinct but were re-established by members **dispersing** from the other local populations. Modern connotations embrace the more general idea of populations that are separated from one another with varying degrees of **connectivity** and chance of extinction.

Mortality. Death.

National Biological Survey. A new agency in the Department of the Interior that has taken over the research duties of the U.S. Fish and Wildlife Service, the National Park Service, and other Interior agencies, and whose mission is to inventory the natural resources of the United States and develop methods to conserve those resources.

National Wilderness Preservation System. The **wilderness** areas of the United States that were created and managed under the Wilderness Act of 1964.

Natural regulation. Processes that effect the **population** dynamics of organisms that are not directly related to human activities, for example, plant succession and earthquakes as opposed to hunting.

Non-discretionary terms and conditions. A set of procedures listed in a **biological opinion** that an action agency must take to avoid **jeopardizing** or **taking** a **listed species**.

Non-equilibrium metapopulation. A situation in which local **populations** of a **species** are completely isolated and as local populations go extinct, so does the species at a regional scale, local population by local population.

Non-governmental organizations (NGOs). Formally organized interest groups that actively participate in resource management.

Nuisance (bears). 1. one that causes significant depredation to lawfully present livestock or uses unnatural foods, which have been reasonably secured from the bear, resulting in conditioning of the bear or significant loss of property. 2. one that displayed aggressive (not defensive) behavior toward humans which causes a demonstrable immediate threat or potential threat to human safety and/or a minor human injury resulting from a human-bear **encounter**. 3. the bear has had an encounter with people resulting in a *substantial* human injury or loss of human life.

Omnivorous. Eating both animals and plants.

Open road. A **road** with no motorized access restrictions.

Outbreeding (depression). Matings among individuals from different **populations** that have a history of relative isolation and different selection processes. Depression (reduced survival and reproduction) can occur when gene complexes that are adapted to different local conditions, and/or are incompatible, are joined due to those matings.

Policy alternatives. Options for solving a policy problem.

Policy process. A series of phases that most policy issues go through that includes: problem recognition and definition, alternative development and recommendation, alternative implementation, policy evaluation, and continuation, modification, or abandonment.

Polygamous. Having more than one mate.

Population. A group of fish or wildlife in the same **taxon** below the **subspecific** level, in common spatial arrangement that interbreed when mature (50 CFR § 17.3 [1993]).

Population viability. The persistence of a population in a specific area over a specific time.

Precision. The degree to which repeated measures agree in relation to the actual value.

Private land. Areas owned by entities other than local, county, state, and federal governments, including individual home sites, farms, ranches, and industrial timberlands.

Reasonable and prudent alternatives. A set of options required by the U.S. Fish and Wildlife Service to avoid an Endangered Species Act **taking** that are usually a part of a **biological opinion**.

Recovery goals. A specific set of targets identified in a **recovery plan** such that when a **listed species** reaches those targets they will be considered recovered. These targets include both **population** variables and regulatory mechanisms to assure a sustained recovery.

Recovery plan. A document prepared by the U.S. Fish and Wildlife Service for **listed species** describing why they were listed, their present status, the need for recovery, steps to be taken to achieve recovery, monitoring methods to assess recovery, and the point at which the monitoring indicates the species has recovered.

Recovery zone. The area in which **listed species** are to be recovered.

Refuge. An area where wildlife are not subject to many of the human-caused disturbances that may be limiting **populations** in other areas such as habitat disturbances, poaching, and developed recreation.

Regulation. A specific **rule** that is developed to implement the broad directions of a law.

Reintroduction. The process of establishing a **species** in an area that it previously occupied but no longer occupies.

Reliable knowledge. A concept applied to the approach and design of studies (i.e., the appropriate use of three scientific methods—inductive, reductive, and hypothetico-deductive), the knowledge they generate, and the limits to the application of that knowledge.

Resource base. The amount of a specific resource, such as berry-producing shrubfields, in a specific area at a specific time.

Resource cushion. The amount of the **resource base** that could be altered by an activity before the activity would have a negative effect on **species** dependent on that resource.

Restricted road. A **road** in which the use of motorized vehicles is restricted seasonally or yearlong.

Road. A route of at least 500 feet that is passable by a conventional pick-up truck or passenger car.

Road density. Linear miles of **road** per square mile.

Roadless areas. Areas of western national forests greater than 5,000 acres that do not contain any roads and have been inventoried by the U.S. Forest Service in relation to their suitability as **wilderness**.

Rule (proposed, final). Regulations developed by a federal agency which are published in the ***Federal Register*** for public comment, or as adopted.

Secure habitat. Portions of **bear management units** where the risk of human caused **mortality** and **displacement** of grizzly bears is low.

Sensitive species. Those that occur on U.S. Forest Service lands that are rare and may be declining, and which receive special attention when an activity is planned and implemented; somewhat analogous to U.S. Fish and Wildlife Service **candidate species**.

Sink. See **source-sink**.

Snow road. A temporary **road** that uses snow as the road base.

Source-sink. In terms of **population** dynamics, when dispersing individuals from specific source populations experience higher **mortality** rates in other areas (sinks).

Species. 1. As defined by the Endangered Species Act—any **subspecies**, of fish or wildlife or plants, and any **distinct population segment** of any species of **vertebrate** fish or wildlife which interbreeds when mature. 2. A category of biological classification ranking below the genus or sub-genus comprising related organisms that are potentially capable of interbreeding.

Standards. Specific management directions, for example, two leave trees per acre in a timber harvest area.

State lands. Areas under the administration of a state agency; typically in the West, endowment or grant lands that were given to the states from the federal land base to support the public school systems.

Status review. The Endangered Species Act requires that the Secretary review the status of all **listed species** every five years to determine if conditions have changed and a reclassification or **delisting** is warranted.

Submodel. A specific portion of a **computer model** that produces output that is necessary for the model or another submodel to produce its output.

Subspecies. A **population** or populations of a species that are geographically isolated for a sufficient amount of time to develop distinct characteristics, and would successfully interbreed if no longer isolated.

Taking. As defined by the Endangered Species Act—means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. U.S. Fish and Wildlife Service regulations define **adverse habitat modification** as a taking.

Taxon. A classification of animals or plants that share the same distinguishing characteristic. Taxons are hierarchical, ranging from distinctions between plants and animals, vertebrates and invertebrates, to **species**, **subspecies**, and **distinct population segments**.

Threatened. Any **species** which is likely to become an **endangered** species throughout all or a significant portion of its range.

Threshold values. Points at which major changes occur, e.g., as **open road** densities increase, grizzlies may be able to adjust until **road density** reaches a point that they quit using an area.

Translocation. The act of moving individuals to a different area where they are supposed to remain for an extended period.

Umbrella species. Species with broad habitat and spatial requirements such that management programs designed for them are likely to benefit other species.

Ungulate. A hoofed mammal such as deer, elk, cattle, and sheep.

Vertebrate. An animal with a backbone or spine.

Viable population analysis (models). A branch of **population** studies that models **demographic**, genetic, and environmental factors in an attempt to predict how long before a population goes extinct, the probability of a population going extinct within a specific time frame, the factors that have the greatest influence on extinction rates, and population densities that have a high probability of persistence for a specified time.

Warranted but precluded. A protocol of the Endangered Species Act that applies to the **listing** process when the available data indicates that a listing or a reclassification is appropriate, but other factors such as funding levels, judicial rulings, or similar protection for other **species** makes the action unnecessary or contradictory.

Wilderness areas. Areas in the **National Wilderness Preservation System** that were established by the U.S. Congress and are managed under the provisions of the Wilderness Act.