1987

Greater Yellowstone Ecosystem

U.S. House Committee on Insular Affairs

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GREATER YELLOWSTONE ECOSYSTEM

AN ANALYSIS OF DATA SUBMITTED BY FEDERAL AND STATE AGENCIES

PREPARED BY THE

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FOR THE

SUBCOMMITTEE ON PUBLIC LANDS

AND THE

SUBCOMMITTEE ON NATIONAL PARKS AND RECREATION

OF THE

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COMMITTEE ON INTERIOR AND INSULAR AFFAIRS

November 21, 1996

Dear All Members of the Committee:

Subject: Letter of transmittal

This is in reference to the Members of the Committee on Interior and Insular Affairs in analysis of federal and state land management data in the Greater Yellowstone Ecosystem which was prepared for the use of this Committee by the Congressional Research Service of the Library of Congress.

Also appended as a letter from Chairman Hamilton of the Public Lands Subcommittee and Chairmen Davis of the National Parks and Recreation Subcommittee, along with their 'Future and Recommendations' which was prepared for the use of this Committee by the Congressional Research Service of the Library of Congress.

We are pleased to present the thoughtful consideration of the Committee on an excellent analysis of federal and state land management data in the Greater Yellowstone Ecosystem at prepared by Congressional Research Service of the Library of Congress.

We have also included in this analysis of the data and support the areas where the Committee and the Congress must concentrate future oversight and legislative efforts.

The Greater Yellowstone Ecosystem is a vast, large area spanning across the boundaries of Wyoming, Montana, Idaho and the state of Montana. It is managed by a myriad of agencies, mostly at higher elevations. It is the area where decision making in an area with virtually no viable economic natural resource development communities exist and in a setting deemed value.

We held a junior Subcommittee hearing on September 12, 1995, to determine the facts, but were disturbed at the lack of information on the area. We understood the complexity of the agencies responsible and the challenges for virtual analysis of the data. We have received the Congressional Research Service for analysis, materials for the assessment of the report that is attached. The details and chronology of the collection procedure are explained more fully in our 'Summary and Observations.'
SUMMARY AND OBSERVATIONS

Background:

When the Subcommittee on Public Lands and the Subcommittee on National Parks and Recreation announced on October 25, 1985 joint hearing on Federal land management practices on the so-called "Greater Yellowstone Ecosystem," a more or less routine handling of a complex issue was expected. However, as the rest of this publication will attest, the hearing was only the prelude to a larger effort to learn more about that important area.

The hearing was a long one. Thirty-eight witnesses, representing as many organizations and government entities, testified well into the evening. There was general agreement on the area's importance. Otherwise, testimony ran the full gamut. The diversity of views offered was matched by the varied land management policies and techniques of the Federal agencies which, proceeding under thin mantles of inter-agency cooperation, make thousands of separate decisions whose cumulative impacts really define the overall handling of the area.

It was the inability of the Subcommittees to focus the debate that led to the call for more information. With four Federal agencies, three States, and private owners all making land management decisions affecting seven national forests, two national parks, three wildlife refuges, wilderness and grazing areas, State, county and private lands, and more, the lack of common data and consensus was understandable. Nevertheless, it was dismaying.

Reasoning that the conflicts inherent in managing the Greater Yellowstone area will simply grow more acute, and that many will still come back to the Congress for resolution, the Subcommittees sought to find out "what is known" about the area under discussion.

The first step was to define the "Ecosystem's" boundary. The Congressional Research Service (CRS) of the Library of Congress was asked to analyze all of the testimony, identify "areas of concern" to the witnesses and draw a boundary around those areas. The
map was duly completed, with the limits drawn wherever feasible along already existing administrative lines (e.g., country lines, National Forest District lines, etc.). The Subcommittees chose not to label it an "ecosystem" map because of the continuing evolution of the definition of that word. However, it was clear from the testimony that the boundary enclosed essentially a free-standing area of great size in which the movement, interdependence and interplay of biota resemble the classical definition of an ecosystem. Moreover, even opponents of the term had begun, for convenience sake, to refer to the "Greater Yellowstone Ecosystem." Thus the term (or simply "ecosystem") will be used throughout these introductory comments.

With the map in hand, the Subcommittees then prepared a thorough set of questions for the land managing agencies responsible for the area, principally the U.S. Forest Service, the National Park Service, the U.S. Fish and Wildlife Service, the Bureau of Land Management and the Fish and wildlife agencies of the States of Montana, Wyoming and Idaho, and other Federal agencies as well. They were asked to tell us "what is known" in areas ranging from visitor use and timber sales to locations of abandoned mines and grizzly bear kills. Knowing the amount of work this would entail for each agency, the Subcommittee stipulated that no new data should be compiled. Either the information existed and could be transmitted or a gap existed. In the latter case, the agency was asked to state that the data was unavailable.

Voluminous data and hundreds of maps arrived and were referred to the Congressional Research Service for independent analysis. The U.S. Geological Survey and the Forest Service were especially diligent in submitting quality data by the deadline and continuing to provide attentive cooperation as the analysis continued.

CRS staff performed professionally in transforming the often disjointed raw data into an intelligible format. Theirs was an especially difficult task. As is pointed out in the Report, while Federal agencies created no new data for submission, the fact that so much existing data on that huge area had never before been compiled into a single document means that "new information," in a sense, is being offered. Likewise, the authors point out that the maps accompanying the report are unique in the information that they convey. The Report does not purport to cover every item of information submitted by the agencies. In some cases, the data was too scarce or ambiguous to be analyzed. At the other extreme, the data on the qualifications of Federal personnel working in the area was so voluminous that CRS resources were not sufficient to computerize it. Submissions being public information, it may remain for enterprising graduate students to review the materials for potential dissertation topics.

Information not used in the report remains available for future public and Congressional access. For Library of Congress access, contact the Geography and Map Division for "Yellowstone Ecosystem, Resources and Management Inventory Maps: "GC4762, V401 Ivar (V4)."

In any event, the choice of what information to highlight and how to highlight it remained for the Congressional Research Service. The Report stands on its own. The following comments represent not reactions to the Report. Certain generic and occasional specific observations are suggested by the data amassed and they are offered in the following paragraphs.

Observations:

The first thing likely to strike the reader of the CRS Report is the unevenness of the regulatory data on the region, both in quantity and quality. One realizes that each agency has its own special set of needs as well as constraints when collecting information. But there is also a need to look at the "big picture," and that has proved exceedingly difficult to do. It is precisely the inability to do so that has permitted some of the major ecosystem problems to burst until today they seem nearly intractable. It is imperative that all persons working to resolve conflicts in that region agree, at the very least, on statistics and definitions so that, hopefully, they may agree ultimately on the solutions.
The complexity of the Greater Yellowstone Ecosystem is suggested by its sheer size. The map prepared by the Congressional Research Service indicates that it may contain up to 14 million acres. Clearly the centerpiece is Yellowstone National Park, also the center stone in the "crown jewels" of America's protected areas. This 2.2-million-acre preserve has excited the imagination not only of most Americans for over a century, but has been a drawing card for large numbers of foreigners as well. So important is its stature that it has been designated a World Biosphere Reserve by UNESCO and inscribed on the World Heritage List under the World Heritage Convention. It contains unsurpassed natural beauty, including waterfalls, lakes, mountains and the most spectacular geysers in the world. Yellowstone is also famous for its splendid diversity of wildlife—elk, deer, moose, bald eagles, trumpeter swans, trout and grizzly bear.

However, the focus of the joint hearing, and of the attached Report, rightfully has extended beyond the Park as well to the several million acres of surrounding territory. These areas contribute directly and indirectly to the health of natural systems in Yellowstone Park. They also possess their own unique values and have their own human and animal constituencies. More than 90 per cent of the lands surrounding Yellowstone are Federally owned and managed. As a measure of public concern over the non-Park lands, a majority of persons testifying at the hearing directed their remarks at these other parts of the Ecosystem.

The Greater Yellowstone Ecosystem contains most of the animal species which were present before the arrival of the first white visitors. The wolf is the only one of the original major vertebrates still missing from the area. Nevertheless, the populations of many animal species have been reduced by human activities in or near their habitats, and further reductions are likely. Of critical concern is protection of the water quality of streams and lakes of the area as well as the associated riparian areas. Cutthroat trout, being a food source for many species and an indicator of water quality, are an especially important link in the system.

In the public's mind, grizzly bears are the most important indicator of the Ecosystem's health. These large animals, whose most heavily used habitat is often crucial to many other species, are particularly sensitive to human presence and are thus the first species displaced by development activities. Although expressly protected by Federal law, testimony at the hearing charged the agencies with lax enforcement. Deaths do continue, most of them seemingly clustered in discreet areas. The Report uses the term "black hole" in connection with the cluster areas. The term is in itself a disturbing designation because history shows that where grizzlies come into conflict with human activities, the animals invariably lose, very often with their lives.

There are many human activities in the Greater Yellowstone Ecosystem. The principal ones involve timber harvesting, water developments, grazing, energy and mineral exploration and development, and recreation. Phosphate mining, 100 miles south of Yellowstone Park, is the single largest industry on Federal lands in the region. However, the Report shows that recreation is the major economic activity overall, supporting two-thirds of the direct jobs resulting from activities in the National Forests. This is a significant statistic that may not be generally understood. Report data suggests that the economic values assigned by the Forest Service to recreation seriously misrepresent its importance to local communities and hence masks recreation losses associated with other human activities.

By any measurement, the submitted data on human activities is inadequate for comparing the effects of various management options. The agencies may be able to make a convincing case on a particular project, as a general rule, that would not be apparent from the information offered to the Subcommittees. The data on recreational activities appear to be particularly deficient in understanding what, when and where the various activities are occurring. Forest Service categories for recreation are frankly, mystifying and the little data collected by other agencies is often incompatible with that of the Forest Service.

The impact of human presence on sensitive natural systems throughout the Ecosystem is the source of
virtually all conflict in the area. Logic suggests that some way be devised to determine the extent of impact in advance of administrative actions. For example, the most serious ecological impacts of development activities result from access roads. Roads frequently increase erosion and pollute the clear streams and lakes upon which many animal species depend. Of perhaps more importance, however, is the human presence which results from access roads. Yet road construction and access decisions are determined for each resource activity; there is no coordinated consideration of the effects of roads and access on the Ecosystem.

The problem of coordination extends to the existing "coordination committees" themselves. A review of the data is convincing that the committees are inadequate to provide a comprehensive, integrated overview of the Ecosystem. The Greater Yellowstone Coordinating Committee excludes several important agencies, such as the Bureau of Land Management, State Wildlife agencies, and possibly one or more of the National Wildlife Refuges. Other committees focus on one animal species or issue, supporting a fragmented approach to coordination. In addition, there may be duplicative efforts because of the multiple committees on some issues.

Even where the expertise and commitment exist within a coordinating body, there is serious reason to believe that the data needed to support many decisions simply is not available. The Report reveals that data on activities in the Ecosystem, and on the effects of those activities, is incomplete and inconsistent among the Federal agencies. It is insufficient to evaluate management choices and hence to resolve conflicts in a lasting manner and on the basis of facts. Perhaps the most striking example of this concerns the recording of grizzly bear kills. Two agencies submitted data which can only charitably be called "at variance." They differed in practically every category: number of kills, location, cause, etc. This is particularly disturbing in the case of the grizzly—a prominent creature in the Ecosystem, expressly protected by an Act of Congress, whose well-being is supposedly the highest priority of each Federal agency.

Accuracy of data depends on thoroughness and quality of research. Only the Forest Service has a research branch which is independent of its land managers, and can therefore relatively easily conduct studies which last beyond limited personnel tenures. The structure of research efforts, as well as the scope, therefore affects the agencies' ability to generate good data that translates into good decision-making.

Although the jurisdictions of the various Federal agencies in the Greater Yellowstone Ecosystem are a matter of historical record, one is nevertheless struck, when perusing the Report, by how much the Federal government's administrative boundaries can affect comprehensive, coordinated management. Regional boundaries fragment the area into three Forest Service Regions, two Fish and Wildlife Service Regions, and three Bureau of Land Management State Offices. Even within the regions, individual unit boundaries often have little relevance to the Ecosystem. Four of the Forest Service Ranger Districts include lands distantly separated from those in the Ecosystem. In virtually all agency decision-making, the whole is subordinated to its fragments.

Recommendations:

The Report documents the most serious deficiency: an inadequate data base. Data varies from non-existent to very good to inconsistent, and it varies from agency to agency, even within the same agency. Yet the agencies manage roughly the same type of terrain containing generally the same wildlife and conducting generally the same human activities. If data underpinning management decisions vary, then the decisions themselves will vary despite the best intentions to achieve consistency.

The Report also documents inconsistencies in current attempts to achieve coordination. The Subcommittees appreciate two recent coordination attempts taken as a result of the joint hearing. The Forest Service and National Park Service have agreed to improve contacts, and the Forest Service has assigned "lead agency" responsibility to a single National Forest in coordinating approaches to resource management in the Ecosystem. However, Report data can
lead one to question whether "more of the same" will adequately address the continuing problem of coordination.

The Report deserves thorough review by all parties interested in resolving conflicts in the Greater Yellowstone Ecosystem. Obviously, disagreements will continue, but hopefully they will take into account the data (or lack thereof) contained in the Report.

The observations set forth in these paragraphs represent "first impressions." They attempt to single out those deficiencies that reasonable people would agree must be overcome if a more rational, coordinated management scheme is to be devised.

In holding the hearings, the Subcommittees hoped to stimulate discussion on new approaches to old problems. Clearly, little can be said here that will move opposing forces to early agreement on such controversial topics as oil and gas leasing, below-cost timber sales, and the like. But suggestions can be made for improvements in data collection and management, on the coordination of multi-agency management efforts, and on certain of the more outstanding resource problems on which consensus is possible. In this spirit, the following suggestions are made:

Data Collection - The agencies basically need to gather management statistics in a more comprehensive and coordinated fashion. Department of Interior agencies especially need to begin collecting such information. When it is gathered, it needs to be in a form which can be shared and understood by other agencies. Likewise, the Forest Service should review its definitions to assure that they conform to common usage—or can at least be easily translated into common usage.

One agency, presumably the Inter-agency Grizzly Bear Committee, should be specially charged with gathering the data on grizzly bear deaths and sold to make this a regular part of its agenda. The Fish and Wildlife Service is required by law to consult under Section 7 of the Endangered Species Act. That it does not have up-to-date and accurate statistics immediately available for use in these consultations is deplorable, to say the least.

Data Management - A central clearing house for Greater Yellowstone Ecosystem data would go far toward standardizing and making available data collected by the land managing agencies. It is therefore suggested that a non-land managing agency be given that responsibility. The U.S. Geological Survey is in the process of perfecting a digital cartography program that is ideally suited for this task. In this exciting program, data is computerized and plotted with great precision for retrieval in map form. The agency could receive information from all sources, feed it into a Geographic Information System, and make the data base available to all agencies, including city and local governments (who would be encouraged to submit data also). Federal agencies would be required to develop compatible data bases. With the Geological Survey leading by providing both hardware and software, the main data base should include (in addition to standard geographic data on topography, roads, ground cover, ownership, etc.), at a minimum:

a. Geologic data on energy and mineral resources;
b. Energy and mineral leases and claims, mines, drill sites, etc., to the extent they are known;
c. Past and future timber sales;
d. Recreation sites;
e. Visitor use patterns;
f. Existing and proposed water development projects;
g. Grazing allotments;
h. Maintenance levels of roads;
1. Grizzly bear death locations, and statistics on cause of deaths, with
   supplementary material in narrative form describing the deaths;
2. Eagle nests, whooping crane sites, trumpeter swan sites, ungulate calving
   grounds, migration corridors;
4. Impediments to animal movements;
5. Hunting and fishing concentrations;
6. Trails and trailheads; and
7. Historical and archeological sites.

Care would need to be taken to protect from public disclosure certain information, such as the
location of critical bird nesting areas or archeological sites, if such disclosure could result in
harm to fragile resources.

Research - Emulate the practice of the Forest Service by requiring agencies, particularly the
National Park Service, to establish research arms that are separate from the land managers.
It would also be useful, for example, to have the Fish and Wildlife Service do a
comprehensive biological survey of the area; all species present, distributions, numbers and
other data.

Coordination - The numerous, duplicative coordinating committees need to be coordinated
themselves. Among the options that might be considered are the following:
1. Eliminate some or all of the current committees and replace them with a more
   comprehensive one.
2. Make the Greater Yellowstone Coordinating Committee responsible for:
   a. assuring that all relevant
might occur.

2. A comprehensive road management plan could be developed for the Ecosystem, with the plan including:
   a. road construction locations and standards,
   b. required road maintenance levels (including costs),
   c. road closure standards (location and timing), and
   d. road destruction for any roads slated for elimination.

3. A committee could establish zones within the Ecosystem which define not only the appropriate levels but the timing of human presence, taking into consideration the requirements of wildlife and other resources in the area. The following are advanced for consideration:
   1. Scrap the Management Situation concept. Create instead "zones of density" of grizzly bear use and adjust human and grazing access accordingly.
   2. Eliminate the so-called grizzly bear "black holes" by targeting enforcement in those areas and following with vigorous prosecution.
   3. Conduct thorough forensic investigations of bear kills and include in statistics greater precision on cause of death.

Grizzly Bears - Two outstanding facts would lead the most impartial observer to conclude that the Federal grizzly bear management program in the Greater Yellowstone Ecosystem is flawed: deaths continue, and statistics on those deaths are suspect. Compliance with existing law requires improvement in both areas. Therefore, the following are advanced for consideration:

Other Wildlife - More data should be acquired on non-game species in the Greater Yellowstone Ecosystem, and more attention should be given to fish as "indicators" in the Ecosystem. Fish are a prime source of food for many other species and a good indicator of habitat for others (e.g., trumpeter swans). By extension, a similar increase of attention should be given to protection of all riparian habitat.

The foregoing recommendations do not necessarily require legislation. Much can, and should, be initiated by the agencies themselves. It is hoped that these suggestions can help all interested parties better understand the issues involved, and that future Congresses will not hesitate to take whatever further action -- by way of oversight or legislation -- that may be required to ensure that proper management policies, coordination and cooperation are achieved to protect the Greater Yellowstone Ecosystem.
YELLOWSTONE:
ECOSYSTEM, RESOURCES, AND MANAGEMENT

Prepared at the Request of:
Hon. John P. Seiberling, Chairman
Subcommittee on Public Lands

and
Hon. Bruce F. Vento, Chairman
Subcommittee on National Parks and Recreation

for the use of the
COMMITTEE ON INTERIOR AND
INSULAR AFFAIRS

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December 12, 1986
ABSTRACT

This report summarizes and evaluates information on the lands and resources in and around Yellowstone National Park. The information was provided by numerous Federal and state agencies in response to questions from the House Interior Subcommittees on Public Lands and on National Parks and Recreation. The report describes the Yellowstone ecosystem and its major resources, identifies the development activities in the area, and considers the effects of those activities on the ecosystem and its resources. The report also examines grizzly bear distribution and mortalities as an example of development's effects on an "indicator species," and evaluates the inter-agency coordination in managing the federal lands of the region. The report presents numerous findings, the most significant are:

1. Grizzly bears are useful indicators of the health of the Yellowstone ecosystem, and their population trends provide useful information on the effects of land and resource management in the area.

2. The "Management Situations" concept for grizzly habitat management is not particularly effective for preventing grizzly bear deaths. There are seven concentrations of grizzly deaths - grizzly bear black holes - in and around Yellowstone National Park. Preservation of grizzly bears requires special attention to these areas, and to the causes of death in these areas.

3. The most significant impacts of human developments on the Yellowstone ecosystem result from the access required for virtually all development activities in the area. Access has two effects:
   a. Roads that provide most forms of access can seriously degrade water quality. Many species of animals (especially fish) require clean water, and the Yellowstone ecosystem depends on large volumes of clean water which are produced in the area.
   b. Human activities can disturb and displace many species of animals. Some species, such as grizzly bears, are particularly sensitive to human presence, but many of the other animals important to the ecosystem ( elk and bald eagles, for example) can be, or have been, displaced by developments.

4. The existing information and coordination mechanisms are inadequate to provide the comprehensive coordinated management needed to maintain the balance in the Yellowstone ecosystem. Comprehensive data did not exist for any aspect of management of the ecosystem (including grizzly bear mortalities). Some coordinating committees appear duplicative, while for others, membership and focus is incomplete. Finally, the existing administrative boundaries and organizations tend to restrict, rather than assist, information gathering.
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- Development Activities
- Grizzly Bear Mortality Clusters
- Federal Agency Coordination and Information

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INTRODUCTION

Yellowstone National Park, the world's first national park, was created by an Act of Congress in 1872, protecting more than two million acres of spectacular natural beauty, including geysers, waterfalls, lakes and mountains in what is now Montana, Idaho, and Wyoming. In the floor debate on the bill, Congressman Henry L. Dawes (R-Mass.) stated: 7

"The headwaters of the Yellowstone River] is a region of the country seven thousand feet above the level of the sea, where there is frost every month of the year, containing the most sublime scenery in the United States except the Yosemite valley, and the most wonderful geysers ever found in the country. The purpose of the bill is to preserve that country from depredations."

In the past century, development and human population have increased in nearby areas outside the Park. Biologists have noted that the rare species found in the Park have ranges that extend beyond Park boundaries into these areas of increasing development and that most species depend on resources outside the Park for some part of their life cycle. Geologists and physical scientists are investigating the hydrological connections between Yellowstone's unique geothermal features and watersheds in nearby forests.

Scientists have therefore come to recognize that preserving the many of the unique features of the Park is at least partly dependent on management of the surrounding lands. Many feel the Park is too small to protect its living and geological resources adequately and that management of lands around the Park should be integrated into the management of a larger "Greater Yellowstone Ecosystem."

DEFINING A YELLOWSTONE ECOSYSTEM

Yellowstone National Park is dominated by a high plateau, surrounded by still higher, mountains, which are in turn surrounded by lower plains with less rainfall. The animal and plant communities in the plateau and surrounding mountains have distributions that reach well outside Park boundaries. The Park and its surrounding mountains form perhaps the largest relatively undisturbed ecosystem in the contiguous United States.

An ecosystem is a "unit made up of all the living and nonliving components of a particular area that interact and exchange materials with each other." 12 Given such a definition, the existence of a "Greater Yellowstone Ecosystem" is a scientific construct, rather than a legal designation, and is independent of any congressional action. Moreover, as this definition makes clear, it is possible to set only general, not precise, boundaries on any ecosystem, because animals move. It is, therefore, impossible to draw a line through any area and then assert that one independent ecosystem lies on one side and another on the other side. A lack of agreement on boundaries should be expected from a scientific viewpoint. Even so, the concept is used to identify clusters of plant- and animal-which appear together, and are generally different from those in surrounding areas. Observers may agree that some general area can be identified which includes the majority of the organisms in the ecosystem and their essential physical requirements. The ecosystem approach can then be useful as a management tool.

HEARTS ON THE GREATER YELLOWSTONE ECOSYSTEM

A number of conflicts have surfaced in the Yellowstone area. There have been charges that timber harvests damage grizzly habitat, that oil, gas, or geothermal drilling will damage Yellowstone's waters, that grizzly bear populations are incompatible with heavy visitor use, and that the National Parks and National Forests are being managed in favor of animals to the detriment of people or the local economy. Animal populations are, in fact, affected by many types of activities, including timber harvesting, water development, grazing, energy and mineral development, and recreation. Conversely, these resources are affected by the requirements of wildlife, as well as many of the activities encountered in economic development of the other resources.

The House Interior Subcommittees on Public Lands and on National Parks and Recreation responded to public concern about management of Yellowstone National Park and its resources by holding an oversight hearing on the Greater Yellowstone Ecosystem (GYE) on October 24.
The purposes of the hearing were (1) to examine the meaning and significance of the Greater Yellowstone Ecosystem, its natural, cultural, and recreational resources, and their associated economic and environmental values; (2) to identify the various resource uses and the potential conflicts among them; and (3) to review the strengths and weaknesses of the State and Federal arrangements for managing the ecosystem and its resources.

Request for Additional Information

Lengthy testimony from federal agencies, organizations, and individuals went far toward meeting those purposes, but the subcommittees were left with numerous unanswered questions about resource management in the Greater Yellowstone Ecosystem. In order to evaluate the many issues raised at the October 1985 hearing, the Public Lands and National Parks Subcommittees, with the assistance of the Congress--Research Service (CRS), prepared follow-up questions for the federal and state agencies responsible for managing portions of the area. Those questions were addressed to the agencies listed in Table 1, and Appendix I lists the questions asked of each agency regarding lands and their management in the COVR.

This list of agencies which provided information to the subcommittees is a nearly comprehensive compilation of federal agencies with activities in the Yellowstone area. The Minerals Management Service, which collects royalties from energy developments on federal lands, is the only federal agency identified in the course of this analysis which was not surveyed. Additional State agencies, local governments, and the Intertribal Council probably have supplemented the data provided to the subcommittees, but the agencies listed above represent the vast majority of those interested and involved in managing the Yellowstone ecosystem.

Area for Which Information Was Provided

Respondents had to have some geographical limits to reply, so CRS analysts were asked to prepare a map to assist the agencies in responding. The map's boundaries were chosen to include similar topography and climate zones as well as similar vegetation. For administrative convenience, legal boundaries such as Ranger Districts, U.S. Congress--House Committee on Interior and Insular Affairs--Subcommittee on Public Lands and Subcommittee on National Parks and Recreation, Greater Yellowstone Ecosystem Oversight Hearing, Oct. 30, 1985, 99th Congress, 1st Session, Washington, D.C., U.S. Govt. Print Off., 1986, 457 p. Serial No. 99-18 (hereafter referred to as Greater Yellowstone Ecosystem Oversight Hearing.)

The Intertribal Council, Joint Opening Remarks, Greater Yellowstone Ecosystem Oversight Hearing, p. 2.

TABLE 1: Agencies Providing Information on Resource Management in the Greater Yellowstone Ecosystem

<table>
<thead>
<tr>
<th>DEPARTMENT OF AGRICULTURE</th>
<th>U.S. Forest Service</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Animal and Plant Health Inspection Service</td>
</tr>
<tr>
<td>DEPARTMENT OF THE INTERIOR</td>
<td>National Park Service</td>
</tr>
<tr>
<td></td>
<td>Bureau of Land Management</td>
</tr>
<tr>
<td></td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td></td>
<td>U.S. Geological Survey</td>
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<tr>
<td></td>
<td>Bureau of Indian Affairs</td>
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<td></td>
<td>Office of Reclamation</td>
</tr>
<tr>
<td></td>
<td>Office of Surface Mining</td>
</tr>
<tr>
<td>OTHER FEDERAL AGENCIES</td>
<td>Advisory Council on Historic Preservation</td>
</tr>
<tr>
<td></td>
<td>Department of Energy--Bonneville Power Administration, Federal Energy Regulatory Commission</td>
</tr>
<tr>
<td></td>
<td>Department of Commerce--National Geographic and Atmospheric Administration</td>
</tr>
<tr>
<td></td>
<td>Department of Defense--Army Corps of Engineers--Environmental Protection Agency</td>
</tr>
<tr>
<td>STATES OF MONTANA, IDAHO AND WYOMING</td>
<td>Department of Fish and Game</td>
</tr>
<tr>
<td></td>
<td>MONTANA--Department of Fish, Parks, and Wildlife</td>
</tr>
<tr>
<td></td>
<td>WYOMING--Department of Game and Fish</td>
</tr>
</tbody>
</table>

Tracts, township lines, etc.) were used where they approximated natural boundaries. Every effort was made to include all areas discussed in any way at the subcommittees' hearing in October, 1985. Map 1 shows the area for which information was asked. It will be referred to as the "Committee's Greater Yellowstone Map," or "COYR" in this report, and the region contained within the COYR will be called the COYR Region or "COYR." The COYR is displayed in Map 1, which shows graphically topographic and other features of the area. Table 2 identifies the acreage managed by each of the major administrative units, while Figure 1 (p. 6) shows the administrative units for the various Federal land managing agencies in the COYR. The total land area of the COYR is about 14 million acres. Of this, the U.S. Forest Service is the largest landowner, with 10.7 million acres in seven National Forests. The National Park Service manages 3.4 million acres in Yellowstone National Park (NP), Grand Teton NP, and the John D. Rockefeller, Jr. Memorial Parkway connecting the two Parks. The U.S. Fish and Wildlife Service has three Refuges in the COYR, with 71,000 acres, while the Bureau of Land Management (BLM) manages about 124,000 acres, predominately in the Madison River Valley and around Red Rock Lakes National
### TABLE 2. Land Ownership in the CYEAR (est. = estimated)

<table>
<thead>
<tr>
<th>Landowner or Manager</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellowstone National Park</td>
<td>2,219,801</td>
</tr>
<tr>
<td>Grand Teton National Park</td>
<td>304,861</td>
</tr>
<tr>
<td>J. D. Rockefeller Parkway</td>
<td>22,722</td>
</tr>
<tr>
<td>National Park Service Subtotal</td>
<td>2,554,444</td>
</tr>
<tr>
<td>National Elk Refuge</td>
<td>24,747</td>
</tr>
<tr>
<td>Red Rock Lakes National Wildlife Refuge</td>
<td>32,467</td>
</tr>
<tr>
<td>Gray's Lake National Wildlife Refuge</td>
<td>36,552</td>
</tr>
<tr>
<td>U. S. Fish and Wildlife Service Subtotal</td>
<td>72,867</td>
</tr>
<tr>
<td>Beaverhead National Forest</td>
<td>471,250 est.</td>
</tr>
<tr>
<td>Gallatin National Forest</td>
<td>1,150,100 est.</td>
</tr>
<tr>
<td>Custer National Forest</td>
<td>509,100 est.</td>
</tr>
<tr>
<td>Shoshone National Forest</td>
<td>1,343,009</td>
</tr>
<tr>
<td>Bridger-Teton National Forest</td>
<td>3,400,110</td>
</tr>
<tr>
<td>Caribo National Forest</td>
<td>429,790 est.</td>
</tr>
<tr>
<td>Targhee National Forest</td>
<td>1,123,300 est.</td>
</tr>
<tr>
<td>U. S. Forest Service Subtotal</td>
<td>10,187,900 est.</td>
</tr>
<tr>
<td>Idaho BLM Lands</td>
<td>42,500 est.</td>
</tr>
<tr>
<td>Montana BLM Lands</td>
<td>76,500 est.</td>
</tr>
<tr>
<td>Wyoming BLM Lands</td>
<td>48,000 est.</td>
</tr>
<tr>
<td>BLM Subtotal</td>
<td>129,000 est.</td>
</tr>
<tr>
<td>Idaho State Lands</td>
<td>44,400 est.</td>
</tr>
<tr>
<td>Montana State Lands</td>
<td>47,250 est.</td>
</tr>
<tr>
<td>Wyoming State Lands</td>
<td>3,300 est.</td>
</tr>
<tr>
<td>State Land Subtotal</td>
<td>110,850 est.</td>
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<tr>
<td>Champion Timberlands</td>
<td>142,000 est.</td>
</tr>
<tr>
<td>Other Private Landowners</td>
<td>800,000 est.</td>
</tr>
<tr>
<td>Total Land in the CYEAR</td>
<td>14,000,000 est.</td>
</tr>
</tbody>
</table>

Wildlife Refuge (WR). (BLM land ownership was estimated from maps provided by the Forest Service.) Thus, the Federal Government owns about 12.9 million acres in the CYEAR, more than 90 percent of the total land area. The States also own land in the CYEAR, with Idaho owning an estimated 15,000 acres and Montana owning about 10,000. The remaining one million acres are privately owned. The largest private landowner is Champion Timberlands, a forest products company. Champion owns about 142,000 acres in the Gallatin and Madison Ranges, northwest of Yellowstone NP.
New Information

As a general rule, the Federal agencies created no new data to respond to the Subcommittees' questions. Most of the data existed in files scattered among the various Federal agencies. In many instances, the information was not actively used in managing the area. This report, therefore, contains virtually no data which did not previously exist. However, the existing data on the Yellowstone ecosystem and on the development activities on various Federal lands in the Yellowstone area has never before been compiled into a single document. Thus, this report provides "new" information, in the sense that the data had not previously been compiled or readily available. In addition, the maps accompanying this report are the first spatially descriptive documents which identify most development activities and other important factors in examining the Yellowstone ecosystem. The significance of this report, therefore, is not in new data, but rather in the broad compilation of existing data -- beyond agency boundaries -- and the analysis of the interrelationships of these activities with the ecosystem.

PURPOSE OF THIS REPORT

The primary purpose of this report is to summarize and evaluate the additional information provided to the House Interior Subcommittees by the various agencies. Thus, this report can provide the basis for future congressional oversight on Federal activities affecting the Greater Yellowstone Ecosystem. The report also provides a comprehensive view of Federal land management in the area, and reveals opportunities for management adjustments that result from such a view. Similarly, such opportunities illustrate the value of a comprehensive view in examining land management for areas where the activities of one agency can affect the lands and resources of another agency. Thus, this approach may prove useful in examining resource conflicts in other units of the National Park System and other such lands.

This report is organized into several chapters. Chapter II describes the natural state of the Yellowstone ecosystem. Chapter III describes how various development processes and activities affect the natural system; the development activities discussed include timber harvesting, water developments, grazing, energy and mineral management, and recreation. Chapter IV describes several significant site-specific conflicts between grizzly bears, as indicators of the health of the ecosystem, and other uses. Finally, Chapter V discusses issues related to inter-agency coordination and management.
THE YELLOWSTONE ECOSYSTEM

This chapter describes the physical features of the CVR which help to distinguish it from surrounding lands. It is followed by a description of major vertebrate species which help define the ecosystem, and which have been the focus of special controversy. The important findings of this analysis are:

1. The Yellowstone ecosystem still contains the great majority of the species present in the past with the first signs of the return of the whooping crane and the peregrine falcon. The wolf is the only large vertebrate originally present that is still completely missing from the CVR.

2. The populations of many animal species, such as bighorn sheep and trumpeter swans, have been affected by development activities on or near critical habitats.

3. Fish, especially cutthroat trout, are food sources for many species in the CVR, and play a critical role in the health of the ecosystem.

4. Grizzly bears are important as indicators of the health of the Yellowstone ecosystem, because:
   a. Areas of prime importance to grizzlies are also important to other species (e.g., eagles, trumpeter swans, elk, fish, etc.).
   b. Grizzlies are sensitive to human intrusions; and
   c. Grizzlies often die in human-bear encounters, these deaths are concentrated in certain areas.

5. Forest service and Park service lands are currently divided into grizzly bear management situations, or zones. These management situations do not accurately reflect important grizzly habitat and use.

PHYSICAL FEATURES

The geology (elevation and landform) and hydrology of the Yellowstone area distinguish it from the surrounding countryside. These features help determine the plant and animal communities which can develop, and thus aid in defining the limits of an ecosystem.

Genetics

The Yellowstone area is an identifiable land form, distinct from the surrounding area. It is characterized by a high plateau composed of old lava flows (with average elevation of 8000 feet), centered in Y. Yellowstone National Park. The plateau is virtually surrounded by several high mountain ranges. [See Map 1.1 Grand Teton Peak in Grand Teton NP is the highest mountain in the area, at 11,746 feet, but more than 40 peaks in and around Yellowstone NP exceed 10,000 feet.] The area surrounding the CVR is dominated by lower elevation plains within 3000 feet in elevation, dotted with hills and low mountains. The area is, in effect, an island of mountains in the dry plains of the west.

The three principal geologic provinces from the foundation of this ecological island: the Yellowstone Volcanic Plateau, the Overthrust Belt, and the Northern Rocky Mountain Province. Most of Yellowstone NP and the area southwest of the Park contain volcanic rocks, with calderas (volcanically formed basins) in the Park and near Island Park Reservoir: the geothermal resources of the Yellowstone Volcanic Plateau are related to the geologically recent volcanic activity. The Overthrust Belt, along the Idaho-Wyoming border, is characterized by many thrust faults running from northwest to southeast in the southern half of the CVR. These thrust faults have created structural traps for hydrocarbons. The Northern Rocky Mountain Province, to the east and north of the volcanic plateau, is characterized by mountain ranges of volcanic or Precambrian rocks, separated by river valleys. These three geologic provinces are distinct from the bedrock of the surrounding plains.

Two high mountainous ridges extend from the Yellowstone area— the Wind River Range to the southeast and the Salt River and Wyming Range to the south. These ranges are geographically similar to the mountains surrounding the volcanic plateau of Yellowstone National Park. Some descriptions of the Greater Yellowstone Ecosystem exclude the eastern lands of these ranges, but their geology distinguishes them from the surrounding plains and they historically had elks and fawns similar to those found in Yellowstone NP.

Hydrology

The high plateau and mountains receive more than twice as much precipitation as the surrounding plains. Annual snowfall exceeds six feet (about six inches of precipitation) throughout most of the area.


5.5. Geological Survey response to Subcommittees' questions. Map of geologic features.
while the plains generally receive less than three feet of snow (about three inches of precipitation). Precipitation in the GYFR, including snowfall, averages more than 12 inches per year, while the surrounding plains average less than 16 inches of precipitation annually. The greater precipitation in the GYFR allows for substantially different plant and animal communities than can develop in the surrounding plains.

The high elevations and precipitation levels in the GYFR mean that the area contains the headwaters for several rivers: the Snake River, the Green River (which flows through Flaming Gorge to the Colorado River), and numerous tributaries of the Missouri River (most notably, the Yellowstone River). Because of the numerous rivers originating in the GYFR, the US National Weather Service maintains a dense hydrogeological network (consisting of numerous rain and stream gauges and river gauging stations) in the area. This also implies that activities which alter the hydrology of the GYFR can have effects far beyond the boundaries of the area.

The most famous features of Yellowstone are probably the geysers and hot springs. While other places also have geysers—notably Island and New Zealand—none can match the size, power, or number of geysers in Yellowstone National Park. The sources of groundwater for Yellowstone’s hydrothermal system is still under investigation. The U.S. Geological Survey has reported a similarity between the waters in the Yellowstone hydrothermal system and rainwater (collected in surface water and cold springs) in the Gallatin Mountains, suggesting that recharge for the Yellowstone hydrothermal system comes from the mountains to the north and northeast of the Park.

Finally, Red Rock Lakes are an important hydrologic feature of the GYFR. These lakes are located about 50 miles west of Yellowstone N.P. near the Continental Divide. Although not in the central plateau or the surrounding mountains, their warm springs may be linked to Yellowstone’s hydrothermal system and the other active areas by the animal communities that help define the ecosystem. 

Finally, Red Rock Lakes are an important hydrologic feature of the GYFR. These lakes are located about 50 miles west of Yellowstone N.P. near the Continental Divide. Although not in the central plateau or the surrounding mountains, their warm springs may be linked to Yellowstone’s hydrothermal system and the other active areas by the animal communities that help define the ecosystem.

The higher elevation and greater precipitation of the GYFR cause its vegetation to differ from the saguaro and grasses of the surrounding plains. The GYFR is heavily forested, but there are numerous meadows and open creek bottoms, and saguaro flats in the central plateau.

FORESTS

Commercial timberland (as defined as forest land which includes producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation) on non-Federal lands, most National Wildlife Refuge lands, and all Federal wilderness areas are excluded from commercial timbering. The only exceptions to this exclusion are areas which may now be harvested. All National Park lands, most National Wildlife Refuge lands, and all Federal wilderness areas are excluded from commercial timbering. Therefore, laws prohibiting harvest in these areas. Thus, harvesting is prohibited on nearly seven million acres in the area where are available for at least half of the Federal lands in the GYFR.

Table 3 shows the 1.76 million acres of commercial timberland in the GYFR (see also Figure 2, p. 14), this is 17.5 percent of the National Forest land in the area. Wilderness and wilderness study areas (WSSA), where timber harvesting is prohibited, account for 4.26 million acres (42 percent) of the National Forest lands in the GYFR. The remaining 60 percent of National Forest land in the GYFR is excluded from commercial timbering for various, unspecified reasons and very little information exists on the vegetation of these areas (The RM also manages commercial timberland in the GYFR although the acreage and location are not known). The commercial timberland is heavily stocked in the Targhee National Forest (91%). This can be explained partly by the amount of wilderness north, east, and south of Yellowstone National Park (as shown in Map 8), but 77 percent of the non-wilderness lands in the Targhee have been identified as commercial timberland, while less than 20 percent of non-wilderness lands in the other National forests in the GYFR are considered commercial timberland.

Lodgepole pine dominates the forested area, accounting for more than half of the commercial timberland in the GYFR (as shown in Table 4 and Figure 3). The other major timber types include Engelmann spruce/subalpine fir, and aspen. See Effects of Other Uses on Timber Harvesting, p. 48, for a further description of the effects of timber harvesting on wildlife.)

10Commercial timberland (as defined as forest land which includes producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation) on non-Federal lands, most National Wildlife Refuge lands, and all Federal wilderness areas are excluded from commercial timbering. The only exceptions to this exclusion are areas which may now be harvested. All National Park lands, most National Wildlife Refuge lands, and all Federal wilderness areas are excluded from commercial timbering. Therefore, laws prohibiting harvest in these areas. Thus, harvesting is prohibited on nearly seven million acres in the area where are available for at least half of the Federal lands in the GYFR.
### Table 3: Commercial Timberland by National Forest

<table>
<thead>
<tr>
<th>National Forest</th>
<th>Wilderness &amp; VHA</th>
<th>Commercial Thieland</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Acreage</td>
<td>Acreage % of NF</td>
</tr>
<tr>
<td>Beaverhead NF</td>
<td>416.5</td>
<td>48.2 11.0%</td>
</tr>
<tr>
<td>Gallatin NF</td>
<td>3,160.0</td>
<td>32.9 17.4%</td>
</tr>
<tr>
<td>Custer NF</td>
<td>519.0</td>
<td>42.0 11.9%</td>
</tr>
<tr>
<td>Shoshone NF</td>
<td>2,433.0</td>
<td>33.1 3.1%</td>
</tr>
<tr>
<td>Bridger-Teton NF</td>
<td>6,600.0</td>
<td>136.2 37.9%</td>
</tr>
<tr>
<td>Caribou NF</td>
<td>162.0</td>
<td>0.0 0.0%</td>
</tr>
<tr>
<td>Targhee NF</td>
<td>1,180.0</td>
<td>902.8 65.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10,070.7</td>
<td>4,280.0 17.3%</td>
</tr>
</tbody>
</table>

### Table 4: Commercial Timberland by timber type

<table>
<thead>
<tr>
<th>National Forest</th>
<th>Lodgepole Douglas Spruce/Pine</th>
<th>Fir</th>
<th>Fir</th>
<th>Aspen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Commercial Acreage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beaverhead NF</td>
<td>48.2 17.4%</td>
<td>12.7</td>
<td>1.0</td>
<td>8.7</td>
</tr>
<tr>
<td>Gallatin NF</td>
<td>261.9 19.0%</td>
<td>18.0</td>
<td>7.4</td>
<td>1.2</td>
</tr>
<tr>
<td>Custer NF</td>
<td>42.0 17.4%</td>
<td>8.6</td>
<td>0.0</td>
<td>**</td>
</tr>
<tr>
<td>Shoshone NF</td>
<td>85.1 14.4%</td>
<td>5.0</td>
<td>9.4</td>
<td>11.4</td>
</tr>
<tr>
<td>Bridger-Teton NF</td>
<td>231.9 13.2%</td>
<td>15.6</td>
<td>5.9</td>
<td>18.2</td>
</tr>
<tr>
<td>Caribou NF</td>
<td>166.9 9.1%</td>
<td>21.4</td>
<td>18.0</td>
<td>12.8</td>
</tr>
<tr>
<td>Targhee NF</td>
<td>902.8 51.2%</td>
<td>89.7</td>
<td>3.2</td>
<td>9.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,761.2 1,002.2 462.8 1,122.3 214.0</td>
<td>56.9</td>
<td>26.2</td>
<td>7.7</td>
</tr>
</tbody>
</table>

### Figure 2: Commercial Timberland by National Forest

- **Caribou NF**
- **Bridger-Teton NF**
- **Shoshone NF**
- **Custer NF**
- **Gallatin NF**
- **Targhee NF**
- **Beaverhead NF**

### Figure 3: Commercial Timberland by Timber Type

- **Lodgepole Pine**
- **Douglas-fir**
- **Spruce/Fir**
- **Aspen**
Lodgepole Pine

The U.S. contains the largest contiguous expanse of lodgepole pine (Pinus contorta) in the United States. Lodgepole pine typically grows in extensive overstory stands interspersed with few other tree species, because its life cycle is linked to insect-caused mortality and severe wildfires which kill off other species in a wide area. The mountain pine beetle is a native insect throughout the western United States. It survives at low population levels until the lodgepole pine reaches a certain age, when beetle populations expand rapidly, killing the host trees in northeastern Oregon. Beetle epidemics are biologically restricted to stands of lodgepole pine, greater than 14 inches in diameter (generally 140 or more years old) [1]. See Map 2 for locations of heavy insect infestations in the U.S. The trees killed by the beetles increase the available fuel, eventually contributing to devastating wildfires. However, throughout most of its range, lodgepole pine has adapted to wildfires by developing rotten cones; the cones generally remain closed until the heat of a fire releases the seeds. Thus, the configurations lead to regeneration of the lodgepole stands. Lodgepole pine can regenerate naturally without fire, because some seeds are released without the heat of a wildfire. The leaf-and-fire cycle causes a natural rotation (i.e., age when trees die of natural causes) of about 150 years for lodgepole pine in the U.S. More than a million acres of federal commercial timberlands in the U.S. contain lodgepole pine, accounting for 57 percent of the National Forest timberland in the U.S. Nearly half of this is in the Targhee NF, with the Gallatin and Bridger Teton Forests accounting for substantial portions. Nearly two-thirds of the lodgepole pine stands exceed the standard harvest age on the National Forests (90 years). On 16 percent of the salvage has trees over 160 years old. More than 75 percent of the lodgepole stands on the Bridger-Teton are over 140 years old. Thus, many areas are approaching the natural rotation age for lodgepole pine, with increasing risks from insects and from wildfire.

Douglas-fir

The lodgepole pine stands are interspersed with stands of Douglas-fir (Pseudotsuga menziesii) and whitebark pine (Pinus albicaulis), particularly at the lower elevations. Douglas-fir also typically grows in even-aged stands, particularly in the Columbia river basin, although they have scattered stand infestations of western spruce budworm and of Douglas-fir beetle. Douglaserfic is also a naturally occurring species throughout the range of lodgepole pine, generally exceeding 200 years in the U.S. Douglas-fir stands are also even-aged, because they are often affected by the


2Idaho Department of Fish and Game response to Subcommittee's questions. p 2
The spruce/fir forests occur on less than eight percent of the commercial timberland in the GCR. This timber type is most common on the Bridger-Teton and Shoshone Forests. Nearly 20 percent of the spruce/fir forests (all on the Shoshone SF) are sufficiently varied to be classified as uneven-aged forests. Most of the remainder (an additional 66 percent of the spruce/fir acreage) is more than 140 years of age, and thus approaching (albeit slowly) the natural rotation for the timber type.

**ANIMALS**

In addition to the conflicts described above, aspen (Populus tremuloides) is scattered throughout the area, and accounts for significant timberland acreage in the Targhee and Cuyahoga National Forests. Despite the substantial acreage of aspen timberland, aspen is not harvested commercially in the GCR. A variety of diseases limit the life-span of aspen, and the natural rotation is only about 75 years in the GCR.

**Habitat**

The status and well-being of the animals of the Yellowstone area have been at the heart of many of the concerns about this area. The area's many jurisdictional boundaries do not limit the range of bears, fish, whooping cranes, elk, and other animals. Coordinating the management of these species requires not only exceptional cooperation among its many responsible agencies, but also detailed knowledge of the animals' resource needs and movements. The animals' needs may be at odds with the legal mandates or preferred policies of the agencies, or their accommodations may result in substantial modification of the normal means used to achieve the desired goals. Moreover, successfully coordinating management may be easier for some species than for others.

Not only is there a problem in preventing the extinction or local loss of species; there is an equally serious problem in preventing introduction of non-native species which may damage or destroy vital, delicate, symbiotic, or even systems. For example, one needs only look no farther than Olympic National Park (ONP). At ONP, introduced mountain goats are destroying delicate alpine plant life which (due to long isolation from large grazing mammals) has never evolved -- or has lost -- adaptations that permit the species to survive. While deliberate introduction of non-native species by management professionals is now relatively rare, the water Yellowstone ecosystem, with its high visitation rate, is still vulnerable to accidental introductions, or deliberate introductions by irresponsible individuals. From gypsy moth to cockroach to mountain goats, the ecosystem's plants and animals are surrounded by potential invaders. An example of an invasion that was nearly successful will be discussed under Non-Native Species under Recreation (p. 102).

The ecology of each species in an ecosystem is tied to that of every other species in the ecosystem. Actions affecting one may have an unpredictable affect on many other species, as is seen easily in the reports of the introduction of house cats to remote islands or rabbits to Australia or of the loss of Atlantic salmon to the eastern United States. Species strongly dependent on one or a very few food items may be wiped out if that food disappears, but species dependent on a wide range of resources may be able to shift, at least for a time, to other resources.

When too many of these alternative resources are destroyed, the ecolife species may also be lost. Many of the controversial species in the GCR are ecologically in their food choices: grizzlies, bald eagles, and peregrine falcons. In these cases, food shifting may temporarily correct losses of habitat or to protect resources themselves become depleted. Other species (whooping cranes, trumpeter swans) may also take many foods, but only in a restricted habitat. Only preventing the loss of this habitat can ensure the preservation of these species.

Habitat fragmentation -- the separability of usable habitat into disjoint units -- can be a particularly acute problem for a wide-ranging species like the grizzly. Timber activities could inhibit grizzly access from Yellowstone Park to surrounding heavily used habitat. There may be travel corridors of forest cover and limited human intrusion linking areas heavily used by bears. These connecting links may therefore have an important proportion to the number of bears in them at any given time. Breaks in these travel corridors could reduce or eliminate grizzly use of important habitat by removing the cover that allows free grizzly bear movement. At this point, not enough is known about specific requirements of grizzly bears to identify methods of modifying timber management and other development activities to provide adequate cover.

Forest Service consideration of local fauna in land management planning relies on the concept of "indicator species." At each Forest, managers select well-known and/or low-elevated animals as indicator species because "their population changes are believed to indicate the effects of management activities.13" Indicators may be selected "because their population changes are believed to indicate the effects of management activities on several species of selected major biological communities or on water quality.14" All species listed under the Endangered Species Act are required to be treated as indicator species by the Forest Service. Once the Forest Service has chosen a species as an indicator, the agency must take various specific steps to consider the well-being of the species in management planning.

\[13\] 36 C.F.R. 219.19 (a)(1)

\[14\] 36 C.F.R. 219.19 (a)(1)
The grizzly bear, *Ursus arctos horribilis*, listed as a threatened species in the lower 48 states, is now found in all of the seven National Forests in the CCF, except for those in California, and is an indicator for the other six. Because important grizzly habitat is frequently important habitat to other species as well, as shown below, its status as an indicator species is appropriate.

The grizzly bear and other species of mammals, birds, and fish which have been the focus of special controversy or attention are discussed below. Sometimes called "charismatic megafauna," the discussion below is grouped taxonomically, beginning with grizzly bears. . . by far the most controversial species in the CCF. In each case, the habits, range, and populations are discussed, with emphasis on how each species is or might be affected by human activities or management decisions.

Grizzly Bears

Habits

Grizzly bears (*Ursus arctos horribilis*) are the largest terrestrial carnivores in the contiguous United States, but their diet is more appropriately called omnivorous, since it includes a wide variety of plants. In the spring, bears typically feast on the carrion of elk, deer, and other animals which died and whose decomposition was slowed by the area's harsh winter. Small rodents, active in the remains of their winter tunnels, are caught by bears. Grizzlies will also attack elk and moose when these animals are still weak from winter's effects. An occasional bear of elk raf is eaten, and bears congregate at streams in the spring to catch the spawning cutthroat trout. These various protein resources are particularly important for the female bear as her cubs are born months before she leaves her hibernation. The growing cubs and weaning bears are also dependent on these foods. Later in the summer, bears shift to plant matter, such as seeds, clover, glacier lilies, tubers, berries and other plants.

Population Levels

Under the Endangered Species Act, grizzlies are listed as threatened in the contiguous United States, with only six populations threatened. As a management species in the CCF, it is one of the largest. Estimating population size has been

13This section covers grizzly bears, rather than black bears (*Ursus americanus*). Black bears are seen far more frequently than grizzlies in Yellowstone, although the black bear population is also declining. However, black bears are not endangered, are more tolerant of human developments, and rarely threaten human lives; thus, studies of their populations appear less critical to understanding the effects of activities on the ecosystem.


the nut caches of squirrels. They also eat the insects in rotten logs or underneath animal dung.

Grizzlies feed during much of the night and particularly at dawn and dusk. During the day, bears rest in thick groves of trees where they construct a shallow daily bed. While visiting a special foraging area such as a field of strawberries, they retreat to nearby islands of trees during the day.

Among the behaviors that are of special interest in terms of forest management needs are the bears' use of cover in forested areas, but there is surprisingly little information on this subject. An analysis of their behavior while in such areas is logistically difficult for several reasons. First, it would be difficult to find a bear in such an area unless the bear is radio-collared. Second, bears are often gregarious during their daily rest periods, and observations of a known bear could put the investigator in danger from unknown bears. Third, the presence of an observer close enough to monitor a bear's behavior in dense cover could make the bear aware of the observer and lead to modification of the bear's activities or to danger of attacking aggressive behavior from the bear.

During the fall, bears begin searching for suitable denning sites for winter hibernation. These sites are typically at elevations between 7000 and 7000 feet, very isolated from human disturbance, in timbered areas, with an entrance facing north. The northern exposure allows snow to drift over the entrance, providing further isolation for the den. Bears typically dig their dens at the bases of trees, rather than adapting some natural chamber. dens are not reused, but the general site often is. According to one study, bears in the CCF enter their dens each year between October 25 and November 21, with early winters leading to early denning. bears often dig their dens days to weeks in advance but wait for an approaching snowstorm to enter the den: a behavior that guarantees that their tracks will be covered by falling snow, and may reduce the risk of being found by predators.
controversial ever since a 1960s decision by the National Park Service to reduce the access of bears to open garbage pits. At the time, some authorities argued that the closure of garbage pits was desirable in order to discourage "not all concentrations of bears around these food sources, and to return the bears to a more natural diet. Critics charged that such a sudden withdrawal of an important food source would seriously damage an already precarious population, and that closure, while desirable, should be done much more gradually.

When the number of counted bears dropped following the closure, a few observers claimed that the drop was merely an artifact of the more difficult counting methods that were now required, rather than a real decline in the population. Most authorities now agree that a drop in population did occur. Moreover, the average age of females at the time of their first litter has risen from five to six years, the average litter size has decreased, and the weights of some bears have decreased, all changes which are consistent with food stress. The controversy may never be resolved to everyone's satisfaction, particularly since the Park Service removed radio collars and ear tags from a large number of bears at the time of the drop-closings. Since that time, many additional bears have been radio-collared and tagged, and aerial counts have been taken, and reports on the details of each sighting of a grizzly are made to managers. The population now shows a long term decline of 1.7 percent per year.

Recovery

The number of reproductively active females generally defines the rate of growth that is possible for any population. In the case of grizzlies, whose females produce cubs only once every two or three years, "the adult females constitute the crucial component of the population, inasmuch as the difference between a 'recovering' population, and one sliding toward extinction, presently amounts to the loss of one or two adult females per year," since there were only 32 female bears of reproductive age were estimated to be in the population as of 1984. The saving of even one adult female each year "is roughly equivalent to (increasing) the litter size from the

22Knights and Eberhardt, Population Dynamics, p. 131
23Knights and Eberhardt, Population Dynamics, p. 131-132
24Knights and Eberhardt, Population Dynamics, p. 126-127

present value to that prevailing when the garbage dumps were available as a supplementary food supply."

As bears approach areas of human concentration, they increase their risk of conflict and the associated risk of death, whether from illegal hunters or straying kills, legal management control actions, road kills, self-defense actions. Therefore, a crucial factor is the issue of recovery is the tendency of the bears to wandered. Bears have a tendency to use an area repeatedly when a favored food source is available. Bears learn from their mothers and from their own experience when a particular root, berry, or seed is available, and return at the approximate time of year in a site where food has been found in the past. Use of a particular meadow, stream, or grove of trees might therefore be very tenacious, but limited to only a small part of the year.

A given bear might, in any single year, visit only certain parts of the Park system or wilderness areas. But over the course of several years, the bear is likely to wander over a far larger area, thus virtually guaranteeing that it will leave lands afforded the greatest federal protection. In addition to the normal wandering shown by bears, there is an increase in wandering during dry years, when important food supplies are reduced. These worst-case years of high wandering, and accompanying risk of bear mortalities, can be predicted in the short term on the basis of rainfall patterns.

Some parts of the GGV might be called "black holes" for bears, due to their concentrations of bear mortalities. Map 3 shows these "black holes" are around towns, second home and resort developments, relatively undeveloped roadless areas, and at heavily developed campsites. Surprisingly, the U.S. Fish and Wildlife Service did "not have the specific localities for each of the mortalities through the years." Data from the State of Wyoming concerning deaths in the entire GGV show that over the past decade, more than half the grizzly deaths were illegal kills. (See Table 3.)

22Knights and Eberhardt, Population Dynamics, p. 131
23Pictor et al., Climate, Carrying Capacity, and the Yellowstone Grizzly Bear, p. 134
24The term "astromy, a "black hole" is a "hypothetical celestial body with small diameter and intense gravitational field... having its characteristics is an intense attraction for matter, which, once the matter comes within the black hole's vicinity... is unable to escape the area. (Source: Webster's New Collegiate Dictionary, Springfield, Mass. C. Merriam Co., 1975, p. 111.)
25S. Fish and Wildlife Service (FWS) response to Subcommittees' questions, p. 11.
TABLE 5  Mortality Causes for 112 Grizzly Bear Deaths in the Yellowstone Area From 1970-1985

<table>
<thead>
<tr>
<th>Mortality Cause</th>
<th>Number Recorded</th>
<th>% of Mortalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
<td>18</td>
<td>16.1</td>
</tr>
<tr>
<td>Management Control</td>
<td>18</td>
<td>16.0</td>
</tr>
<tr>
<td>- search/Management Acc</td>
<td>6</td>
<td>5.4</td>
</tr>
<tr>
<td>- ed Kill</td>
<td>5</td>
<td>4.5</td>
</tr>
<tr>
<td>Self Defense</td>
<td>2</td>
<td>1.8</td>
</tr>
<tr>
<td>Illegal</td>
<td>60</td>
<td>53.5</td>
</tr>
<tr>
<td>Unknown</td>
<td>3</td>
<td>2.2</td>
</tr>
<tr>
<td>Total</td>
<td>112</td>
<td>100.0</td>
</tr>
</tbody>
</table>

In Table 5, "Management Control" refers to the deliberate killing or removal of bears from the ecosystem (Wyoming included removed bears since, from the standpoint of the recovery of the bear population, removed bears are equivalent to dead bears.) "Research/Management Accident" includes bears which might die during attempts to put collars or tags on them or which are killed when, say, being moved to a more remote area.

With rare exceptions, grizzly bears are now found only in Yellowstone National Park and its immediate surroundings. The areas used most heavily by the bears are shown in Figure 6. This map is based on the best data available since 1970, using observations by experienced individuals and airplane sightings. The authors made every attempt to avoid biases created by the presence of an observer, and to have the map on bear density alone.

In the mid-1970s the Fish and Wildlife Service proposed critical habitat for this population of bears under the requirements of the Endangered Species Act (16 U.S.C. 1532). The proposal was withdrawn, in favor of a system of "situations" or zones of management. The regulations designating these situations (designated as Management Situations 1 to V or MS-1 through MS-V) specify the level of consideration that will be given to the bears' requirements within those zones, with MS-1 being the most restrictive of activities that conflict with the bears' needs. (These Management Situations are described in Table 6, p. 75.) The Forest Supervisors and National Park Superintendents are charged with deciding the locations of the situation boundaries in their jurisdictions. 19

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FIGURE 6  Distribution of Sightings of Unmarked Grizzly Bears, 1970-1981
Cross-hatching indicates areas of highest use; slanted lines mean high density; solid lines delineate areas where sightings are common, while the dashed lines indicate areas of occasional sightings. The outer rectangular dashed line is used as "bear range" by various agencies. Based on Knight and Eberhardt's Figure 1, provided by R. R. Knight.
MANAGEMENT SITUATION I

Population and habitat conditions. The area contains grizzly population centers (areas key to the survival of grizzlies where seasonal or year-round grizzly activity, under natural, free-ranging conditions is common) and habitat components needed for the survival and recovery of the species or a segment of its population. The probability is very great that major federal activities or programs may affect those direct or indirect relationships to the conservation and recovery of the grizzly.

Management direction. Grizzly habitat maintenance and improvement (improvement applies to Forest Service only), and grizzly-human conflict minimization will receive the highest management priority. Management decisions will favor the needs of the grizzly bear when grizzly habitat and other land use values compete. Land uses which can affect grizzlies and/or their habitat will be made compatible with grizzly needs or such uses will be discontinued or eliminated. Grizzly human conflicts will be resolved in favor of the grizzlies unless the bear involved is determined to be a nuisance. Nuisance bears may be controlled through either relocation or removal but only if such control would result in a net, natural free-ranging grizzly population and all reasonable measures have been taken to protect the bear and/or its habitat (including area closures and/or activity curtailments).

MANAGEMENT SITUATION II

Population and habitat conditions. The area lacks distinct grizzly population centers; highly suitable habitat does not generally occur, although some grizzly habitat components exist and grizzlies may be present occasionally. By definition, management situation II areas are those considered unnecessary for species survival and recovery, although the status of such areas is subject to review and change according to policy and other uses. When grizzly population and/or grizzly habitat use and other land use needs are mutually exclusive, the other land use needs will prevail in management considerations. If grizzly population and/or habitat use represents demonstrated needs that are so great (necessary to the survival of the species or a segment of its population) that they should prevail in management considerations, these areas should be reclassified under Management Situation I. Nuisance grizzlies will be controlled.

MANAGEMENT SITUATION III

Population and habitat conditions. Grizzly presence is possible but infrequent, such as developments, such as campgrounds, resorts or other high human-associated facilities, and human presence result in conditions which make grizzly presence undesirable for humans and/or grizzlies. There is a high probability that major Federal activities or programs may affect the species' conservation and recovery.

Management direction. Grizzly habitat maintenance and improvement are not management considerations. Grizzly-human conflict minimization is a high priority management consideration. Grizzly bear presence and factors contributing to their presence will be actively discouraged. Any grizzly involved in a grizzly-human conflict will be controlled. Any grizzly frequenting an area will be controlled.

MANAGEMENT SITUATION IV

Population and habitat conditions. Grizzlies occur in isolated units and habitat and human conditions make the area potentially suitable for grizzly occupancy, and the area is needed for the survival and recovery of the species. The probability is very great that major Federal activities and programs may affect the species' conservation and recovery.

Management direction. The grizzly bears have no significant potential use on [here the area. Grizzly habitat maintenance and improvement or important management considerations. Grizzly-human conflict minimization is not a management consideration. Grizzly-human conflict is ongoing; the area is not suitable for grizzly occupancy. Management decisions regarding reestablishment of grizzlies.
Population and habitat conditions. Craters do not occur, or occur only rarely in the area. Habitat may be unsuitable, unavailable, or suitable and available but unoccupied. The area lacks survival and recovery values for the species or old values are unknown. Major federal activities and programs probably will not affect species conservation and recovery.

Few, if any, activities are prohibited on the strength of these regulations alone, but the regulations may require that certain activities be slowed, modified, or restricted in various ways. In many cases, zone boundaries in National Forests coincide with, or are similar to, wilderness boundaries, in the Shoshone, for example, the MS-II lines are identical to wilderness boundaries for considerable distances, even where these boundaries are straight lines (Compare Maps 1 and 8). Even now, there appear to be substantial discrepancies between the boundaries of the situation areas as given by the Forest Service and by the U.S. Fish and Wildlife Service.

The differences between the Situation maps (Map 1 and Figure 4) can be important, especially if the Situation I, II, and III areas are misinterpreted as meeting areas of high, medium, and low bear use or density. These areas illustrate the problem. The area north of Yellowstone Park is considered by Knight and Dashford to be of the highest density of bear use. To much of this area, where visitor use is extremely high, is considered Situation II by the National Park Service, a fact which suggests that Situation maps are not bear density maps. In fact, the bear densities and the level of bear deaths and removals that occur in the area around Fishing Bridge would appear to contradict the definition of "Population and

For example, several timber sales have been proposed in MS-I areas in various National Forests. See "Effects on fish and wildlife" under "Timber Harvesting" for more details. Livestock grazing occurs in MS-I areas as well.

Thus, without more data, one cannot predict the effect of predator control on the wolf population. The concept of "management" situations may overly narrow the ability to alter the current situation. Lastly, the analysis of factors affecting wolf mortality, see Grizzly Bear Management Situation I, indicates that one agency consistently drawing larger boundaries than the other was evident.

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habitats (Figure 13: Diagrams 5 and 6) are a special case in the analysis of the Forests of the Greater Yellowstone Ecosystem in the early part of this century. In 1911, the Military Administration of Wyoming (called for the removal of wolves as a way of protecting prey species such as elk, deer, mule deer, and other herds. The Yellowstone passed into the civilian hands of the newly created National Park Service a few years later, the wolf killing continued, and the wolf population was essentially wiped out in the next few decades, although sporadic sightings of one or two wolves continued for many more years.

John Weaver, a biologist for the Forest Service, noted the huge populations of large ungulates\(12\) in the Yellowstone area, stating "To have a large population of ungulates without such a predator (wolves) in the system is unnatural."

You're missing a primary component of the whole system."

The effect of predators on their prey populations is currently one of the more significant topics in theoretical population biology. In the wolf-ungulate interaction of Greater Yellowstone, two species seem possible. First, kills by wolves could be added on top of current mortality, and total mortality of ungulates could increase, causing prey population growth to slow or stop. Second, at the other extreme, all prey taken by wolves might not be killed by wolves, which would reduce the wolf population and cause prey population growth to increase. Furthermore, some intermediate level between these extremes is also possible. Thus, it is not clear how many wolves are in Yellowstone and what their ultimate effect would be on the wolf population. The wolf population is a complex system, and it is not clear if there is one "correct" level of wolf population density that would be most advantageous to both the wolf and the elk.

13An ungulate is any mammal having hooves. In the GYE, this includes such species as elk, deer, moose, pronghorn antelope, and mountain sheep.

14Footnote: Return of the Native (by Christopher Cave) National Parks, v. 46, no. 7-8 (July/August 1986): 24.
ecosystems, particularly if the large ungulates are migratory and are also the most abundant of several alternative prey 7 3. Théberge and Gaucher have provided a recent summary of studies of wolves and their effects on prey populations. Of eighteen studies they reviewed, seven concluded wolves were the major limiting factor on the ungulate prey, five concluded that the wolves were not, and six concluded that weather, forage, and human hunting confounded the predator-prey relationship 35.

Historical evidence may be instructive. Using such archeological and historic evidence, Houston 26 suggests that early wolf densities in the region were low in spite of large populations of ungulates. If so, the ungulate populations were more likely limited by the harsh winters than by predation. The extensive and historical recent scientific research on the ungulates of the Park area shows that wolves are only unique, testing ground for such theories if wolves are reintroduced. Scientists are waiting to test predation/prey theories in the cold light of real observations at Yellowstone.

Bison

There are about 1000 bison (Bison bison) in Yellowstone National Park. 77 The majority of the population resides in Yellowstone National Park throughout the year. However, three to five percent of the bison use the areas adjacent to Yellowstone National Park during part of the year, particularly in winter. The principal conflict from this "leakage" of this slowly growing population is with livestock grazing, particularly because bison carry brucellosis, a disease which attacks cattle, sheep, goats, pigs, and certain other domestic animals. The disease can be abortion, stillbirth, birth of sick young, and infertility. Transmission occurs through contact with fetal membranes and fluids. However, since the bulk of the herd remains in the Park, conflicts regarding disease or other problems have been rare. The Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture notes that the only uncontrolled source of brucellosis in the area is from the herds of bison and elk centering in the Park. 38. However, APHIS considers

...
slightly more likely than bison to spread brucellosis during these migrations (if only because there are 15 times as many elk); it is not clear why the elk have been relatively untouched by the brucellosis controversy.

During the fall migrations to the lowlands, sport hunters (in many of the jurisdictions around the National Parks, especially the National Forests) are the primary cause of elk mortality. But now that the ecosystem lacks one of the elk's previous major predators (wolves), bears have become second to humans as a major predator on the herd. However, the bears' kills are opportunistic, and occur chiefly in the spring. Bears, just emerging from hibernation, attack any weak and starving elk that have barely survived the winter. Bears may also attack elk foraging in deep snow or resting on the ground. Bears do not generally attack elk during the summer when other food sources are readily available, although they will readily feed on elk carcasses, should they find them at any time of year.4

Critical areas for elk include the small traditional calving grounds in which females return each year to give birth, as well as low elevation wintering areas. Roads constitute barriers to migration in that elk initially hesitate to cross them. Even after elk become accustomed to a particular road, increased hunter access may present a threat to those elk that use it.

Bald Eagles

The CCEB is home to a substantial portion of the bald eagles (Haliaeetus leucocephalus) inhabiting the Rocky Mountain states. Bald eagles are endangered throughout the CCEB, although their populations have risen substantially since use of the pesticide DDT was cancelled in 1972. There are now 55 nesting pairs in the area, including 12 pairs which nest in Yellowstone National Park. The areas used most often by the birds are shown in Map 4. The local population growth of the last 15 years is largely attributed to only six pairs nesting along unusually rich rivers and streams south of Yellowstone National Park.42

Fish constitute a major portion of the bald eagles' diet. In fact, the presence of open water in early spring within three miles of a nest site is a major distinguishing feature of bald eagle nest sites in the CCEB.43 Prey species include trout and Utah suckers. Spring

42Craighead, Track of the Grizzly, p 147.
43Personal communication with Robert Oakley, Wyoming Fish and Game Department, October 4, 1983.
45Swanson, et al., Ecology of Bald Eagles of the CCEB, p 15-18.
46The CCEB Bald Eagle Working Team (made up of representatives from the three States, the three forest Service regions, the Fish and Wildlife Service region, one National Park Service region, and the Idaho State Director of the Bureau of Land Management) has divided the area into three population zones, the Yellowstone Unit, the Snake Unit, and the Continental Unit. (See Figure 5.) In the Yellowstone Unit, the team found that 35% of the factories limiting suitable habitat are natural wildfires and increased human use. Two bald eagle nests have been abandoned near Fishing Bridge and Giant Village on Yellowstone Lake due to human developments. Human impact is reduced.
by travel restrictions due to spring snow depth and by the late (July 15) opening of the fishing season on Yellowstone Lake.

Little winter food is available for eagles in the Yellowstone Unit, and the majority of both adults and immatures leave the area during winter. Many of these birds move to the other two units, but some winter in the Pacific Northwest. 48

Productivity (fledged young per occupied nest) is significantly lower in the Yellowstone National Park Unit than in the other two. However, the differences in productivity between this and the other two populations are insignificant up through hatching. 49 The difference must occur during the period the young occupy the nest. The fact that the Yellowstone Unit population continues at current levels is due in part to immigration of eagles from the other two units, which are more productive areas. 50

The Snake River Unit, according to the Team, has ample prey of many species, with open cutthroat trout being particularly important in the spring. This Unit experiences a net increase of adult eagles during winter. It should be noted that the Team's Snake River Unit extended well beyond the boundaries of the CCUM (compare Figure 3 and Figure 1), and the Team commented on the critical importance of the lower portion of the Snake (outside of the CCUM, apparently) to a variety of animals and plants. The Team noted that habitat change in the area, including associated degradation of the fisheries, had occurred as a result of regulation of the Snake River flow. Year-round recreational activity (rafting, fishing, boating, etc.) also disrupts the eagles' habitat along the Snake River.

The Continental Unit includes the upper portion of the Henry's Fork, Red Rock Lakes National Wildlife Refuge (KLENNR), Hebgen Lake, and the Madison River, all in the CCUM. The Henry's Fork and several of its tributaries remain open throughout the winter due to geothermally warmed water in the area. Disturbance by boaters, housing developments, loss of trees due to insects, and timber management to control insect infestations are the chief disruptions of eagle habitat in the Idaho portion of this area. In the Montana portion of the Continental Unit, nesting areas are mainly in Douglas-fir habitat near large bodies of water. Sources of habitat loss in this area are housing development, intrusion by fishermen, recreation development, and timber management.

48Swanson, et al., Ecology of Bald Eagles of the CCUM, p. 15-18
49Swanson, et al., Ecology of Bald Eagles of the CCUM, p. 28
50Swanson, et al., Ecology of Bald Eagles of the CCUM, p. 44
Peregrine Falcons

Peregrine falcons (Falco peregrinus) prey on domestic pigeons, ducks, herons, cranes, and many other birds. Occasionally, they will also take mammals and even insects. The species nests on cliffs and ledges, in the tops of trees, and the unoccupied nests of other species. Some nest sites are occupied for decades by succeeding pairs of falcons.15

Peregrine falcons were once nearly extinct in the United States due to the effects of pesticides. As pesticide use declined, captive breeding programs were begun. With reestablishment of the captive-bred falcons into unoccupied but suitable habitat, the species has staged a remarkable comeback, though it is still endangered in most of its range. No breeding pairs of peregrine falcons were located in Idaho, Montana, or Wyoming in 1981-1983.16

Peregrine falcon populations are now expanding in the COYV, though it is still listed as endangered in all parts of the COYV. A cooperative program of reintroduction sponsored by various federal agencies (including the National Park Service, the Forest Service, the Fish and Wildlife Service), the various States, and the Peregrine Fund (a private, non-profit organization) has been responsible for this improvement. By establishing young captive birds at "hacking sites" where they are artificially fed for a certain period, researchers hope to induce the falcons to return to the general area when they mature.

To date, 73 male and 74 female peregrines have been reintroduced under this program.5 Some of these birds have already successfully established nests, including the first known wild peregrine falcon nest in Montana in many years. Heinrich and his coworkers hope to establish 30 nesting pairs in Yellowstone National Park and its surroundings, with approximately 10 pairs in each State. They argue that the establishment of a self-sustaining population will require 50 birds (half males, half females) to be reintroduced each year through 1980. Recovery is also seen as many of the birds that are successfully

15Because of the risk of theft of peregrine eggs by illegal collectors, no data are presented in this report on locations of hacking sites.


Peregrine Falcon Reintroduction Proposal. p. 3. The total calculated from Figure 2 of the Proposal is 149 birds, although the text claims 156 birds have been reintroduced. The discrepancy is not explained in the paper.

reintroduced do not survive long enough to reproduce, and some may leave the area: one breeding pair is established for every 35 falcons released.17

At Red Rock Lakes, the use of lead shot by waterfowl hunters is now banned to reduce the risk to falcons (and eagles) of lead poisoning from feeding on injured birds. With the apparent progress on the reintroduction to the COYV of this species and the whopping crane, the Greater Yellowstone Ecosystem now lacks only one large vertebrate -- the wolf -- that it was known to have in historic times.

Trumpeter Swans

Trumpeter swans (Cygnus buccinator) are not now listed as endangered. During 1932, the species was thought to be very depleted, and the population in the Yellowstone area was only about 37 resident pairs.18 The species has recovered substantially since then, but the Yellowstone Ecosystem still represents crucial North American habitat for the species.19 In addition to breeding birds, there is an even larger number of overwintering swans. Their winter feeding depends upon the geothermal activity throughout the area which prevents many streams from freezing over, since the swans feed on submerged aquatic vegetation. (See Map A, showing both components of the population.)

There are 300-400 resident birds breeding on small ponds in and around Yellowstone National Park. The Refuge Lake area of the Gallatin National Forest, the Targhee National Forest near the southwest corner of Yellowstone National Park, as well as parts of the Bridger-Teton National Forest are other substantial resident trumpeter swan populations. However, the major source of trumpeter swans in the area is Red Rock Lakes. Parts of this area have been closed to unauthorized entry to protect the swans. Also, lead shot and lead sinkers are banned at the Refuge to prevent swans from ingesting them. Even so, the refuge officials noted "increasing reproductive difficulties" in recent years, which it attributed in part to cold, wet springs. The Refuge has built and distributed floating nest platforms around the refuge. The design of the nests prevents birds from falling into spring floods.20 Data were not supplied on how frequently the nests are used.

17Peregrine Falcon Reintroduction Proposal. p. 3.
19Personal communication with Ruth Gale, Biologist, Montana Cooperative Wildlife Research Unit. October 7, 1985.
20FW response to Subcommittees' questions. p. 15.
The larger component consists of overwintering birds, including about 95 percent of all the trumpeter swans breeding in Canada. The average number of wintering swans has grown from 516 (1970-1978) to 1640 in 1986. Overwintering swans rely not only on natural vegetation, but also on an artificial feeding program at Red Rock Lakes National Wildlife Refuge. Two small ponds at the east end of the refuge provide winter habitat for up to 300 swans.

The Fish and Wildlife Service stated that the wintering areas are "really the critical factor to the swans' success in the area. These wintering areas need a combination of open water throughout the winter and a supply of submerged aquatic vegetation for food to provide winter habitat. This habitat cannot be mitigated" (f. 59). It is in critical supply and any disturbance to these wintering areas critically affects the wintering population."55

Wandering Cranes

The Grays Lake National Wildlife Refuge (16,200 acres) is the site of an experimental use flock of wandering cranes (Grus americana), an endangered species which was reduced to a total population of only 2 birds in the 1960s. Map 4 shows use areas for the experimental flock in 1981-1985. These large, long-lived birds pair for life, and feed and nest in wetter areas or along lakeshores. The Grays Lake experimental population represents an ambitious attempt to ensure the survival of the species in the event that a hurricane or other disaster should strike the one remaining natural flock. It is still too early to determine whether this experiment will be successful in establishing a second flock of wandering cranes.

The "whoppers" at Grays Lake are being raised by sandhill cranes under the孵化 parents for whoping crane eggs that have been sub-stituted for their own. The sandhill cranes of the Grays Lake National Wildlife Refuge naturally use Yellowstone National Park and Red Rock Lakes National Wildlife Refuge, as well as other wetlands in the U.S. and their adaptive offspring have followed them into these areas. The first juvenile "whoper" saw in Yellowstone National Park in the summer of 1985 (See Map 4 for location of flock use.) With a current population of 30-50 whoping cranes in the Grays Lake

53State of Wyoming response to Subcommittees' questions.
55PWS response to Subcommittees' questions. p. 15.
56Personal communication with Wendt Brown, Research Biologist, University of Idaho, October 7, 1985.

61It seems likely that the whopper's use of the CGWR will increase as the birds' numbers increase.57

Fish: Salmonids

Salmonid fish (trout and whitefish) are at the heart of the ecosystem's attractiveness for many species, including humans. In the two National Parks, the main species caught are cutthroat, brown, rainbow, brook, and lake trout, as well as mountain whitefish. The Yellowstone cutthroat trout (Oncorhynchus clarkii clarkii), is a particularly important link in the ecosystem's food chain. This trout lives in the lake habitat, and each spring, adult fish move into the surrounding streams to spawn. Adult mortality during the spawning run is high, since cutthroat trout are an important source of food at this crucial spring period for many species of birds and mammals. Bears, just emerging from hibernation, are among the species' major predators. This timing of the spawning run is critical, since the spring period is when bears, especially females with young cubs, need protein. Certain rare or threatened species such as bald eagles, murrey, white pelicans, loons, and otters are also heavily dependent on the cutthroat trout.

Many fish species spend most of their lives in lakes and return to fast-flowing streams to spawn. Some species prefer to spawn in very fast-moving water while others build their nests in pools and shallow riffles. Stream spawners scroop out a shallow depression in the gravel, where the eggs are laid and fertilized. The eggs and very young fish remain in the nest, where the flowing water supplies oxygen necessary for them to survive. Eventually, they move downstream to lakes where they may spend several years before returning as adults to spawn. Initially, their food consists of small insects and other invertebrates, and later includes other fish.

The species which spawn in streams are dependent upon clear water with low sediment levels, cool temperatures, and high oxygen levels without too severe conditions. The eggs and young fish suffocate in the gravel nests. Activities which raise sedimentation or temperatures, or lower oxygen levels, could reduce or even destroy such fish populations.

61PWS response to Subcommittees' questions. p. 15-A.
62PWS response to Subcommittees' questions. p. 15-A.
DEVELOPMENT ACTIVITIES

This chapter addresses the economic consequences of various human development activities, as well as the interactions between these activities and the natural ecosystems and the possible conflicts among the activities. The activities examined include timber, harvesting, water developments, grazing, energy and mineral development, and recreation. The following conclusions can be drawn about these activities from the information provided to the Subcommittee:

1. Recreation is the major economic activity on the federal lands in the GCR. Followed by phosphate mining in the Caribou National Forest. In the National Forests, dispersed recreation (using primarily natural, scattered sites) accounts for more visitors, but has less impact on local jobs than developed recreation (using sites with Forest Service improvements).

2. The most important ecological impact of development activities in the GCR is human access, frequently requiring building and use of roads. However, access, per se, is determined by independent decisions concerning each resource specialty, rather than as an integrated issue which is broadly considered for cumulative effects on the ecosystem.

3. The existing data available to federal land managers is incomplete and inadequate, especially for recreation activities and for units of the National Park System.

4. The economic values used by the Forest Service for some activities (particularly recreation) appear to be essentially arbitrary, and management choices may be influenced by economic comparisons that do not reflect the relative importance of the activities.

OVERVIEW OF ECONOMIC IMPACTS

Numerous human activities in and around the GCR can affect the ecosystem. Certain actions, especially at certain times or in specific locations, may radically alter the natural ecosystem, and perhaps even jeopardize the long-run ecological stability of the area. At the same time, many humans depend on these natural resources, and several commodities depend on the area for their economic well-being. The human activities in the GCR include timber management, water developments, range management, energy and mineral development, recreation, and cultural and historic resource management. Before
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receipts are generated. The Forest Service reports only total payments for the National Forests, therefore, county payments associated with the COGR must be estimated to allocate total payments for forests and counties with National Forest lands both inside and outside the COGR. The estimated Forest Service county payments associated with the COGR averaged about $400,000 annually from 1967 through 1985. (The detailed procedures used to estimate these payments is presented in Appendix III.) The estimated payments exceeded $400,000 in 1985, and may be more typical, since 1982 and 1983 were particularly poor revenue years for the Forest Service.

In many circumstances, changes in Forest Service county payments would not affect total federal payments to a county because of the Payments in Lieu of Taxes Act (PILT). Under this Act, the U.S. generally pays counties $0.75 per acre for most types of federal land (including National Forests). However, PILT payments are exactly offset by Forest Service county payments. PILT payments cannot fall below a minimum of $0.75 per acre, but will be reduced from the standard $0.75 per acre by Forest Service payments. Forest Service payments from the COGR National Forests are low enough (the highest payments were $0.23 per acre from the Targhee NF in 1984) that changes are fully offset by corresponding changes in PILT payments to COGR counties. Thus, it seems likely that the COGR counties with National Forest land would be unaffected by any changes in Forest Service county payments.

**Timber Harvesting**

The following section describes the Federal timber sale program, the jobs which result, and the effects of timber harvesting on other resources. The major findings are:

1. Timber access roads are the most significant impact on the ecosystem, by affecting water quality and increasing human activities (both the timber harvesting and other forest visitors who use the roads).

2. Insect infestations of the timber are a major reason for harvesting in the COGR, and account for many, but not all, of the below-cost timber sales.

3. The seasonal timing of timber activities is important in assessing their impact on animals, but timing is typically ignored in determining the conditions for timber sales.

4. Cover ... dense stands of timber .... is important for many animals, especially grizzly bears, and activities that reduce timber stand density (such as chipping) can be harmful.

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**Federal Timber Management**

Both the Forest Service and the BLM sell timber from their lands in the COGR. Table 5 shows that more than 130 million board feet are harvested annually, with 99 percent of the total coming from the National forests. More than half of the total is harvested from the Targhee NF, where timber salvage sales account for 70 percent of the timber harvest. Overall, 60 percent of the timber harvested from the Federal lands in the COGR is from salvage sales.

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**Salvage Sales**

The majority of the timber harvested in the COGR is salvage of lodgepole pine infested with mountain pine beetles. These native insects have evolved a boom-and-bust cycle with lodgepole pine. The beetle populations reach epidemic proportions in salvage pine stands, killing the majority of the trees in the stand, wildlife then sweeps through the stand, opening the lodgepole’s suppressed cones to release the seeds and thereby regenerate the stand. Salvage timber harvesters attempt to mimic this natural cycle, by clearing out the trees while the wood is still usable, and regenerating the stand artificially. However, artificial regeneration is not always successful, and the roads and other human activities associated with timber harvesting have greater effects on water quality and animal populations than does the natural cycle.

Deed lodgepole or lodgepole salvage sales accounted for 60 percent of the timber sale program from the National Forests in the COGR from 1981 through 1985. Salvage sales are heavily concentrated
in the Targhee NF, because of heavy insect infestations at the southeast corner of Yellowstone National Park. Map 1 identifies areas of intensive insect infestation (primarily, although not exclusively mountain pine beetles), as well as the areas harvested in the recent past and proposed for harvesting in the near future.

Timber harvesting is the only means currently used to control the beetle. Forestry research suggests that beetle problems can be controlled through (1) a discontinuous pattern of timber stands, (2) reduced average stand size and age, and (3) reduced tissue health. Salvage operations are generally not effective unless the harvest is within the first two years after the initial outbreak.

Fire can also control beetle infestations, but only intense fires... which would kill the trees - kill the beetles. Finally, insecticides can be used, but it is difficult to reach the beetles under the tree bark and the high cost and environmental effects of pesticides limit their usefulness.

The ability to control beetle through timber harvesting is limited. A long time is required to convert the extensive even-aged stands of mature lodgepole to younger, more vigorous, beetle-resistant stands. This conversion is further hampered by the poor economics of salvage operations. Salvage sales averaged gross returns of less than $10 per thousand board feet (MBF) from PSW through FYB, this is substantially less than the Forest Service’s direct cost to prepare and administer the sales. In addition, the lodgepole pine stands in the National Parks and in the wilderness areas are exempt from harvesting, and thus beetle populations can maintain themselves in these protected areas. Still, assuming insect control is desirable, the salvage sale program may be the least cost means of controlling beetle epidemics and the subsequent devastating fires.

Commercial Sales

Non-salvage timber sales account for 40 percent of the Federal timber cut in the GOY. Lodgepole pine dominates, accounting for 73 percent of the non-salvage volume harvested annually. Although lodgepole accounts for only 57 percent of the commercial timber in the GOY, lodgepole pine accounted for more than 90 percent of the timber harvested from the Bridger-Teton, Shoshone, and Coeur National Forests, though it was less than two-thirds of the harvested volume from the Gallatin and Beaverhead. Douglas fir accounts for much of the rest of the GOY timber harvest, including more than 90 percent of the non-salvage timber harvested from the Targhee NF and nearly three-quarters of the GOY timber harvested from the GFY in Montana.

TABLE 9. Average Value of Timber Harvested from Federal Lands in the GUIR
(In dollars per thousand board feet)
May 1984-1985 average. N/A = not applicable)

<table>
<thead>
<tr>
<th>Forest</th>
<th>Douglas-fir</th>
<th>Spruce</th>
<th>Dead/ Salvage</th>
<th>Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaverhead NF</td>
<td>$13.49</td>
<td>$28.76</td>
<td>$11.41</td>
<td>$1.35</td>
</tr>
<tr>
<td>Gallatin NF</td>
<td>19.75</td>
<td>17.26</td>
<td>14.71</td>
<td>1.00</td>
</tr>
<tr>
<td>Custer NF</td>
<td>8.67</td>
<td>20.00</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Shoshone NF</td>
<td>14.43</td>
<td>2.11</td>
<td>2.65</td>
<td>7.42</td>
</tr>
<tr>
<td>Bridger-Teton NF</td>
<td>21.83</td>
<td>39.66</td>
<td>18.95</td>
<td>24.37</td>
</tr>
<tr>
<td>Caribou NF</td>
<td>22.94</td>
<td>24.28</td>
<td>26.10</td>
<td>n/a</td>
</tr>
<tr>
<td>Targhee NF</td>
<td>n/a</td>
<td>2.44</td>
<td>1.00</td>
<td>9.42</td>
</tr>
<tr>
<td>BLM - Idaho</td>
<td>10.67</td>
<td>18.64</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>BLM - Montana</td>
<td>9.40</td>
<td>11.95</td>
<td>10.90</td>
<td>n/a</td>
</tr>
<tr>
<td>BLM - Wyoming</td>
<td>n/a</td>
<td>12.55</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>GUIR Total</td>
<td>$23.55</td>
<td>$20.76</td>
<td>$16.28</td>
<td>$8.61</td>
</tr>
</tbody>
</table>

Cores receipts for FY83 through FY85 were $8.05 million, but this includes purchaser used credits of $2.54 million. Estates for the timber harvested in the GUIR totaled $1.03 million. K-V Fund deposits were estimated to be $9.88 million, this includes $2.34 million from the Gallatin, Custer, Shoshone, and Targhee NF, and an estimated $1.5 million from the Beaverhead, Bridger, Teton, and Caribou NF. Finally, the Forest Service has paid the counties an estimated $1.75 million because of timber harvest in the GUIR. Thus, while $5.81 million was received from timber sales, $6.66 million was deposited in special timber funds or returned to the counties; the Forest Service used $0.85 million (nearly $300,000 annually) more than was received.

Timber sales also require expenditures by the federal government. Funds from FY83 through FY85, the National Forests in the GUIR spent $8.96 million on timber sale preparation, administration, and support ($2.71 per MBF sold), and used $1.38 million from the K-V Fund ($4.05 per MBF sold). This $11.34 million expended substantially exceeds the $5.81 million in cash receipts from timber sales during this period.

The latter K-V Fund deposits from other receipts. Their K-V Fund deposits have been estimated at the average ratio of deposits to receipts for the other 4 Forests. K-V Fund deposits equal 35% of gross receipts for the Gallatin, Custer, Shoshone, and Targhee Forests.

It is sheer coincidence that the K-V Funds used by the Forests equal the K-V Fund deposits for the 4 Forests reporting their deposits.
harvested in Idaho. An average of 133 million board feet have been harvested annually from the Federal lands in the CGVR. This suggests that about 930 employees are supported by timber harvesting in the CGVR, assuming that sawmill labor intensity has not changed much since 1971. This figure roughly concurs with the employment in sawmills receiving CGVR timber.

In 1970, the timber industry accounted for less than 10 percent of the employment in the counties around CGVR. Data from the Forest Service input-output model indicated that timber harvesting created 12.6 percent of the direct jobs resulting from activities on the National Forests, although 79.2 percent of the indirect and induced jobs resulted from timber harvesting. Thus, CGVR timber harvesting is an important source of employment, exceeding the jobs created by all other National Forest commodity outputs combined, except phosphate mining on the Caribou NF. However, recreation activities in the CGVR create substantially more direct, indirect, and induced jobs than all commodity outputs combined. (See Table 7, p. 41, and Economic Effects under Recreation, p. 95.)

Effects on Other Resources
Effects on Water and Watersheds
Timber harvesting can alter water flows and watershed values, and the runoff from the CGVR is important for several major rivers. Forests have long been recognized as valuable for protecting watersheds, largely by regulating water run-off and preventing erosion. Snow accumulation is greater in forests than in surrounding forested areas (because of wind-blow snowdrifts and lower evaporation rates), and the openings increase melt rates and peak runoff. Thus, timber harvesting generally increases spring flows and flood potential, while decreasing summer streamflow.

A more important watershed concern may be the potential water pollution from increased erosion following timber harvesting. Erosion from harvested sites is of some concern, but it is widely recognized that the erosion from roads associated with timber harvesting is

67Ball, Estimating Timber Employment. p. 3.

generally far more damaging to water quality. A Forest Service research report on lodgepole pine management for the control of mountain pine beetles stated, 70

The primary watershed concern with epidemics is that during the low flows of water quality through sedimentation from roads constructed to salvage timber.

Increased sedimentation can be a particular problem for downstream users who depend on clean water, as well as for fish and wildlife.

Effects on Fish and Wildlife
The road construction which nearly always accompanies timber harvesting can be beneficial to harmful to fish and wildlife populations, depending on the road locations and use. Roads can have both direct impacts, by increasing erosion and creating open corridors through the forest, and indirect impacts, by increasing the numbers of people present in the area. The roads and the access they provide can affect fish and wildlife populations in various, interconnected ways.

The Idaho Department of Fish and Game stated that additional roads would make big game (particularly elk) more vulnerable, and that this would require the Department to shorten the hunting season or to reduce the number of hunters or the elk harvest in some other way. However, from the agencies' responses provided to the Subcommittees, it is impossible to determine whether similar damage is occurring in other parts of the CGVR or for other species, and whether the benefits of increased access may be greater than the damage.

Increased access is harmful to grizzly bears, because most bears are of human contact, 71. Since access is necessary for timber harvesting, timber cutting restricts bear habitat and can alter bear behavior. A greater reliance on temporary timber roads (roads which are permanently closed to travel after timber removal is completed) can reduce the long-term impact of road construction.

The timing of the timber cutting and removal can influence the impact of roads on grizzlies. Access can be timed so as to avoid prime bear use areas when the bears are there, such as den sites.


11Idaho Department of Fish and Game responses to the Subcommittees' questions, p. 2.
during winter or stands near clover meadows when the clover is blooming. This level of control on timber harvest timing requires greater knowledge and understanding of grizzly habits, but is rarely used in current timber harvesting contracts. Here, such measures might allow timber harvesting over a greater area with minor impacts on grizzly bears. Greater control is probably most important in areas with substantial grizzly bear use. Several sales have been proposed in areas with heavy grizzly use (as identified in Figure 4, p. 75), including two sales in the Gallatin National Forest (north of West Yellowstone and east of Cooke City) and one in the Shimshun (on Sunlight Creek and along the Clark’s Fork of the Yellowstone River).

Control over the timing of access could also probably reduce the effects of timber harvesting on birds, particularly bald eagles and peregrine falcons. Avoiding the disturbance caused by timber activities during the nesting season would likely enhance the reproductive success for these endangered birds, with minimal impacts on timber harvesting, providing that the next trees are left standing. Again, current timber harvesting contracts do not typically include such timing restrictions for wildlife protection.

**Habitat.** In addition to the effects of increased access, the cutting of trees can directly affect fish and wildlife habitats. Fish can be affected by stream sedimentation, particularly from roads constructed for timber removal, and by the loss of shade which can raise stream temperatures above tolerable levels. 74 The effects of timber harvesting on fish habitats can be minimized by protecting riparian areas and with careful road engineering to minimize sedimentation.

Protecting fish habitat in the GVR is critical, since fish are important food sources for other animals, such as grizzlies and bald eagles. In addition, the wetlands and riparian areas that are important for fish are also favored habitats for bald eagles, trumpeter swans, whooping cranes, and moose. Thus, the importance of protecting these areas goes beyond the direct benefits to sport anglers.

Timber harvesting can improve the abundance and the distribution of forage for elk, deer, and grizzly bears. 75 Timber harvesting typically increases succulent herbaceous plant growth, and timber management that emphasizes the retention of shrub and pine is minor

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74McCregor, So I and Water Quality. p 44.

species of low commercial value) can provide pine nuts for grizzlies. However, any benefits to big game from increases in forage after timber harvesting are limited to the summer, because snow accumulations in clearcut restrict winter forage availability. Light and Burbridge noted that 76.

Forage in clearcut openings during winter is usually unavailable to big game due to deep, crusty snow. On elk and deer winter range where winds do not influence snow depth, clearcutting in response to beetle epidemics generally results in loss of cover and no gains in available forage.

Thus, timber harvesting can benefit wildlife species where summer forage is a limiting factor, however, the winter habitat. For example, is the limiting factor, timber harvesting in the GVR will likely yield no benefits for the species.

Cover is recognized as a significant component of habitat. Timber harvesting generally reduces the amount of cover, while intermediate stand treatments, such as thinning, often reduce the cover density. The Forest Service has considered 40 percent of an area remaining in cover to be optimal for summer elk habitat, but the Idaho Department of Fish and Game has stated that 60 percent should be considered a minimum, rather than an optimum. 77 Cover is particularly important around elk calving grounds, such areas, which tend to be used in successive seasons, could be protected with little impact on the timber harvest by avoiding harvests near calving grounds.

For grizzly bears, cover is important for dappled resting sites, particularly near forage areas. The lack of dense cover around potential foraging sites, whether natural meadows or feeding areas enhanced by human actions, may limit foraging activities of the bears. Dense cover can be maintained by avoiding timber activities around foraging sites.

Feeding and next trees are important for bald eagles and peregrine falcons. The preferred trees are large snags (dead, bare trees), particularly near favored fishing areas. Leaving, or even creating, snags could be beneficial for these species. Harvesting can probably occur quite close to next trees without affecting the birds, as long as next seasons are avoided.

76Ibid. p 39.
Effects on Recreation

Aesthetics. A timber harvest site is not particularly beautiful, but extensive stands of dead or dying lodgepole pine, such as an area with a mountain pine beetle epidemic, may not be any better from an aesthetic viewpoint. Timber salvage operations can improve aesthetics if the dead trees are replaced by healthy ones. However, harvesting can also aggravate the aesthetic problems. Forest Service research reports that 17

From a visual perspective, the more rapidly the dead lodgepole pine is replaced with healthy vegetation, the better; however, if cutting methods selected for natural regeneration or to minimize losses (from mountain pine beetle) are visually more undesirable than the effect of standing and fallen dead timber, the visual discontinuity of the landscape will have been aggravated or even magnified instead of lessened.

The current Forest Service visual management objectives and criteria may be sufficient to adequately protect the exceptional aesthetics of the GWY, particularly if the most restrictive criteria are applied to the travel corridors bringing tourists into Yellowstone and Grand Teton National Parks. However, if second homes on the private lands scattered along the lower elevations remain or proliferate, the interests of the homeowners could conflict with timber harvesting. If the homeowners, resort owners, and permitees organize into an effective interest group, the Forest Service could have difficulty sustaining current timber harvesting programs.


Effects on Range Management

Timber harvesting can be beneficial for range management. Dense, mature timber stands produce little forage, but clearcutting can yield significant quantities of forage for several years.18 The forage produced by timber harvesting is beneficial for grazing, because livestock are more tolerant of human presence and cover is less important for livestock than for wildlife, and because the National Forests are grazed primarily during the summer, when the areas are clear of snow. At times, timber harvesting can conflict with range management, when both activities occur on the same or adjacent sites simultaneously. However, some control of the timing of harvesting and of livestock use can minimize such conflicts.

Effects on Energy and Mineral Development

Timber harvesting has little impact on energy and mineral development. The road construction often associated with timber harvesting could be beneficial for energy and mineral exploration and development by providing access to previously roadless areas, particularly since the Forest Service would then bear the costs of road development and maintenance. However, timber harvesting can at times conflict with energy and mineral activities, when both activities occur on the same or adjacent sites simultaneously. Some control of the timing of harvesting and of exploration and development of energy or minerals can minimize such conflicts.

WATER DEVELOPMENTS

This section describes the water development proposals in the GWY, and describes the effects of these types of projects on other resources. The conclusion about water developments are:

1. There are many federal agencies (at least ten) involved in various types and aspects of water developments, with little coordination among them.

2. Water projects can eliminate riparian areas, which are critical habitats for many animals, and harm cutthroat trout populations, on which several other animals depend.

Federal Water Projects

Water management in the GWY (as well as elsewhere) is a complicated issue. States generally have jurisdiction over water rights, although certain Federal laws reserve some water rights in particular...
areas to the Federal Government. Two federal agencies - the Bureau of Reclamation (Bureau) and the Army Corps of Engineers - construct most Federal water projects. Although the Federal Energy Regulatory Commission (FERC) regulates hydropower developments and the Environmental Protection Agency and the Army Corps of Engineers review proposals for water projects on Federal lands, in addition, the Federal land managing agencies - principally the Forest Service, National Park Service, and Fish and Wildlife Service - are responsible for maintaining adequate water quality in the lakes and rivers flowing through their lands. This allocation of Federal agencies makes for complex water management arrangements in the COVR.

Federal Energy Regulatory Commission

There are numerous proposed and licensed water projects throughout the COVR (Map 5); with the Federal Energy Regulatory Commission (FERC) overseeing the permitting and licensing for major hydropower projects. In response to a request for a license, FERC issues a preliminary permit authorizing three years' access to a site for a feasibility study. The permit holder can then file for a license to build and operate a facility. Licensing requires a public hearing on the project, among other actions. Certain projects (such as those with a generating capacity less than five megawatts) are exempt from the full licensing process and can receive operation authority more quickly.

There are 15 projects in various stages of FERC permitting and licensing within the COVR (Map 5). FERC has issued permits for four projects north and northeast of Yellowstone Park, in the Gallatin and Beaverhead Forests, one exemption (for a project of less than five megawatts) has also been applied for in this area. These are four FERC projects on private lands in Paradise Valley along the Yellowstone River north of the Park. A permit has been requested for a hydropower facility at the Island Park Dam, west of Yellowstone. The other four projects are south of Yellowstone. One is a permit for a hydropower feasibility study for the Jackson Lake Dam in Grand Teton National Park, while another is a preliminary permit for a hydropower facility on private land between the National Elk Refuge and the Bridger-Teton National Forest. The other two permits are for Forest Service land - Gros Ventre River in the Bridger-Teton and on Fall Creek in the Caribou, near Swan Valley (below Palisades Dam).

63Bureau of Reclamation response to Subcommittees' questions.
64FERC response to Subcommittee's questions (by map).

Bureau of Reclamation

Most of the Federal water projects in the COVR have been constructed by the Bureau of Reclamation (Bureau). Bureau is currently considering upgrading the hydroelectric generating capacity of Palisades Dam by replacing existing generators and using some of the water presently being spilled. This change would not require any additional permits, and the power generated would be marketed by the Bonneville Power Administration. Bureau did not provide any information about the potential effects of this upgrade on the reservoir or on the Snake River below the dam.

Bureau also identified two proposed future developments in the COVR. One, on the Madison River in Montana, includes developments that would irrigate 12,400 acres with water diverted from the river. The other plan is to develop the power potential of the Clark's Fork of the Yellowstone River, in the Madison and the National Forest, with three dams and reservoirs on the main stream and one on Sunlight Creek. This plan was presented to Congress in 1941, but the project has never been authorized or funded. Sunlight Creek is one of the areas identified as a concentration of grizzly bear deaths. (See Grizzly Bear Mortality Clusters, below.)

Other Water Projects

A number of water projects (which do not require FERC permits or licenses) are pending in Wyoming. The Wind River Indian Tribes and the State of Wyoming are discussing enlarging two reservoirs on the Wind River Reservation: Bighorn and Bull Lake. However, the extent of the tribes' reserved water rights in Fremont County must be settled before either project can be undertaken.

The Army Corps of Engineers has limited activity within the COVR. Among other things, the Corps occasionally modifies stream channels to control possible flooding. In some areas, this includes 'channelization,' whereby artificial stream channels are constructed to direct

65Bureau of Reclamation response to Subcommittees' questions.
66Bureau response to Subcommittees' questions.
68Bull Lake is not in the COVR, but it adjoins the area and its watershed is entirely within the COVR.

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the flow of water, but no channelization has occurred or been proposed for the CGVR. The Corps also use levees to contain streamflows in limited areas. In the late 1940s, the Corps built levees along about 11 miles of the Snake River, between Grand Teton Park and the Bridger-Teton National Forest, to protect the valley from flooding. The Corps is responsible for annual inspections and emergency repairs on these flood control levees.

There are numerous small water projects on the National Forests, mostly wells, springs or irrigation diversions; the number of such projects ranges from 16 on the Caribou NF to 47 on the Tangier, although not all Forests reported the number of water projects in the CGVR. The only reported water development proposal in the National Forests is the reconstruction of the Fremont Lake Dam on the Bridger-Teton NF near Pinedale, Wyoming.

Dams and hydropower projects are not the only water developments in the CGVR. The U.S. Geological Survey has studied the effects of wastewater effluent discharge in the two National Parks, including three effluent sites in Grand Teton and four sewage lagoons in Yellowstone (at Fishing Bridge, Madison Junction, Old Faithful, and Grand Village), the latter study, conducted cooperatively with the National Park Service, included continued monitoring of the effects of effluent discharges on the lakes and streams of the area.

Economic Effects

Direct jobs resulting from Federal water developments in the CGVR were not identified by any of the agencies responding to the Subcommittees' questions. It seems likely that federal water developments provide few permanent jobs, compared with the other activities occurring on Federal lands in the CGVR, because of the relatively small size of the existing projects and the few proposals for new developments.

The water diverted by Federal water developments is primarily used to irrigate the dry plains surrounding the Yellowstone ecosystem. Water is essential for the ranchers and farmers in the vicinity, although no information was provided to determine the degree of local dependence on Federal water projects. However, the CGVR contains the headwaters of several streams and rivers of significance both locally and throughout the West; except from irrigation water are low, and the climate favors high.
There are no new reservoirs imminent for the Galway. (The Boulder's plans for the Clark Fork have not been authorized.) However, several proposals might increase the height of existing dams, thus expanding their reservoirs. A comprehensive list of proposed increases is not available. The most important immediate effect of expanding a reservoir is the loss of land and the riparian vegetation along the shore. Many animal species of the Yellowstone ecosystem depend on these riparian areas, including bald eagles, trumpeter swans, whooping cranes, as well as moose and grizzly bears. Recovery of the riparian areas may require a decade or more, depending on the stability of the new shoreline. In extreme cases, where shore erosion is severe, riparian vegetation might never be reestablished. Without specific information on proposed dam enlargements, however, the possible effects cannot be examined in detail.

Another possible impact of reservoir expansion is the loss of upstream areas for fish spawning. Several important fish species of the lakes and reservoirs of the Galway, such as cutthroat trout, spawn in the streams above the lakes. Some dam enlargements would inundate spawning streams; for example, the PWS estimated that raising the Middle Creek Dam (on Babbitt Creek in the Gallatin National Forest) by 10 feet would eliminate half of the cutthroat trout spawning habitat and more than three-quarters of the grizzly spawning habitat. The natural spawning runs are important to grizzly bears and bald eagles in addition to providing sport fishing without cost to the Government.

Control of water flow through the dam can be managed to minimize the loss of stream habitat. Boulder stated that their activities directly benefit wildlife in the streams below Island Park and Palisades Dam. Increased releases from Island Park Reservoir provide more open water for trumpeter swans wintering along Henry's Fork of the Snake River, while releases from Palisades Reservoir are increased during goose nesting season to ensure that nests will be high enough to be protected from summer irrigation flow. 

Hydropower Facilities

Hydropower facilities generally have little direct impact on animals or on other resources. However, increased hydropower projects may increase human traffic in travel corridors to and from the site and in the area around the dam. In

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1) PWS response to Subcommittees' questions. Attachment 11, p. 3 (Original letter from John C. Wood, U.S. Fish and Wildlife Service, Billings, MT, to John J. Dulan, Bozeman District Ranger, Gallatin National Forest, Bozeman, MT, on December 13, 1985.)

2) Boulder response to Subcommittees' questions.

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Stream Channel Projects

The effect of levees for controlling streamflow on other resources depends on the location and extent of the levee. If the levee is not constructed around floodplains, the potential for downstream flooding, and bringing human developments and access closer to the riparian zones (perhaps impairing on wildlife) in addition, may encourage development on floodplains, thus increasing local economic losses during severe floods.

The CBE Bald Eagle. Working Team stated that the streamflow regulation along the Snake River has degraded the River's fisheries. In the past, control of water flow led to lateral erosion and channel expansion. The levees, built to reduce lateral erosion and flooding, increased channelization and the velocity of water in the Snake River. According to the CBE Bald Eagle Working Team, these changes have had the following results:

1. Trout habitat is degraded. In-river spawning habitat is practically eliminated and spawning is restricted to feeder streams.
2. Shallows and riffle, used by eagles to obtain prey, are reduced.
3. Islands that have trees adequate for nests are being eliminated.

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Bald Eagle Management Plan for the Greater Yellowstone Ecosystem, November 1983, CBE Bald Eagle Working Team. Published by Wyoming Game and Fish Department, p. 28.
6 Conditions conducive to cottonwood regeneration have been eliminated by preventing the flooding and scouring action of the river in adjacent flood plains.

Even more damaging to bald eagles, in the Team’s opinion, was the increased housing development following levee construction.

GRASSING

This section describes grazing on Federal rangelands in the CVBR, the jobs which result, and the effects of grazing on other resources in the area. There are several major findings:

1. Grazing on federal rangelands in the CVBR supports little direct employment, although there are secondary effects (indirect and induced jobs).

2. Grazing requires federal cash expenditures substantially greater than the resulting revenues.

3. Livestock can damage riparian (stream- and lake-side) areas, which are critical habitats for many animal species.

4. Sheep grazing in areas with moderate or higher grizzly bear densities may result in unnecessary conflicts between humans and bears.

Range Management

Commercial grazing is allowed in the National Forests, on BLM lands, and in some National Wildlife Refuges (including Red Rocks Lake NWR in the CVBR). The CVBR contains more than 7 million acres where commercial grazing is allowed, as shown in Table 11. Under the regulations of the administering agency,77 ranchers obtain grazing permits, which authorize them to graze a specified number of animals, during a specified period, in a specified area (known as an allotment). The permittee pays a grazing fee for the permitted amount of use, based on an animal unit month. (The amount of forage a cow and calf consume in one month is called an Animal Unit Month - or AUM.) The permits must be renewed annually, and the Forest Service has the authority to alter or revoke a permit. Changes are rare, however, because Forest Service policy generally favors continuing permits to maintain the status quo.

77BLM and Forest Service regulations differ substantially; this discussion only describes Forest Service grazing permits, since they account for 93 percent of the grazing use on Federal lands in the CVBR.

TABLE 11 Grazing on Federal Lands in the CVBR During 1985

<table>
<thead>
<tr>
<th></th>
<th>Cattle Grazing</th>
<th></th>
<th>Sheep Grazing</th>
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<td></td>
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<td>Permitted Actual Livestock</td>
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</tr>
<tr>
<td></td>
<td>Acres</td>
<td>Use</td>
<td>Use</td>
<td>Acres</td>
</tr>
<tr>
<td>Bearhead</td>
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<td>38.8</td>
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<td>Br.-Teton</td>
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<td>111.0</td>
<td>5.7</td>
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<td>1,632.9</td>
<td>438.4</td>
<td>1,632.9</td>
<td>37.2</td>
</tr>
</tbody>
</table>

Cattle Grazing

Cattle grazing is permitted on more than 1.5 million acres (about 12 percent) of Federal land in the CVBR, this is more than 60 percent of the Federal grazing lands, as shown in Table 11, with sheep grazing on the other 40 percent of Federal grazing lands. More than a third of the cattle grazing allotment acreage is in the Bridger-Teton National Forest, although all of the National Forests in the CVBR contain one or more cattle allotments. For much of the CVBR, about
three acres are required to support a cow and calf for one month, although conditions vary -- more than seven acres are needed per AUM in the Targhee NF. Nearly 400,000 AUMs of cattle were grazed on the CVR National Forests in the 1983 grazing season, with nearly another 20,000 AUMs on RM land and 5,960 AUMs in Red Rock Lakes NWR. The actual use was about 92 percent of the permitted level in the CVR, varying from 86 percent on the Bridger-Teton NF to 103 percent on the Targhee.

Cattle are grazers, eating primarily grass when it is available, thus, cattle compete directly with wildlife which graze principally elk and bison in the CVR. Cattle are typically turned loose, and allowed to roam freely throughout the allotment. The permits are responsible for maintaining the fences and other improvements, and for transporting the cattle to and from the allotment, but permittees do not continually supervise their cattle.

One might expect that the relatively low level of protection would lead to substantial losses of cattle to predators or poisons plots. Forest Service data on livestock losses do not distinguish cattle losses from sheep losses. However, the statistically significant correlation between livestock losses and cattle and sheep grazing indicates that fewer than one percent of cattle grazing in the CVR are lost annually, while about five percent of sheep are lost. Thus, there appears to be little cause for concern over potential cattle losses in the CVR.

Sheep Grazing

Sheep (and goat) grazing is permitted on nearly 1.0 million acres of federal rangelands, nearly 50 percent of the federal grazing land in the CVR. The sheep allotments are concentrated in the south and west of Yellowstone National Park, on the Bridger-Teton, Targhee, and Caribou National Forests, as shown in Table 11. For most of the CVR, about five acres are required to support a ewe and lamb for one month. More than 1.000 AUMs were grazed in CVR National Forests in the 1983 grazing season, with another 3,900 AUMs of sheep on RM lands in the CVR. The actual use was only 87 percent of the permitted level, use was at 80 percent of the permitted level on the Bridger-Teton NF, but only at 41 percent on the Targhee.

9 Grazing seasons in the National Forests are generally during the summer months, although the seasons vary substantially among the forests.

10 Sheep require less forage than cattle; 1 ewe with lambs equal 1 AUM. However, sheep allotments in the CVR contain much less forage than the cattle allotments, and thus about 25 acres are required per sheep AUM.

Sheep are browsers, eating predominantly herbs and shrubs; they compete directly with wildlife browsers, such as deer and moose. Sheep can be a serious problem in competition for range, because they browse close to the ground, leaving little food available for other animals. Nearly continual movement is necessary to prevent sheep from overgrazing an area, and thus sheep are typically accompanied by herders, rather than turned loose in the allotment. This greater protection should lead to lower losses of sheep to predators, poisonous plants, and other factors. However, the correlation of livestock losses with cattle and sheep use indicates that about five percent of the sheep are lost annually. Half of all livestock losses in the past five years are due to predators; the primary predators are probably coyotes, but some live losses (less than one percent of predator losses) has been lost to grizzlies.

Range Management Economics

The grazing fee for nearly all federal rangelands was $1.35 per AUM in 1983. Using this fee, receipts from grazing on the Federal lands of the CVR in 1985 were calculated to be $580,000. However, not all grazing receipts are available for the U.S. Treasury. As noted earlier, the Forest Service returns 25 percent of its gross receipts to the counties where the National Forests are located (calculated to be $116,100); the BLM generally returns 12.5 percent of its gross grazing receipts to the counties (calculated to be $3,200). In addition, half of grazing receipts from each agency are deposited in a Range Retirement Fund (calculated to be $185,000), which are subsequently appropriated to each agency for rangeland improvements. Thus, only about $219,700 from 1983 grazing receipts was available to cover Forest Service and BLM range management costs.

It seems likely that the range management c.-ats exceed the net grazing receipts from the CVR. Gross Forest Service grazing receipts nationwide in 1985 were $9.0 million, compared to FYS appropriations for range management of $28.2 million. Similarly, gross BLM grazing receipts nationwide in 1985 were $1.8 million, while appropriations for range management were $68.0 million. Thus, gross grazing receipts accounted for only a third of range management costs. Because grazing fees are the same on nearly all federal rangelands.


Federal lands. It is probable that the Forest Service and BLM net grazing receipts (after payments to counties and range improvement deposits) are substantially less than range management costs in the GGWR.

The Forest Service identified grazing fees on private lands near the National Forests in the GGWR. The private land grazing fees ranged from $7 per AUM near the Hebgen Lake District of the Gallatin NF to $11.50 on the adjoining Boisean District. The grazing fees on private lands averaged about $10 per AUM. The federal grazing fee of $1.15 per AUM is more than 80 percent below the reported private grazing fees in the GGWR. Private fees would be expected to be higher than fees for federal rangelands, because of such factors as permit conditions (both physical and financial) and differences in operating costs, but competitive pricing for leases of federal lands in the few places where they occur are only 15 percent below comparable private grazing fees. Thus, grazing on Federal lands accrues for fees which are substantially below the private market value of the grazing, and which do not cover the range management costs of the agencies.

Economic Effects

The Forest Service reported that 144 direct jobs were created by livestock grazing in the National Forests of the GGWR. Only 1.4 percent of the total number of all types of jobs created directly by activities in the GGWR National Forests. In addition, another 93 jobs were created indirectly or were induced by livestock grazing. These estimates were derived from the agency's input-output model, however, each Forest modifies the model to its own circumstances, and thus the "jobs created" estimates may not use the same basis on all Forests and may not be very comparable to other industries.

As noted above, the Forest Service returns 25 percent of its gross receipts to the counties where the National Forests are located. For grazing, this is calculated to be $134,100 for FY86 (based on 1985 receipts); less than 15 percent of the total 1985 Forest Service payments to these counties. BLM payments to counties for FY86 from grazing were calculated to be only $3,200.

103: Forest Service responses to Subcommittees' question 10
105: Forest Service responses to Subcommittees' question 1.
Certain livestock management practices can protect water quality and riparian areas from the possible damages by grazing. The location of fences, salt, and watering sites generally determine the distribution of livestock.\textsuperscript{111} Fences can be built to keep livestock out of riparian areas, although such an approach is quite expensive. Water impoundments scattered throughout an allotment can reduce pressures on streamside riparian zones and other wetlands.\textsuperscript{112} Similarly, certain grazing systems (such as deferred rotation and rest rotation) can protect important areas from grazing during critical periods.\textsuperscript{113} However, such practices would likely increase costs, particularly for the permittee, and would probably require more activities on the allotments by both the agencies and the permittees.

\textbf{Effects on Fish and Wildlife}

Degraded water quality from livestock grazing can reduce fish populations. Sediment in streams can impede oxygen exchange in the gravel where cutthroat trout eggs develop, and thus reduce spawning success. Lower fish populations would reduce the value of fishing for recreation and could harm other animals dependent on cutthroat trout, such as grizzly bears and bald eagles.

Livestock also compete directly with many animal species. As noted earlier, cattle graze primarily on grass when it is available, and thus compete with elk and bison for forage; sheep are browsers, eating predominately shrubs and herbaceous plants rather than grass, and thus compete with deer for forage. Allotment use is generally allocated in such a way as to allow sufficient forage for existing wildlife populations, but some rangelands are already considered overgrazed and increased elk and deer populations could exacerbate such conflicts. Another potential problem is that the U.S. elk and bison carry brucellosis, a disease which can lead to spontaneous abortions in cattle. Domestic herds in Montana and Wyoming are currently free of the disease, while those in Idaho are nearly free of brucellosis.\textsuperscript{114} However, cattle grazing near elk or bison calving grounds could contract the disease.

The most serious conflict between grazing and elk is created by fencing, which may prevent elk from migrating summer and wintering grounds. Some fences have been designed to allow passage of wildlife.


\textsuperscript{112}Thomas, et al. Riparian Zones. pp. 10-12.

\textsuperscript{113}Hall, Management Practices and Options. p. 4-5.

\textsuperscript{114}APHIS response to Subcommittees' questions. p. 1.
particularly more and stimulate wolf, or restraining livestock, but two
of the livestock deaths to the CWR National Forests between 1981 and 1983 were due to predators.

Predators can conflict with livestock grazing, and particularly with sheep grazing. Half of the livestock deaths to the CWR National Forests between 1981 and 1983 were due to predators. Of this, only the livestock deaths have been attributed to grizzlies. Including 14 on the Gallatin NF. Thus, it is likely that other predators, particularly coyote and perhaps golden eagles, are the primary livestock predators in the CWR.

Grizzlies can also be killed as a result of their conflict with livestock. The number of bears killed illegally by poachers is not known, but more than half of all grizzly deaths since 1974 have been illegal kills that probably involve some by poachers. The conflict is particularly acute with sheep. The protection for grizzlies is probably in violation the peace-time conflict between sheep and grizzly bears. This might be done by eliminating selected sheep allotments by altering allotment boundaries to exclude areas used by grizzlies or by shifting certain allotments to cattle grazing. The Targhee National Forest, for example, has chosen to not issue sheep grazing permits that are valued.

FOREST AND MINERAL DEVELOPMENT

Energy and mineral developments are scattered throughout the CWR. Mining, primarily for gold, but including many other metals, is generally concentrated to the north and east of Yellowstone Park. There is some interest in coal in the southern reaches of the CWR. Phosphate mining, principally in the Caribou National Forest, supports a substantial industry in Idaho. Oil and gas activities are predomi-

11Gallatin National Forest response to Subcommittees' question 1
12Forest Service response to Subcommittees' question 11
14Forrest and Williams, Coordinating Livestock and Timber Management With the Grizzly bear p. 202

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ately confined to the Bridger-Teton NF, although most of the available National Forest lands have been leased. There are many geothermal leases west of Yellowstone, but no geothermal developments have begun.

The RMR is responsible for energy and mineral activities on all federal lands. In the National Forests, the Forest Service controls the surface access and impacts, and can recommend actions related to leases and claims, but the RMR has the ultimate authority. Energy and mineral activities are allowed in some National Parks (generally under the laws establishing those Parks), but not in Yellowstone or Grand Teton. Similarly, energy access and development occurs in some wildlife refuges, but none has occurred in Red Rock Lakes, Grays Lake, SFR or the National Elk Refuge.

This section presents information on the energy and mineral activities in the CWR, the resulting economic effects, and the impacts on other resources. The conclusions are these:

1. Phosphate mining in the Caribou National Forest supports more jobs than any other single activity on the federal lands in the CWR, and nearly equals the total jobs associated with recreation in the CWR National Forests.

2. The major impacts of energy and mineral activities on the ecosystem are:
   a. The potential water pollution, and
   b. The human access created to explore for and develop the resources.

3. There is little opportunity for environmental review of energy and mineral leases, exploration, or development by interested groups, and limited federal control over exploration and development once leases are issued and claims are filed.

4. Geothermal development appears, at this time, to represent little threat to the hydrothermal resources of Yellowstone National Park.

MINERAL ACTIVITIES

Energy and mineral development can affect other resources. Openings in the surface, for example, can cause changes in surface and groundwater quality. The most significant impact is probably the access which accompanies mineral exploration and development, as noted under timber harvesting. Increased access can have water quality and animal populations. This may be a more critical issue for energy and minerals, because the land management agencies have less administrative control over these activities, and thus less effective control over the associated access.

In general, there are two approaches by which mineral resources from federal lands can be acquired: leases and claims. Leases are
used for certain minerals, including most energy resources, under the general authority of the Mineral Leasing Act of 1920. This Act, together with various amendments and supplementary laws, provides the basis for regulating the disposal of coal, phosphates, oil and gas, and geothermal resources from the Federal lands in the COVR. Most other minerals on Federal lands, commonly referred to as lodeable or hardrock minerals, are generally available to claimants under the Mining Act of 1872, as amended and supplemented by more recent legislation.

**Lodeable Minerals**

RM has the primary responsibility for mineral leases on Federal lands, regardless of which agency manages the surface resources. The surface-managing agency, typically the Forest Service, can recommend areas to be withheld from leasing and can specify stipulations in the leases for protecting other resources. But the RM has the final authority over issuing leases. Two other Interior Department agencies -- the Minerals Management Service (MMS) and the Office of Surface Mining (OSM) -- are also involved in mineral leasing. MMS handles all receipts from Federal mineral leases, while OSM is responsible for assuring adequate site restoration for abandoned surface mines. (No mining is allowed within the borders of most Parks.)

**Coal.** Much western coal is mined in strip mines, which can have substantial impacts on water and animals as well as displacing recreation and other activities. Coal exists throughout much of the COVR, and there is high potential for coal production in the Gros Ventre, Salt River, and Wyming Range. The U.S. Geological Survey has projected that coal mining in the COVR is unlikely in the near future due to current economic conditions, but much of this coal is relatively deep and would necessitate underground mining, which is much more costly than surface (strip) mining.

The Office of Surface Mining indicated that there are no active coal exploration or surface mining operations within the COVR. One the Great Coal Company has an approved coal exploration site in the Bridger-Teton National Forest near Polson Meadows (between the Salt River and Wyming Range), and has attempted to obtain a permit for strip coal mining near McDougall Gap also in the Bridger-Teton National Forest.


121 OSM response to Subcommittees' questions p. 27.

122 Office of Surface Mining response to Subcommittees' questions p. 27.

123 OSM response to Subcommittees' questions. p. 20.

124 Office of Surface Mining response to Subcommittees' questions. Map. 125 OSM response to Subcommittees' questions. p. 27.

126 OSM response to Subcommittees' questions -- Enclosures 19.

127 OSM response to Subcommittees' questions -- phosphate map.


129 OSM response to Subcommittees' questions. Phosphate Map.
Park Reservoir. 129 There was some production in this area in the 1950s; some of the phosphate leases have not expired, and two processing plants were proposed there in 1977, although neither was built. 130

Oil and Gas. Oil and gas exploration, including seismic testing and exploratory drilling, and oil field development can have numerous impacts on other resources. Water quality can be affected by the required roads and by the waste which accompany drilling. Animals and humans can be displaced from drilling sites and disturbed by the noise and by the explosions of seismic testing. Thus, the location of oil and gas activities and the procedures under which they occur govern the possible effects of oil and gas exploration and development.

Several areas within the GDR have high hydrocarbon potential, including the eastern edges of the Shoshone National Forest, the Wyming and Salt River ranges, the Snake River Valley in Idaho, and the Henry’s Lake area 131. Most oil and gas drilling in the GDR has occurred in the Bridger-Teton NF (no information was provided on drilling in the Shoshone NF by either the Forest Service or the BLM). 132 The Caribou NF has seven abandoned wells, while the Targhee has one abandoned, one active, and one proposed well (all in Idaho, west of Jackson, Wyoming); there is no reported oil and gas drilling in the Montana National Forests in the GDR. (See Map 6 for well locations.) There are currently 18 producing wells, 5 active drilling sites, and 10 abandoned wells in the Bridger-Teton NF. Most of these (including 13 producing wells) are concentrated in the Big Piney Range District, south of South Piney Creek and near McDougal Gap, but they reach as far north as Buck Creek, near Grand Teton National Park. In addition, 13 new wells have been proposed for drilling in the Bridger-Teton; the proposals are similarly concentrated in the Big Piney District, but two are proposed for the south side of the Gros Ventre Range and one near the ridgeline southeast of Mount Leidy.

The BLM is responsible for oil and gas leasing on all Federal lands, under an interdepartmental agreement, the Forest Service is responsible for lease applications on the National Forests, and BLM generally follows the Forest Service recommendations. For the GDR, the BLM

132 BLM response to Subcommittees’ questions. Oil and Gas Map Overlay.
133 BLM response to Subcommittees’ questions. Oil and Gas Map Overlay.

The BLM response to Subcommittees’ questions. Phosphate Map.

134 BLM response to Subcommittees’ questions. p. 21.

The procedures used for oil and gas leasing and development have been criticized as not providing adequate opportunity for environmental review by interested public groups. 135 While the mere granting of a lease has no direct, immediate impacts on other resources, the application typically associated with active leases can have profound effects on water quality, animal populations, and recreationists. The Forest Service stated that National Forest plans currently being

136 Map 6 shows the federal lands in the GDR which have been leased for oil and gas, or from which leasing applications have been filed. New leases are prohibited in ecoregional designated wilderness and wilderness study areas, although valid existing leases can be developed under regulations intended to preserve the wilderness character of these areas. Oil and gas activities on the majority have been leased, including lands with little potential for oil and gas discovery. For example, there are leases for oil and gas exploration in portions of the Beaverhead and Gallatin Forests where the federal survey reports on known potential for oil and gas. One group, critical of Federal oil and gas leasing activities in the Yellowstone area, has estimated that 83 percent of available lands have been leased, while the Forest Service has recommended no leasing for less than 4 percent of available lands. 137

137 BLM response to Subcommittees’ questions, p. 17, 20.

138 Gallatin and Beaverhead NF responses to Subcommittees’ question.

139 USGS response to Subcommittees’ questions. Oil & Gas Overlay.


141 There have been numerous complaints about oil and gas leasing on Federal land, but an analysis of the system is beyond the scope of this report. For more information, see:


prepared provide general direction on areas available for leasing, with a site-specific environmental analysis occurring when an application to drill is filed. There is little or no environmental review prior to issuing leases. How-ever, leases are generally regarded as contracts which guarantee the right to drill somewhere within the lease. The leases themselves may have no direct effect on other resources, but their existence can effectively lead to a drilling right with virtually no environmental recourse.

Geothermal Resources. Geothermal energy development typically includes using steam or hot water to produce electricity. Such production is typically very noisy at the site, and generates hot wastewater with numerous minerals that can pollute streams. The only known electrical-grade geothermal resources in the Geyser are those in Yellowstone National Park, which cannot be developed. Several low-temperature hydrothermal systems (warm springs), which could be used for heat although not for commercial power generation, exist in the Geyser, including one near the town of Emils Montana, and two in the Bridger-Teton National Forest, east of the J D Rockefeller Parkway and in the Gros Ventre Range.234

There are two known geothermal resource areas (KRA) in the Geyser. The Yellowstone KRA, outside the western boundary of the Park, was established by the USGS (Geological Survey because of the available geologic data and thermal evidence. However, this area was withdrawn from leasing in 1941 by BLM to protect the nearby hydrothermal features of Yellowstone National Park; it was feared that geothermal development could disrupt the underground water pressure which causes the geysers inside the Park.

The Island Park KRA, further south and west, was established because of the numerous, overlapping lease applications. According to the Geological Survey, the geophysical data do not indicate a hot-water resource in that area, and the average reported spring temperature is below 10°C (50°F).235 There are no geothermal leases in the Island Park KRA, but there are 54 lease applications.236 Lease applications have been postponed because of possible hydrologic connections between Yellowstone Park and the Island Park area. However, the Geological Survey has reported no thermal or chemical

136USGS response to Subcommittees' questions, p. 14
137USGS response to Subcommittees' questions, p. 15
138USGS response to Subcommittees' questions, p. 15
139USGS response to Subcommittees' questions, p. 17
140USGS response to Subcommittees' questions, p. 15
141USGS response to Subcommittees' questions, p. 15

Locatable Minerals

The principal effects of hardrock mining on other resources are the impacts of the access for prospecting, mining, and ore removal and the degradation of water quality from the access roads, the opened mineralized surfaces (above and below ground), and the treatment of waste products. Hardrock minerals, and mining claims, are scattered through much of the Geyser. The areas with high mineral potential include the Absaroka Range, north and east of Yellowstone National Park, and the Gros Ventre, Wyoming, Salt River, and Caribou Ranges south of the Park. The minerals being sought are gold and silver, but numerous other minerals have been mined in the area, including chromium, copper, iron, lead, molybdenum, nickel, platinum group metals, tungsten, and zinc.

There has been extensive prospecting and mining for metals in the Geyser, particularly in the Gallatin and Custer National Forests, the Cooke City area, Gardiner-Jardine area, East Boulder Plateau, and the area around the south end of the road along the Boulder River all have high mineral potential for many of the metals listed above and numerous producing mines. Lincoln Mountain and Fairmount Peak in the Gallatin NF and Sunlight Creek on the Shoshone NF have also seen recent activity. Several of these areas (Cooke City, Gardiner, and Sunlight Creek) have been identified as areas of grizzly mortality concentrations (see Grizzly Bear Mortality Surveys, p. 115). In addition, there has been significant placer mining activity in the Gros Ventre Range in the Bearlodge NF; placer prospecting has occurred throughout the Gros Ventre River Valley, but no mines have been cited there. Map 5 shows the locations of the active and abandoned mines and prospecting sites in the Geyser.

In addition to metal mining, non-metallic minerals are mined in the Geyser. Talc is mined in the Beaverlodge NF, and travertine (a building stone) is mined in the Gallatin NF, near Gardiner. Asbestos has been mined from the Gallatin NF (west of Belgen Lake) and rock salt from the Caribou NF, but neither of these mines is currently active.

The process for granting development rights to locatable minerals on Federal lands differs substantially from the leasing of locatable minerals. The 1872 Mining Law allows free exploration of most Federal lands. A prospector can stake a mining claim (a physical location) on a mineral deposit, which is recorded with the BLM. To hold a claim, the claimant must perfect a minimal amount of some form of
development activity each year. The Forest Service requires an operating plan for proposals entailing significant surface disturbance. Claims can be patented, transferring ownership from the Federal Government to the claimant, but a patent is not needed to extract and sell the mineral. The Federal Government collects a fee for recording the claim ($5), for filing for a patent ($25), and for transferring title in the land generally $2.50 or $3 per acre, depending on the type of claim), but collects no royalties or other payments from locatable mineral extraction on Federal lands.

Some Federal lands, such as National Parks, have been withdrawn from mineral exploration. New mineral claims are prohibited in wilderness areas, but valid existing claims can still be developed and patented under existing regulations. Otherwise, the Federal Government has little authority to regulate mineral exploration. The BLM stated that, other than withdrawing Federal lands, they have no authority to regulate mining.142

The Bureau of Land Management does not have the authority to deny a mining claim. The location and working of mining claims is a non-discretionary action on land that is open to mineral entry.

Energy Transmission Corridors

The Bonneville Power Administration (BPA) has examined several possible corridors for transmitting coal-generated electricity from eastern Montana and Wyoming to the Pacific Northwest. Some of the corridors examined passed through the GCR, including through various wilderness areas and even through the edge of Yellowstone National Park. (See Map 1.) Phase I of the Pacific Northwest Long Range East-West Energy Corridor Study, completed in 1977, identified corridor segments with adequate topography, geologic stability, and seasonal access. Nine corridors were considered feasible, and Phase I did not try to evaluate alternative routes.144 The energy situation has changed dramatically since Phase I was completed, but the potential for energy transmission corridors is still considered a long-range possibility.145 More

142ED response to Subcommittees’ questions p. 22


144ED response to Subcommittees’ questions. Enclosure 4: Letter from Archibald M. Maclean, Environmental Manager, BPA, Portland, OR to Joseph J. Seaton, Forest Supervisor, Beaverhead NF, Dillon, MT May 11, 1983

activity generated by direct jobs. Some direct employment likely is associated with oil and gas activities in the Bridger-Teton, since there are 15 producing wells and 9 active drilling sites in the forest.

The Forest Service provided no information on jobs resulting from hardrock mining in the National Forests, although there are numerous producing mines in the CCB. The BLM identified 10 jobs (total) from locatable mineral activity on their lands in Montana.

Effects on Other Resources

Among the principal effects of energy and mineral development are those resulting from the necessary access and the human activities that occur on the sites. Improper road construction can degrade water quality, this can reduce fish populations, and subsequently harm populations of wildlife dependent on fish, such as grizzly bears and bald eagles. The activities themselves can also displace wildlife, particularly elk for grizzlies which avoid human contact. Thus, unless the location and use of roads is controlled, access has the potential to damage water quality and fish and wildlife populations. (For a fuller discussion, see Access under Timber Harvesting, p. 49.)

Mining and Non-Fuel Mineral Activities

Activities associated with mining claims can affect the other resources of an area. Maintaining a claim requires at least $100 worth of development annually, this is a relatively small amount, and does not necessarily have to occur on the claim proper. In many cases, no work will be done as long as there is no challenge to the claim. Nonetheless, it means that the claimant is entitled to access to the site, and human activities may occur on the site. However, the actual effects are likely to be quite limited — in both time and space — until a mine is developed.

There are three basic ways to extract non-fuel minerals: placer mining, underground mining, and surface mining. Placer mining involves the use of running water to concentrate minerals from gravels deposited by past or present streams. The most significant effect of placer mining is that they can introduce sediment loads into clear-flowing streams if improperly operated. Some sediment results from erosion of cleared areas and access roads, but much of it is mobilized during washing gravel to extract the metal (usually gold). Increased sedimentation can harm fisheries by reducing spawning success and eliminating spawning areas, and thus is a concern for the Iris, Ventre, and Madison Rivers, where placer mining has occurred or is being considered.

The effects of underground mining can be more limited. In some cases, the effects may be substantial of the surface above the workings. But the most significant impacts are likely to result from the associated surface facilities, such as the mill, the waste rock, and the tailings pond, although these can be located away from the mine site. For example, the proposed platinum group metal (PGM) mine in the Greater National Forest near Nye, Montana, would require 100 acres in the forest for the small proposal, but less than 1 acre for the larger proposal because the tailings pond would be six miles northeast of the site. The surface activities would displace wildlife and other development activities in the area, including most recreation, in addition to introducing substantial traffic.

Mines, both underground and on the surface, can harm water quality directly in addition to sedimentation from access roads. Mine openings facilitate movement of air and water into the subsurface mineralized zones, and often promote release of toxic metal ions and the formation of acids through the dissolving of corrosive minerals. This can substantially degrade water quality and damage fish and wildlife populations. If precautions are not taken. In addition, mine tailings contain potentially hazardous compounds which can further degrade both surface waters and groundwater. However, many types of mining — such as those under consideration for the Stillwater Complex in the Greater National Forest — have water quality performance standards which generally prohibit the discharge of water used in processing. In these cases, mining might have only limited effects on the surface or groundwater of the CCB.

Surface mines (strip and open pit mines), even more than underground mines, may displace wildlife and recreation activities from a significant area. Surface mining can raise a lot of dust, which

14 National Park Service, Gates of the Arctic, p. 64-65.
16Surface Mining of Non-Coal Minerals. p. 18.
degrades air quality. However, the most conspicuous effect of surface mining is the substantial and relatively widespread change in the land surface. Surface mines without subsequent reclamation create scars on the land which degrade the aesthetic quality of scenic vistas. In any case, the unavoidable alteration of the surface, in addition to the disturbance generated by mining while it is in progress, are probably the most important effects of non-fuel activities on other resources.

**Oil and Gas Activities**

Exploring and drilling for oil and gas can affect other resources, and the various stages in the process can have different effects. The following discussion focuses on the three major types of activities which can affect other resources: seismic, testing, exploratory drilling and well production.

Oil and gas leasing is perhaps the most controversial activity on the federal lands in the U.S. The group has asserted that 93 percent of the area available for leasing has been leased. The BLM reports that there are more than 150,000 existing or pending leases in the U.S., and 6,000 existing or pending leases in Wyoming alone. While the Forest Service has reported more than 12 existing or pending leases in Montana. The Bridger, Teton, Caribou, and Targhee Forests identified a total of 19 producing oil and gas wells and 32 more drilling applications, while 40 wells have been abandoned.

The mere granting of a lease may not have any immediate direct effect on other resources. However, the seismic testing and exploratory drilling typically associated with active leases can have substantial impacts. Seismic activity is usually associated with those leases under consideration for active development, and such exploration may eventually occur on no lands open to leasing. Under BLM and Forest Service regulations, a company may conduct seismic tests in anticipation of leasing favorable tracts in an area; they need not have a lease in the area. Finally, leases normally provide a guarantee that drilling can be pursued somewhere within the company's lease holdings. However, the Federal Government has the right to deny applications to drill on specific sites within a lease.

**Seismic Testing**

Geologists probe rock formations with the potential for being oil and gas reservoirs by examining recordings of shock waves sent through the earth. In some places, mechanical "chopping" devices (trucks with large weights) can be used to send the shock waves, but the relatively roadless nature of the GYU strongly suggests that explosives would be used. The explosions are typically arranged in parallel lines, and detonated simultaneously. Each explosion does some damage, although such effects are localized and the areas generally revegetate naturally in a year or two. However, the lines can still often be seen from a distance, possibly disrupting scenic views. In addition, the wires and debris which are left behind can entangle and even kill animals. Finally, the trails created for the seismic testing can increase human traffic in the area, and may be the most significant and long-term effect of seismic testing.

The most significant transient impacts of seismic testing while it is in progress result from associated human activity and the noise and commotion of the blasts. Many of the lines of explosives are laid out in roadless backcountry, with crews sometimes flown in by helicopter. Such activities bring many people into areas previously accessible only on foot or horseback, and thus can disturb wildlife which has adapted to a near-absence of human populations. Wildlife species which are relatively intolerant of human activity, such as gtizely bears, will likely be disturbed, and one group asserted that elk and bald eagles have been affected by seismic testing. The noise and commotion of explosives can be a disturbing recreationist as well as wildlife. The blasts can allegedly be heard for a dozen miles, and such evidence of human presence can degrade the outdoor experience for backcountry users and other who want to "get away from it all." To date, there is little research to fully assess the effects of seismic exploration -- while it is in progress or subsequently -- on wildlife populations or on recreation.

No data have been collected identifying the extent of seismic testing in the GYU. An noted earlier, leasing is not a prerequisite...
for seismic exploration on federal lands. Rather, the testing can be used to determine whether and where to lease. Each test provides proprietary information to the tester. Thus, several seismic tests by competing enterprises could occur in the same area over a period of time. Reducing the degree of sequential seismic work, perhaps by providing for an exchange of seismic data on some basis following a period of exclusive use, could limit the environmental damages of seismic exploration.

Exploratory Drilling. Seismic tests can only indicate favorable structures and formations. Drilling is needed to confirm the existence of oil and gas. For federal lands, a lease filed an application for a permit to drill (APD). The surface-managing agency (Forest Service for the National Forests) then reviews the written application and APD, and can deny it based on environmental grounds. The Government has stated that drilling must be allowed somewhere on any given lease, but only about 1 lease in 10 has an exploratory well drilled on it.

An exploratory drill site requires several acres to accommodate the drilling pad and the impoundment for the rock chips produced and drilling mud used in the drilling. As with mining, oil and gas drilling can degrade water resources, although impoundments are lined to reduce possible pollution. However, exploratory drilling (and development drilling if a discovery is made) require sizable supplies of fresh water. In some of the drier areas, the water requirements could reduce streamflow during critical periods for fish and wildlife species.

Exploratory drilling disrupts wildlife and other development activities (tapering, grading, recreation, etc.) from relatively small swaths with underground mining. However, road access is generally needed to bring in the drilling equipment and crews, even when helicopter access is specified, the frequent flyovers would likely establish a travel corridor which could restrict wildlife movement. Thus, the most significant impact of exploratory drilling is likely the human access provided to the drilling site.

Exploratory drilling may have only temporary effects; if sufficient oil or gas is found. Dry wells are generally capped, and the sites are often restored naturally in a few years. However, significant access to such sites may continue to be used by others—by loggers of six hunters, for example. Thus, the access provided for exploratory drilling could have effects which last long after drilling has ceased.


Oil and Gas Production. The effects of producing wells are similar to those of exploratory wells; the differences are in the time and extent of the effects. A single, unsuccessful exploratory well in a transient event lasting only a few months to a year. The development of a field can be anything from the original single exploratory well on a small discovery to dozens of wells across hundreds of acres development may last several years and the drilling sites are typically larger than for exploratory wells. Traffic will be substantial while the wells are drilled and outfitted with the necessary equipment and storage facilities. Diam: diameter gathering pipelines (up to an inch in diameter) may be laid down to collect and move the oil and gas from various adjacent leases to a central processing site. Once fully developed, the human presence markedly since production is highly automated. However, inspection, maintenance, and other activities will continue to occur at the sites sporadically through the life of the field, which may be measured in decades. There are currently 19 producing wells in the COYR, with most (13) concentrated in the Big Piney Ranger District of the Bridger-Teton Nat’l Forest.

Geothermal Activities.

To date, the only geothermal activity in the COYR is the leasing of some federal lands, mostly near Island Park Reservoir. As with oil and gas leases, a geothermal leaseholding might have no direct impacts on other resources, the effects result from activities such as drilling which may occur because of the lease. In addition to the potential damage caused by increased human access, geothermal energy drilling could alter water supplies. But water releases from a geothermal operation could increase water temperatures, which could harm trout populations and thus the wildlife and recreation associated with those fish species. The hot brines contain dissolved minerals and are thus corrosive; their ultimate disposal presents a problem which has yet to be solved. The drilling could also alter underground hydrothermal systems, such as the geysers in Yellowstone National Park, but the U.S. Geological Survey reported that a link between Island Park and Yellowstone is unlikely. Finally, the energy must be used on the site, so the construction and operation of a power plant or other facility requiring heat is involved.

Energy Transmission Corridors.

Powerlines, moving energy in, out, or across the COYR, can affect wildlife and recreation. As noted under Water Developments, energy corridors can encourage access to previously unavailable areas, particularly for all-terrain vehicles. Of particular concern are the major east-west corridors considered by Bonneville Power Administration.
tion; these corridors would include a 600-foot wide right-of-way, carrying up to three Ultra High Frequency lines. The straight cleavings typical of such corridors are not particularly attractive, and could detract from recreation values in the area. In addition, an extended opening of this size could serve as a barrier to wildlife movement, especially for wildlife species which prefer cover for traveling. Thus, major energy transmission corridors could harm wildlife populations by altering migration patterns.

RECREATION

This section provides general information on recreation use and imputed economic values of recreation, as developed by the Forest Service to use in evaluating trade-offs in land management planning. More specific information is then provided on use, resulting economic activity, and other effects for downhill skiing, campinggrounds, picnic areas, and resorts, hunting and outfitters, sport fishing, and hiking, backpacking, and cross-country skiing. These are several major findings:

1. Recreation supports more employment than any other activity in the National Forests, and except for phosphate mining in the Caribou National Forest, is responsible for two-thirds of the jobs resulting from all activities in the National Forests.

2. More recreation is dispersed throughout the area than occurs at developed sites, although the imputed economic values for developed recreation are generally higher. The dispersed recreation occurs along roads primarily built for other uses (timber harvesting, etc.). This human intrusion into the farthest reached reaches of the CVBR is probably the most significant impact of recreation on the ecosystem.

3. The economic value of recreation used by the Forest Service for evaluating management alternatives appears to be only tenuously related to the local economic benefits, and inconsistent among adjoining Ranger Districts. These inconsistent values may result in inaccurate comparisons between recreation and other resources.

4. The data on levels and locations of various recreation activities are incomplete and inconsistent among agencies. National Park Service data particularly were lacking, but other agencies provided data which were incomplete over time and organized in categories which limit their utility in making management decisions. There was virtually no data on recreation use by locations for the Park Service and the Fish and Wildlife Service.

Recreational activities include a diverse group of actions by people visiting the Parks and forests for enjoyment. In Yellowstone National Park, visitation has increased spectacularly over the years from 5,118 visitors at the Park in 185,143 visitation rose to 2,262,500 in 1964. Grand Teton National Park reported 2.14 million visitors in 1964, with a significant overlap of visitors to the two Parks. Forest Service data showed more than 3.1 million visits to the CVBR National Forests in 1964; many of these visitors also visited Yellowstone NF. In sum, there may have been as many as 10 million visits to the Federal lands in the CVBR in 1964.

Some activities require intensively developed sites, while other activities can occur with no supporting facilities. The Forest Service divides recreation into two basic categories: dispersed and developed. Developed recreation sites result from "management intent" and include facilities such as campgrounds, picnic areas, resort or "developed" sites. On the other hand, some kinds of fishing, for example, might be considered developed while other kinds would be dispersed. The classification would depend on any ancillary facilities such as docks, toilets, etc.

Figure 4 graphically shows the number of Recreation Visitor Days (RVD) spent in 1964 in developed and dispersed recreation in the CVBR National Forests, by Ranger Districts. In three Districts,

144 The CVBR Bald Eagle Working Team A Bald Eagle Management Plan for the Greater Yellowstone Ecosystem WYoming Game and Fish Dept., Nov 1983 p. 20

145 Grand Teton National Park Superintendent Jack E. Stark's response to subcommittee's questions.


147 Recreation Visitor Day is defined as 'recreational use of National forest sites, areas of land or water, which aggregates 12 visitor-hours [16]. May consist of 1 person for 12 hours, 12 persons for 1 hour, or any equivalent combination of continuous or intermittent recreation use by individuals or groups.' Source: Forest Service RIM Handbook p. 84

148 Data provided by the Recreation Office of the Forest Service in Washington, D.C., for entire Ranger District. District with disjoint parts outside of the CVBR are included in the figures, and thus totals may overstate CVBR recreation in the Gallatin NF and the Custer NF.
Figure 6. Recreation Visitor Days (RVDs) by Ranger District in FY84

- Teton Basin (TNF)
- Palisades (TNF)
- Ashton (TNF)
- Island Park (TNF)
- Soda Springs (CA)
- Pinedale (BTNF)
- Buffalo (BTNF)
- Jackson (BTNF)
- Greys River (BTNF)
- Big Piney (BTNF)
- Kemmerer (BTNF)
- Wind River (SNF)
- Wapiti (SNF)
- Lander (SNF)
- Greybull (SNF)
- Clarks Fork (SNF)
- Beartooth (CUNF)
- Hebgen Lake (GNF)
- Bozeman (GNF)
- Gardiner (GNF)
- Livingston (GNF)
- Big Timber (GNF)
- Madison (BNF)

Ranger District

RVDs (x1000)
developed recreation exceeded dispersed recreation by a small margin, but overall, dispersed recreation accounted for two-thirds of the recreation in the GOVR National Forests in 1984.

The Forest Service provided data on recreation use by several types of activities. As shown in Table 11, camping and picnicking are the most common activities. Hunting and fishing account for nearly one million visits, while certain kinds of dispersed recreation—hiking, dispersed tent camping, and cross-country (X-C) skiing—are also popular. Finally, there are several ski resorts in the GOVR National Forests.

Recreation Data Problems

The only recreation data collected annually for all units of the National Park System concern overnight visitors and entrance statistics. Data on type of overnight stay were provided to the Subcommitter, but no data were available on other types of activities, such as hiking and fishing. Recreation data are only marginally better for the National Park Service's sister agency, the Fish and Wildlife Service. The FWS reported some data on hunting and fishing, but apparently collects information on few other categories of recreational activities.

Ironically, recreation data are far more extensive and available for the Forest Service than for the Nation's premier recreation agency, the National Park Service. However, the Forest Service data, while extensive and computerized, present their own problems of interpretation. The chief problem is that the Service's definitions of activities do not fit an intuitive concept of what such terms should include—a Service-wide problem that is not unique to the GOVER (see especially "Camping" and "Hiking," below.) In addition, reported numbers are often the local managers' best guess of actual levels of activity, rather than the result of surveys or samples. Notes: harnessing the weaknesses and gaps of the Forest Service's raw data, some comparisons can be made, but usually not between agencies.

Bowlill Skiing

There are nine operating downhill ski resorts in the GOVER, and three are in various stages of planning. (See Map 7 for locations.) The nine operating areas are:

(1) Red Lodge Mountain-Grizzly Peak in the Beartooth Subdistrict of the Custer National Forest. According to the Forest Service, the area is not known to have financial problems, and in fact has made "significant capital investments" over the last 10 years.

(2) Big Sky in the South Beartooth District of the Gallatin National Forest. The Forest Service noted that the area has returned approximately $28 million on an initial 1970 investment of $7 million.

<table>
<thead>
<tr>
<th>Year</th>
<th>Gallatin</th>
<th>Custer</th>
<th>Shoshone</th>
<th>Bridger</th>
<th>Caribou</th>
<th>Targhee</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>19.3</td>
<td>16.9</td>
<td>15.5</td>
<td>16.3</td>
<td>16.8</td>
<td>16.5</td>
<td>83.6</td>
</tr>
<tr>
<td>1985</td>
<td>16.8</td>
<td>16.0</td>
<td>15.5</td>
<td>16.4</td>
<td>17.3</td>
<td>16.5</td>
<td>79.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>78.2</td>
</tr>
<tr>
<td>1985</td>
<td>79.2</td>
</tr>
</tbody>
</table>

Data in this table for BC skiing and hiking were provided in response to the Subcommittees' questions to each National Forest, except for the Bridger-Teton. All data are from the October 1984 National Visitor Use Survey. The numbers for dispersed tent camping for the seven National Forests were provided by the Recreation Office of the Forest Service in Washington, D.C.

Note: For resorts not reported.

Note: Does not include tent camping; numbers refer to entire National Forest, including parts outside of the GOVER.

Note: Numbers refer to entire National Forest, including parts outside of the GOVER.

Note: The data are from the October 1984 National Visitor Use Survey.
by the developer. One-day lift tickets cost $22 for the 1986-87 season.

(3) Red Lodge Ski Camp in the Clarks Fork District of the Shoshone National Forest. This area is a very small facility, with no more than 200 Recreation Visitor Days annually from 1976-1984. According to the Shoshone National Forest, the facility "showed a loss in 1982, but operated profitably in 1983-84."

(4) Sleeping Giant in the Wapiti District of the Shoshone National Forest. This area is also fairly small. The USFS says the area "has failed to show a profit in the last three years (1982-84), and visitor days are declining."

(5) White Pine in the Pinedale District of the Bridger-Teton National Forest. Use at this area is "on a slight downward trend," according to the Forest Service.

(6) Snow King Mountain in the Cross Vents District of the Bridger-Teton National Forest. Use at this area is "on a slight upward trend."

(7) Jackson Hole also in the Cross Vents District. Use at this area "has increased only slightly in recent years and may be stabilizing." One-day lift tickets cost $26 for the 1986-87 season.

(8) Kelly Canyon in the Pinedale District of the Targhee National Forest. The Targhee calls the area "economically sound," but another Targhee ski area did not renew its permit in 1984 because of marginal economics.

(9) Grand Targhee in the Tetons Basin District of the Targhee National Forest. The Targhee response says that the area is "economically sound."

In addition to the nine operating areas, there are three areas at various stages of planning or development. The most controversial of these is Ski Yellowstone in the Hebgen Lake District of the Gallatin National Forest. (See discussion below under Effects on Other Resources.) Two additional ski areas, in the Targhee National Forest, are proposed, one near Sawmill Peak south of Henry's Lake, and another near Teton Pass.

Campgrounds, Picnic Areas, and Lodges

Map 7 shows the location of all campgrounds and picnic areas, resorts, ranches, and lodges in the GYVR, and Table 14 shows the number of campgrounds and picnic areas within each jurisdiction. These facilities are generally clustered along the roads leading up the valleys of the National Forests and along the network of roads through the National Parks and Wildlife Refuges. They are also, as might be expected, areas with high levels of other recreation activity, such as fishing and (where legal) hunting. (See "fishing" and "hunting," below, for discussions of these activities.)

<table>
<thead>
<tr>
<th>Campgrounds</th>
<th>Picnic Areas</th>
<th>Campgrounds</th>
<th>Picnic Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridger-Teton NF</td>
<td>18</td>
<td>Yellowstone NF</td>
<td>2</td>
</tr>
<tr>
<td>Grand Teton NF</td>
<td>9</td>
<td>Beartooth NF</td>
<td>0</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Rocky Mountain National Park</td>
<td>9</td>
</tr>
<tr>
<td>C.</td>
<td>2</td>
<td>Bridger-Teton NF</td>
<td>12</td>
</tr>
<tr>
<td>C.</td>
<td>4</td>
<td>Beartooth NF</td>
<td>0</td>
</tr>
<tr>
<td>C.</td>
<td>12</td>
<td>Grand Teton NF</td>
<td>9</td>
</tr>
<tr>
<td>C.</td>
<td>6</td>
<td>Galtz NF</td>
<td>1</td>
</tr>
<tr>
<td>C.</td>
<td>4</td>
<td>Teton NF</td>
<td>16</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Shoshone NF</td>
<td>6</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Teton NF</td>
<td>14</td>
</tr>
<tr>
<td>C.</td>
<td>18</td>
<td>Shoshone NF</td>
<td>6</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Teton NF</td>
<td>18</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Grand Teton NF</td>
<td>16</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Teton NF</td>
<td>18</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Grand Teton NF</td>
<td>16</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Teton NF</td>
<td>18</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Grand Teton NF</td>
<td>16</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Teton NF</td>
<td>18</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Grand Teton NF</td>
<td>16</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Teton NF</td>
<td>18</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Grand Teton NF</td>
<td>16</td>
</tr>
<tr>
<td>C.</td>
<td>0</td>
<td>Teton NF</td>
<td>18</td>
</tr>
</tbody>
</table>

Table 13 (p. 87) shows the overnight stays in campgrounds and in resorts and cabins for FY86 for all seven of the National Forests in the entire area of the GYVR. Picnic king is generally not the most frequent recreational activity in the GYVR, but if one assumes that a typical picnic does not take more than three hours, then the 40,305 RVs of picnicking in the Gallatin NF, for example, represent at least 129,000 person picnicking in that Forest.

Table 15 shows overnight stays for the three National Park System areas in 1984, the most recent year for which statistics are available. Overnight visits to resorts, lodges, and recreational camps are common, as is camping in various forms.

Table 15. Overnight Stays in National Park Units in 1984

<table>
<thead>
<tr>
<th>Park Unit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellowstone NF</td>
<td>2,694</td>
</tr>
<tr>
<td>Rocky Mountain National Park</td>
<td>1,543</td>
</tr>
<tr>
<td>Grand Teton NF</td>
<td>3,035</td>
</tr>
</tbody>
</table>

Table 15 includes overnight stays camping in organized groups, sleeping aboard boats, and any other type of stay not reported in another category. Campground stays include both concession-awarded and NPS campground.


Concession Camps

<table>
<thead>
<tr>
<th>Camp</th>
<th>NPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridger-Teton NF</td>
<td>14</td>
</tr>
<tr>
<td>Rocky Mountain National Park</td>
<td>7</td>
</tr>
<tr>
<td>Yellowstone NF</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
</tr>
</tbody>
</table>

1Includes overnight stays camping in organized groups, sleeping aboard boats, and any other type of stay not reported in another category.
Hunting and Outfitters

The Forest Service divides hunting into four categories: big game, small game, upland birds, and waterfowl. Big game hunting predominates in the CSFR, and for this analysis, all four subcategories have been added together. Figure 7 shows the distribution of hunting pressure in the federal administrative units of the CSFR where hunting is allowed. The Bridger-Teton, Gallatin, Targhee, and Shoshone National Forests accounted for 88% percent of all Hunting Recreation Visitor Days in the National Forests of the CSFR in 1976. Interestingly, the National Elk Refuge (NER) actually has the lowest hunting activity of the nine jurisdictions. This refuge, however, the destination for much of the huge migration of elk travelling from Yellowstone National Park south through the Bridger-Teton. By providing winter habitat, the Refuge makes possible the high levels of hunting activity in the Bridger-Teton.

It is difficult to assess fully the hunting activity in the CSFR because of gaps in the data. The most striking of these gaps is at the Caribou National Forest, which stated "Hunting RDF data for 1976 thru 1978: not kept on the Forest, but probably can be acquired from the archives in Washington, D.C." Another anomaly occurs on the Beaverhead, which reported identical statistics for all four subcategories of hunting for 1979, 1980, and 1981. These statistics were identical not only for the Madison District as a whole, but also within each of the Subdistricts.

Sport Fishing

Map 7 shows the areas of the CSFR judged by federal land managers to have especially heavy fishing use relative to other areas in the same jurisdiction. The areas indicated on the map are not the same as the areas of the best fishing, but rather the areas of the most fishing, based on the judgments of the area’s various managers. Several areas, both in and out of the two Parks, offer outstanding recreational fisheries, in the view of some observers. The most heavily used areas are listed in Table 16, p. 92.

\[16^{16}\] Caribou National Forest response to Subcommittees’ question 17

\[170^{10}\] Wright, Mary, representing the Montana Council of Trout Unlimited Greater Yellowstone Ecosystem Oversight Hearing, p. 549-551.
TABLE 16. Heavily Used Fishing Areas Within the GVR Federal Lands

<table>
<thead>
<tr>
<th>Area</th>
<th>Heavily Used Fishing Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beaverhead NF</td>
<td>Madison River (a certain tributaries)</td>
</tr>
<tr>
<td>Gallatin NF</td>
<td>Hebgen Lake, Gallatin River, Yellowstone River</td>
</tr>
<tr>
<td>Custer NF</td>
<td>Tributaries of the Yellowstone River flowing northeast</td>
</tr>
<tr>
<td>Shoshone NF</td>
<td>Clark's Fork of the Yellowstone River, the North Fork of the Shoshone River, and the Wind River</td>
</tr>
<tr>
<td>Bridger-Teton NF</td>
<td>Several artificial impoundments in the Wind...verser Range: Snake River</td>
</tr>
<tr>
<td>Caribou NF</td>
<td>Only a few scattered areas</td>
</tr>
<tr>
<td>Targhee NF</td>
<td>Henry's Fork, the Palisades Reservoir (on the Snake River); Inland Park Reservoir; and Henry's Lake</td>
</tr>
<tr>
<td>Yellowstone NF</td>
<td>Yellowstone Lake, Yellowstone River, Madison River, Firehole River, and Gibbon River</td>
</tr>
<tr>
<td>Grand Teton NF</td>
<td>Jackson Lake, Snake River</td>
</tr>
<tr>
<td>Rockefelder Parkway Snake River</td>
<td></td>
</tr>
<tr>
<td>National Elk Refuge Lower Flat Creek</td>
<td></td>
</tr>
<tr>
<td>Crazy Lake NR</td>
<td>No response</td>
</tr>
</tbody>
</table>

Figure 8 shows the number of fishing Recreation Visitor Days on those parts of the National Forests in the GVR. (The Targhee did not report data for 1976-77.) In the GVR in 1985, BVDs for fishing were highest in the Gallatin National Forest and lowest in the Beaverhead. Use of the two most heavily fished areas, the Gallatin and the Bridger-Teton, appears to have declined over the last decade.

Fishing BVDs at Red Rock Lakes National Wildlife Refuge and the National Elk Refuge were extremely low, with a peak of 1322 BVDs in 1977 and of 96A BVDs for the National Elk Refuge in 1985. Fishing at these two refuges was less than one per cent of all of the fishing BVDs in the GVR. No data were provided for Crazy Lake National Wildlife Refuge. Consequently, data for the Wildlife Refuges were not included in figure 8. There are no data for fishing BVDs at any of the three National Park System units, although managers did indicate the areas they thought were most heavily fished.
Figure 8. Fishing Recreation Visitor Days in the National Forests of the CGVR, FY76-FY85
Hiking, Backpacking, and Cross-Country Skiing

Analysis of the impact of hiking and backpacking is difficult for two reasons. First, the National Park Service and the Fish and Wildlife Service collect very few data on the subject. Second, while the Forest Service collects more voluminous data, the material is difficult to use because of unconventional definitions of these subjects. "Camping," for example, is divided into four categories: "Camping—General Use," "Camping—Auto," "Camping—Trailer," and "Camping—Group." According to the Forest Service, any and all of these activities may take place in a developed campground. Only the first and last can occur along a trail, remote from any road. The definition of tent camping also makes clear that activities of backpackers while on the trail or away from their tents should not be included in that activity code.

Moreover, the definition of "Hiking and Walking" is also unusual. "Foot travel (including jogging) for pleasure or exercise" includes sightseeing while traveling and rest or leisure stops that are not significant enough to render specific activities. No other category of recreation is as close to these activities usually considered hiking or backpacking. Here defined as walking, away from a road, across country or on a trail, while typically carrying a pack that contains food and other supplies for a trip of several hours to one or more days.

As a result it is impossible to estimate the amount of hiking and backpacking for any area of the CONR based on data available to the Subcommittee. It appears that information is not collected on hiking and backpacking by any agency active in the CONR. The Forest Service categories of "camping" (i.e., all four categories used by the Forest Service) and "hiking" should not be considered surrogates for backpacking. One should not, therefore, include backpacking as an unavoidable percentage of their total values.

One can only speculate on the level of hiking activity in the three National Park System units and the three National Wildlife Refuges. Hundreds of miles of trails cross these six areas and use is probably intense near roads in the summer. Some areas are periodically closed to hikers because of grizzly bear activity or the presence of whooping cranes, nesting trumpeter swans, and other wildlife management concerns. The effects of these closures on hikers are unknown, since no basic data are available on levels of hiking under normal circumstances.

However, data are available (see Figure 9) for "backcountry overnight stays" for the National Park System, which seems to be the best available surrogate for backpacking activity. However, these figures may include individuals whose main activity during the day is fishing, riding, or other activities.

17 Forest Service RM Handbook, p. 45.
Hiking, Backpacking, and Cross-Country Skiing

Analysis of the impact of hiking and backpacking is difficult for two reasons. First, the National Park Service and the Fish and Wildlife Service collect very few data on the subject. Second, while the Forest Service collects more voluminous data, the material is difficult to use because of unconventional definitions of these subjects. "Camping," for example, is divided into four categories: "Camping-General Day," "Camping-Auto," "Camping-Girl," and "Camping-Test." According to the Forest Service, any and all of these activities may take place in a developed campground. Only the first and last can occur along a trail, remote from any road. The definition of tent camping also makes clear that activities of backpackers while on the trail or away from their tents should not be included in that activity code. Moreover, the definition of "hiking and walking" is also unusual: "Foot travel (including jogging) for pleasure or access. Includes sightseeing while traveling and rest or leisure stops that are not significant enough to report as specific activities." So other categories of recreation are any closer to those activities usually considered hiking or backpacking were defined as walking, away from a road, across a country or on a trail, while typically carrying a pack that contains food and other supplies for a trip of several hours to one or more days.

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One can only speculate on the level of hiking activity in the three National Park System units and the three National Wildlife Refuges. Hundreds of miles of trails cross these six areas, and use is probably intense near roads in the summer. Some areas are periodically closed to hikers because of gryllus heat activity or the presence of whooping cranes, nesting trumpeter swans, and other wildlife management concerns. The effects of these closures on hikers are unknown, since no basic data are available on levels of hiking under normal circumstances. However, data are available (see Figure 9) for "backcountry overnight stays" for the National Park System, which seems to be the best available surrogate for backpacking activity. However, these figures may include individuals whose main activity during the day is fishing, riding, or other activities.

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17Forest Service BM Handbook, p. 95.
Figure 9. Tent Camping (Dispersed), Hiking, and Cross-Country Skiing in the Ranger Districts and Park System Units of the CGYA in FY84
fishing, and skiing create many jobs, but other recreation activities
(lodging, resort ranches, riding, camping, bird-watching, snowmobil-
ing, etc.), which are only reported in the aggregate, are consistently
among the largest generators of jobs, comprising over 50 percent of
all reported direct jobs for most of these National Forests.

As shown in Table 7 (p. 41), estimated direct jobs from the
existing ski areas range up to 556 on the Targhee. (The Shoshone
National Forest does not keep separate records of downhill skiing
jobs, since the numbers are so small; the Shoshone accounts for less
than two percent of GCVR downhill skiing Recreation Visitor Days in
1984.) There were 269 5 direct jobs in the GCVR due to downhill
skiing -- a higher total than any other single industry in the GCVR,
except phosphate mining. Indirect plus induced jobs added another 115
jobs in the GCVR.

Big game hunting, with or without outfitters, plays a major role
in the creation of jobs in several areas, particularly the Bridger-
Teton National Forest and the northern part of the Shoshone National
Forest. In contrast, small game hunting produces a total of only 14 6
direct jobs and 11 8 indirect or induced jobs in the entire GCVR.

Fishing activity can be locally important to the economy (see
Table 7, p. 41), particularly in the Jackson Lake Ranger District of
the Gallatin National Forest and in the east-flowing streams of the
Shoshone National Forest. (See Figure 8.) There are 47 direct jobs
related to fishing in the National Forests of the GCVR, and an
additional 73 indirect and induced jobs.

Table 7 (p. 41) shows that "Other Recreation" generates a very
high number of direct, indirect, and induced jobs in the GCVR.
Together, the resorts, campgrounds, and recreation cabin users
contribute more to the over -11 job market in the area than any other
single industry which depends directly on Federal lands in the GCVR.

Economic Value

Where available, values are given for economic values of recrea-
tional activities. "Economic value", (or "benefit value") as used by
the Forest Service, is not a measure of local or regional economic
impact. The Forest Service defines this term as a value "to quantify
the results of a proposed activity, project or program expressed in
monetary or nonmonetary terms." 177 While this definition is not
illuminating, in essence it means that the Forest Service attempts to
estimate how much each participant values a particular experience.
There are a number of methods, chiefly involving surveys of partici-
pants, that can be used to estimate such values. These methods might

177a 5 Department of Agriculture, Forest Service Draft
Environmental Impact Statement: 1985-2030. Resources Planning Act

produce a result showing that, for example, the economic value of a
cross-country skiing visit could exceed the value of a downhill skiing
visit, despite the fact that there are many more downhill skiers or that
downhill skiers individually (and of course collectively) spend more
money on the activity.

The term "economic value" may appear arbitrary, but the concept
has major implications for Forest Service planning, once the value is
calculated. This value is used, especially in recreation, to balance
in economic terms the various choices facing a manager in the planning
process. Effective harvesting or oil and gas drilling are estimated by multiplying the economic value by the
change in output. For example, if an exploratory oil well reduced big
game hunting, valued at $30 per Recreation Visitor Day, by 10 RDVs,
there is a $300 loss in total big game hunting value due to the
drilling. Thus, if the economic value of an activity is low or if the
resulting changes are estimated to be small, the effects may be con-
idered insignificant. Table 17 shows the imputed economic values of
several categories of recreation in the National Forests of the GCVR.

The Table contains several apparent anomalies. The Bridger-
Teton, an area well known for big game hunting, has exceptionally high
values reported for small game, upland birds, and waterfowl hunting.
Similarly, the Targhee and the Caribou report lower values for big
game hunting than for other types of hunting. However, the Shoshone-
Gallatin, and Custer show just the reverse pattern. No explanation
of these and other discrepancies was provided, but it is likely that very
different assumptions were used to estimate values in each of the
Forests.

The Table shows that imputed economic values for the same
activity in adjacent National Forests differ markedly. These differ-
ences might result from any of several reasons. Among the likely
possibilities is the use of different regional averages for these
values. Since three Forest Service regions are represented in the
GCVR, different values might be used even if the Forests are adjacent.
The disparity in imputed economic values of downhill skiing between
adjacent National Forests are particularly puzzling, the reason for
these differences is unclear and does not seem to parallel the
occurrence of major economic impact on the local economy. The use
of different regional averages with relatively little local adjustment, or to other unidentified factors may be the case.
In the eastern that the Forest Service bases policy on such anomalous data, decisions may
appear capricious or incomprehensible until the differences are
clarified or resolved.

Economic effects of hiking and camping outside of campgrounds are
especially difficult to evaluate, again because of the unusual
definitions used by the Forest Service for such terms. The imputed
economic values of camping includes both camping in recreational
vehicles in campgrounds and in tents in areas far from any road
children generally has a higher value than hiking of cross-country
skiing, but there is no explanation for such discrepancies. There are
TABLE 17  Forest Service Economic Values
for Recreational Activities
(in dollars per EUD; n/a = not applicable; n/r = not reported)

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Economic values (in dollars per EUD)

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1The Gallatin NF did not report year of data for hiking or E-C skiing.
2The Custer NF reported 1981 data for fishing.
3The Targhee NF reported 1978 data for downhill skiing and 1981 data for hunting and fishing.
4The Shoshone NF supplied a range of values for camping and picnicking, since "values used in Forest Planning were not broken down distinctly into the listed categories." The values in the table are the low limit; the upper limit is $13.84 per EUD for both categories.

No economic data available from the National Park Service or the Fish and Wildlife Service on these subjects. In general, the Federal agencies charge fees for camping at their developed facilities, although there may not be a fee charged outside of the peak part of the season. The law (16 U.S.C. 460a-6d) requires certain minimum facilities for the agencies to charge such a fee. Tent or trailer spaces, drinking water, access road, refuse containers, toilet facilities, fire facilities, visitor protection, and personal collection of the fees by an agent of the agency. The campgrounds may have sufficient space for a mere handful to several hundred campers.

Table 17 shows the imputed economic values of four categories of hunting EUDs. In contrast, the Custer National Forest cited a study by the Montana Extension Service173 which estimated an expenditure of $1,800 per harvested elk, which would be equivalent to a value far higher than the values shown in the Table—unless the average Montana hunter is spending roughly 60 days to harvest one elk (a good illustration of the difference between local expenditures and economic values). For fishing EUDs, the Gallatin National Forest cited two studies174. In Montana on expenditures by non-resident fishermen, Trout Unlimited reported an average expenditure of $217 per fishing trip by non-residents, and the Madison River Geothermal Study reported $78 per day for non-residents. As with hunting, these reported expenditures differ substantially from the imputed economic values reported by the Forest Service.

There are no data for the economic value of hunting or fishing recreation visitor days on the three National Wildlife Refuges. The Red Rock Lakes and the National Elk Refuge indicated that they do not collect such information. Grays Lake did not respond to the Subcommittees' inquiries.

There are small differences in the estimated economic values reported for summer and winter dispersed recreation. Winter dispersed recreation is rated slightly higher than summer dispersed recreation on some National Forests. These values are shown in Table 18. The reason for the enormous difference between the Bridger-Teton value and the other Forests' values for dispersed recreation is not clear, but may be due to Bridger-Teton's inclusion of such activities as bird-watching and nature photography as dispersed recreation, which other Forests did not include.
### TABLE 18. Forest Service Economic Values for Dispersed Recreation

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<th>Summer Use</th>
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<td>Gallatin NF</td>
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<td>6.00</td>
</tr>
<tr>
<td>Coeur NF</td>
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<tr>
<td>Shoshone NF</td>
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<td>9.19</td>
</tr>
<tr>
<td>Bridger-Teton NF</td>
<td>40.31</td>
<td>40.31</td>
</tr>
<tr>
<td>Caribou NF</td>
<td>3.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Targhee NF</td>
<td>3.00</td>
<td>3.00</td>
</tr>
</tbody>
</table>

1The Shoshone NF supplied a range of values, since "Values used in Forest Planning were not broken down distinctly into the listed categories." The value in the table is the lower limit; the upper limit was $13.84 per BPS for both winter and summer dispersed recreation.

2The Bridger-Teton NF, in its estimate of the economic value of other dispersed recreation in winter and summer, gave the values for "non-consumptive wildlife" use. This category therefore includes such activities as bird-watching, nature photography and study, etc.

**Effects on Water Quality**

One serious consequence of heavy backyard use is contamination of water supplies with human and pack animal wastes. (This is an occasional problem at campgrounds as well.) Of particular concern is human and pack animal fecal contamination, which can spread the parasite Giardia lamblia, and various bacterial contaminants. Contamination by pack animals may also occur. Giardia is a waterborne gastrointestinal disease that is rarely fatal, instead leaving many of its victims in temporary but acute misery. Protection is achieved either by boiling water, or by chemical treatment, with one expert recommending both.173

As many as 10 percent of the U.S. population may be carriers of giardia.174 It is reasonable to predict that contamination levels in the CCB are likely to increase as the number of visitors increases. However, very few studies have been done on the scope of this problem, so current risks in the CCB cannot be assessed.

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any young for several years. The effects of these platforms will be monitored for the next several years. 181

Ski Developments. Due to the mere presence of people, a ski facility may displace animals from critical winter habitat or reduce the suitability of an area for foraging, cover, or travel. Access roads to a facility may increase hunter access, fishing, pressure, or numbers of visitors outside of the ski season. The roads could also harm water quality and degrade fisheries habitat. (See Access under Timb. Harvesting, p. 97, for further discussion.) The condominium development usually required to make destination resorts profitable can have even wider effects due to increased human activity in the area, both winter and summer. For species such as grizzlies that avoid human contact, the area can be effectively closed to their use. Even less sensitive species, such as elk, can be excluded. An existing ski development -- Big Sky in Montana -- disrupts a Yellowstone National Park elk herd which passes through the area during its migration. However, a Park biologist judged the current effects as minor. If the size of the development does not increase. 182

The proposed Ski Yellowstone area - the most controversial ski development in the GNP. It is about 10 miles northwest of West Yellowstone on the north and east sides of Mount Helgen, and would occupy approximately 1,210 acres of private land and 1,700 acres of National Forest land. It falls within grizzly Management Situation II. (See Map 3 and Map 7.) However, it is near a grizzly bear "black hole" and ranks as "Highest Density" in bear use. (See Map 3 and Figure 4, p. 24.) Ski Yellowstone would also occupy an area currently used as an elk calving ground and would overlap moose winter range and calving grounds. 183

Ski Yellowstone's developers initially applied for a permit in 1973. A series of appeals have since been filed by opponents, and the developers have submitted additional materials in support of their application. A permit for development was issued by Gallatin National Forest in August 1982. This special use permit does not allow development until a final master plan, construction plans, and final financial approval are completed. The Gallatin has asked for additional information regarding Phase I of the development, and does not plan to allow any development to proceed until a cumulative effects analysis of grizzly habitat is complete. The Gallatin in reply stated that if the area is reclassified as grizzly Management Situation I, "then alteration of development plans may be necessary." 184 Certain environmental groups have announced plans to sue the Forest Service and the Fish and Wildlife Service concerning the permit.

Ski Yellowstone has bought over 1100 acres of private land (which has appreciated in value due to the proposed development), and has spent approximately $10,000 on one mile road across private land, as well as about $100,000 in planning costs, according to the Forest Service. 185 Planning costs and construction costs would not be recoverable if the development does not proceed.

The two proposed ski areas on the Targhee have received little attention. The Sawtooth Forest has proposed a "community exchange" for grizzly bears, while the area near Teton Pass is not considered part of grizzly bear range. (Compare Map 1 and Figure 4, p. 24.) Among the comments on the Targhee draft forest plan, no one supported any of the potential future ski area proposals. However, the Targhee stated its intention to manage the areas so as not to preclude future ski development. 186

Fishing Bridge. A major controversy also surrounds Fishing Bridge Campground and Visitor Centers in Yellowstone National Park. Fishing Bridge is the site of highly developed facilities on the north shore of Yellowstone Lake where the Yellowstone River drains from the Lake. As its name suggests, Fishing Bridge is a favored fishing site, for both humans and grizzly bears. More grizzlies have been removed from this area, either by death or to zone for control actions than from any other site in the GNP. (See Map 2.) Largely because of concern for the grizzlies, the National Park Service decided in 1974 to close the 71-year-old facility and move the center of human activity to Grant Village, south of West Thumb, where grizzlies are less common. (See Figure 4, p. 24.) As Grant Village expanded, Fishing Bridge was to be closed.

However, citizens, particularly those in Cody, Wyoming, became concerned that moving the facility would divert traffic and business from the Park. As a result, the Park Service agreed to keep Fishing Bridge open. In addition, the Advisory Council on Historic Preservation, a Federal agency, was not consulted on the move, and was concerned about the status of the National Historic District at Fishing Bridge. The Wyoming State Historic Preservation Office shared
these concerns. As a result of such issues, Fishing Bridge has not been closed.

The area is currently operating under Interim Guidelines 186 since 1977, camping at Fishing Bridge has been restricted to 'hard-sided' vehicles (recreation vehicles, trucks, station wagons, etc.), to reduce the risk of harm to either species from human-bear encounters. Additional restrictions contained in the interim guidelines include closure of some portions of the campground where grizzly use has been especially high, intense patrolling of the area for garbage confiscation of unattended food items left within reach of bears, reducing the number of National Park Service employees using cabin night patrols of campgrounds, and training of National Park Service personnel in bear security. A final Environmental Impact Statement on the closure and relocation is expected in May 1987, with a final decision following in June.

Poaching: The Beaverhead and the Gallatin National Forests identified poaching as a 'management' problem in the COG. The Gallatin staff said most poaching of elk, big horn sheep, moose, deer, and black bears occurred in Gallatin Canyon. The source asserted that 17 grizzlies have been poached in the COG in the last five years. Poaching is particularly damaging for grizzlies, due to the species' low population.

Bullets and Hillocks. There may be a direct conflict between hunters and grizzlies. Hunter camps may attract grizzlies because of the presence of carcasses and entrails of hunter kills. Grizzlies, with their acute sense of smell, may be able to detect the camps from considerable distances. The area around the Thoroughfare Plateau in the Teton Wilderness has been particularly controversial, since a great deal of elk hunting occurs there in the fall. The very high density of hunter camps, outfitters, and other recreational facilities - combined with the presence of many well-armed individuals and the elk carcasses - can lead to shooting of grizzlies attracted to those areas. The Thoroughfare Plateau has been the scene of many bear deaths over the last 10 years. (See Map 2.)

There are stringent regulations in the National Forests of the COG for the storage of game meat, fish, and human and animal food.


189: Correspondence between Mr. Tom McNamee and Bridges-Teton National Forest Supervisor. Five letters and memos dated between Sept. 3, 1985, and Sept. 26, 1985. Published by Forest Service Chief R. Max Peterson on March 16, 1986, to Chairman Sathering.


refute this observation. Loggers may also be reluctant to enter an area during a hunting season for similar reasons.

A Yellowstone National Park document sounds the following warning: "The hazard of a bear encounter is low, but very real. If you cannot accept the possibility of an encounter, then... elsewhere." Martinka has shown that, at Glacier National Park, human-grizzly confrontations and grizzly bear removals are strongly correlated with visitation rates. He argues that traditional management of confrontations has "stressed the aggressive treatment of problem bears," rather than "visitor management, as an independent variable, [holding] the key to reducing future confrontations and bear removals in the park environment." Since reductions in the total number of visitors are unlikely or even impossible, he emphasizes control of visitor distribution. Among his listed options are the following:

1. Relocation of trails and campgrounds.
2. Restriction of human activity in an area to times or seasons when grizzlies are unlikely to be present, and
3. Use of computer models with detailed information on visitor travel patterns, campsite use, and bear contacts.

These options are clearly not mutually exclusive. Moreover, the last option could consider far more variables than those cited by Martinka as predictors of grizzly bear confrontations. It is clear, however, that unless data bases are improved beyond those made available for this study, the computer modelling option at Yellowstone National Park is highly improbable at this time due to lack of even raw data on recreation use, rainfall, bear sightings, and bear movements, among other important factors. (See also the following chapter on grizzly bear mortalities.)

192Personal communication with Donald B. K English, Outdoor Recreation Planner, Southeast Forest Experiment Station, U.S. Forest Service, October 21, 1986.


CULTURAL AND HISTORIC RESOURCES

Although this report is primarily focused on the natural resources of the Yellowstone ecosystem, the cultural and historic resources of the area can also affect and be affected by human development activities. This chapter provides a description of what was reported to the Subcommittees about the historic and cultural resources in the CVBR. The major finding is that there is little information about the locations and importance of the cultural and historic resources in the area.

INFORMATION ON THE RESOURCES

Prehistoric and historic sites occur throughout the CVBR. Prehistoric sites are areas with relics which predate written history, such as burial grounds, calixes, petroglyphs (rock art), paleontological sites, and bone beds of bison and antelope. Historic sites include more recent sites that still have importance for understanding the area's history, such as structures associated with past mining activity and Native American Indian settlements. Parts of the area are also used by Native Americans for cultural and religious purposes.

Yellowstone National Park contains numerous cultural and historic sites. There are two historic districts (Fishing Bridge and Old Faithful), five individual structures, and one archeological site in the National Register of Historic Places for Yellowstone National Park, and three historic structures listed for Grand Teton National Park. There has also been a cultural site inventory for Yellowstone,194 which identified 279 cultural sites in the Park; of these, 223 sites are in Wyoming and 57 are in Montana, with none in Idaho. However, the inventory noted that more than 90 percent of the Park lacked a systematic survey of cultural resources, and it was "not

195Cultural Site Inventory of Yellowstone National Park, p. 9.
possible to predict the extent of archaeological resources within Yellowstone National Park.198

The National Forests in the CYN also contain numerous historic and prehistoric sites. Table 19 shows the number of sites identified by each National Forest, with data disaggregated by Ranger District where provided in such detail. Of these nearly 1,000 sites, nine are listed on the National Register of Historic Places, including two on the Beaverhead National Forest, four on the Shoshone National Forest, and three on the Bridger-Teton National Forest.199 In addition, the administrative sites of the Targhee and Caribou Forests and the Oregon and Lander Trail segments that cross the Caribou are eligible for listing on the National Register.200

Despite this listing of historic sites in the National Forests, the information on such sites is far from comprehensive. The State Historic Preservation Office for all three States described the incomplete records on cultural sites in the National Forests. The Idaho State Historical Society stated that "a majority of prehistoric sites on the Caribou National Forest have yet to be located since little cultural resources survey has occurred there."201 Further, "historic resources, in fact, appear to be the best-kept secret of the Forest Service. Unlike other issues which are discussed and debated, the issue of historic resources is virtually ignored."202 Finally, the Wyoming State Archives, Museums, and Historical Department stated that "most of the area delineated [by the CYN] for Wyoming has never been surveyed for cultural resources."203 Thus, the existing information on cultural and historic resources in the National Forests is not complete.

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198Cultural Site Inventory of Yellowstone National Park. p. 4
200Idaho State Historical Society, State Historic Preservation Office, response to Subcommittees' questions. p. 1
201Idaho State Historical Society, State Historic Preservation Office, response to Subcommittees' questions. p. 1
203Wyoming State Archives, Museums and Historical Department, State Historic Preservation Office, response to Subcommittees' questions. Cover letter.

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</tbody>
</table>

Despite this listing of historic sites in the National Forests, the information on such sites is far from comprehensive. The State Historic Preservation Office for all three States described the incomplete records on cultural sites in the National Forests. The Idaho State Historical Society stated that "a majority of prehistoric sites on the Caribou National Forest have yet to be located since little cultural resource survey has occurred there."204 Further, "historic resources, in fact, appear to be the best-kept secret of the Forest Service. Unlike other issues which are discussed and debated, the issue of historic resources is virtually ignored."205 Finally, the Wyoming State Archives, Museums, and Historical Department stated that "most of the area delineated [by the CYN] for Wyoming has never been surveyed for cultural resources."206 Thus, the existing information on cultural and historic resources in the National Forests is not complete.

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the Wyoming State Archives, Museum, and Historical Department stated that "most of the area delineated by the CGRM for Wyoming has never been surveyed for cultural resources." Thus, the existing information on cultural and historic resources in the National Forests is not complete.

PROTECTION OF THE RESOURCES

Federal agencies are responsible for preserving historic properties which they own or control. The National Historic Preservation Act directs the agencies to consult with the Secretary of the Interior and with State historic preservation officers in locating historic sites and recommending qualified sites for the National Register.

There has been some coordination among the Federal agencies for preserving historic sites in the National Forests. The Advisory Council on Historic Preservation (ACHP) reported 61 cases of consultation since 1972, principally with the National Park Service and the Forest Service, although they noted that their records may be incomplete for the older cases. One case of particular note is the Fishing Bridge Historic District in Yellowstone National Park. Beginning in 1974, the National Park Service has considered removing the buildings and returning the area to its natural state, because of the numerous confrontations between humans and grizzly bears. The Wyoming State Historic Preservation Office asserted that the area would qualify for the National Register of Historic Places, and the ACHP became involved in the dispute building demolition in 1980. The National Park Service program to clone Fishing Bridge was halted in 1983, but the agency has begun a new planning effort to reconsider closing the area.

The Council also felt that they were not consulted in all relevant Federal projects, particularly in the National Forests, specifically.


20WYoming State Archives, Museums and Historical Department, State Historic Preservation Office, response to Subcommittee's questions. Cover letter

20Advisory Council on Historic Preservation response to Subcommittee's questions. p. 9

20Advisory Council on Historic Preservation response to Subcommittee's questions. p. 5

20Advisory Council on Historic Preservation response to Subcommittee's questions. p. 8

Given the extent of timber sales, recreational developments, road construction and improvements, and other usual Forest Service activities, it would appear that many undertakings are occurring without offering the Council an opportunity to comment under the provisions of the National Historic Preservation Act.

The Forest Service is developing integrated land and resource management plans for the National Forests, but surveys of cultural and historic resources are generally only conducted on specific sites for each proposed project, oil and gas leases, for example. Include a stipulation requiring a survey for paleontological resources. Initially, the Advisory Council on Historic Preservation concurred with the Forest Service that the Forest plans would have no effect on historic properties, and has ratified a Programmatic Memorandum of Agreement allowing plan development without comments from the Council. However, the State Historic Preservation Offices have recognized that the Forest plans may provide for activities without adequately considering historic resources, the Montana Historical Society, for example, stated that 211

we strongly question whether the Forest Service can undertake "a systematic program of cultural resource inventory, evaluation and preservation aimed at the enhancement and protection of significant cultural resources values" in the absence of a full-time cultural resource staff specialist. Indeed, seven years [sic] work by seasonally employed to class has apparently not provided sufficient information on cultural resources to contribute to the planning alternatives of the draft [Forest plan].

The Advisory Council has since recognized that the Forest plans may allow activities without adequate cultural and historic resource protection, and is therefore currently negotiating a new agreement with the Forest Service. 212


211Advisory Council on Historic Preservation response to Subcommittee's questions. p. 9

211Advisory Council on Historic Preservation response to Subcommittee's questions. p. 8

211Advisory Council on Historic Preservation response to Subcommittee's questions. p. 5
EFFECTS ON OTHER RESOURCES

Cultural and historic resources, in and of themselves, have little effect on the ecosystem. They can, however, affect development activities by restricting activities in some areas. There are several ways in which protecting historic and cultural resources may affect human activities. The most common impact is stopping activities in certain areas; for example, the Bureau of Indian Affairs noted that operations which uncover archaeological sites in the Wind River Indian Reservation are halted, with undamaged sites left in situ, while damaged sites are removed. Cultural and historic sites may also need to be protected from natural processes. Normal weathering and natural catastrophes can damage these sites. For example, the Forest Service has developed a policy of not suppressing some wildfires, under prescribed conditions, to restore some of the natural ecological processes; however, an internal Wyoming State Historic Preservation Office memorandum suggested that this policy could damage historic resources, and fire management plans should be modified to protect these sites.

Finally, the designation of an historic site could increase the attraction of the area, possibly increasing the need to protect the site. In addition, increased recreation visits can influence land and resource management decisions, in much the same manner as other types and sites for recreational activities. Thus, protecting and designating cultural and historic sites could affect other resource uses (see Effects on Other Resources under Recreation, p. 101.)

213 Bureau of Indian Affairs response to Subcommittees’ question 2.
214 Quoting State Archives, Museums and Historical Department, State Historic Preservation Office, response to Subcommittees’ questions; Enclosure: Memorandum from Richard Bryant, Compliance Archivist, to Mark Jungre, Chief, April 26, 1984.

GRIZZLY BEAR MORTALITIES: A SITE-SPECIFIC ANALYSIS

Forest Service consideration of local fauna in land management planning relies on the concept of “indicator species.” The rationale for this concept is that, by assessing the well-being of the indicator species’ population, the health of its ecosystem will be protected. Thus, measuring the condition of the indicator species in the COYR serves as a surrogate for the much more difficult measurement of the condition of the whole ecosystem. The grizzly is a particularly appropriate indicator species for the Yellowstone ecosystem for several reasons: (1) its important habitats are also important to many other species; (2) grizzlies are sensitive to human intrusion, and (3) grizzlies often die in human-bear encounters.

Maintaining adequate populations of this grizzly bears depends on at least two major factors: the rate at which new bears are born, and the rate at which bears die. Both of these rates are, of course, affected by a host of other variables. Human actions affect the bear’s birth rates indirectly, by modifying—or not modifying—grizzly habitat, in a manner that is difficult to measure, and which makes it difficult to identify which bears will benefit. (See Chapter III, Development Activities for a discussion of these effects.) In contrast, bear mortalities caused by humans leave individual bears as victims. As noted earlier, the loss of adult female bears is particularly critical, since the loss of one or two adult females per year to this population constitutes the difference between a declining and a stable or expanding population. In other words, if the average loss of adult females from the ecosystem can be reduced by only one or two per year, the population will likely recover, though perhaps slowly if not. It will become extinct.

The following discussion analyzes current information concerning this indicator species, and its mortalities. The discussion considers particularly the clusters of mortalities and the locations and causes of deaths within these clusters. There are several major conclusions:

1. Data on grizzly mortalities are of unusually poor quality, and discrepancies in agency records are abundant. No single collection point exists, and agencies gather different kinds of information about deaths

2. While no single, over-riding cause exists for the bears’ population decline, the data reveal patterns in the causes of bear deaths at some mortality clusters. These causes may be preventable.
1. The Situation Management concept currently used by the agencies is not a useful management tool for preventing deaths of grizzly bears.

SOURCE OF INFORMATION

Several Federal and State agencies were questioned on locations of grizzly bear mortalities occurring between 1976 and 1985. The Fish and Wildlife Service, which has the responsibility of enforcing the Endangered Species Act, did not have any locality data for deaths before 1983, and the data provided for 1983-1985 was not sufficient to map locations; the agency replied that it did not maintain such specific information. The data from the State of Wyoming and from the Interagency Grizzly Bear Committee (IGBC) were sufficiently clear and thorough to permit analysis. Wyoming provided a map showing the entire IGBC with the location and year of each mortality, and a table showing the number of deaths due to various causes. The IGBC provided a table with information about each bear, a site (usually by township, range, and section), and some brief description of cause of death. Some inconsistencies should be expected when comparing hand-drawn maps with legal site descriptions. However, the extent of the discrepancies in this case is surprisingly large and reflects serious problems in the reporting techniques, especially since this information was the best available from the various sources. Moreover, these two sources rarely agreed with other, less comprehensive sources. Examples of discrepancies include:

1. Deaths identified as occurring at a certain creek or mountain in a given township, range, and section, when no such feature occurred in that section (and, in one case, was found in an adjoining State);
2. Deaths listed by one agency miles from any possible match with data supplied by other agencies.

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As reported by the State of Wyoming (from July 18, 1986, reply by State of Wyoming to Subcommittees' reply) and by the Interagency Grizzly Bear Coordinating Committee (Memo from Glen Counter, Threatened and Endangered Program Manager to IGBC, dated June 19, 1986).

<table>
<thead>
<tr>
<th>Mortality Cause</th>
<th>State of Wyoming Number Recorded</th>
<th>IGBC Number Recorded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Control</td>
<td>14 (4%)</td>
<td>22 (5%)</td>
</tr>
<tr>
<td>Research/Management Accident</td>
<td>8 (4%)</td>
<td>17 (6%)</td>
</tr>
<tr>
<td>Road Kill</td>
<td>5 (3%)</td>
<td>15 (6%)</td>
</tr>
<tr>
<td>Self Defense/Property Protection</td>
<td>2 (1%)</td>
<td>6 (1%)</td>
</tr>
<tr>
<td>Illegal</td>
<td>60 (46%)</td>
<td>21 (33%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>3 (2%)</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Total</td>
<td>94</td>
<td>63</td>
</tr>
</tbody>
</table>

218 "Management Control" refers to the deliberate killing or removal of bears from the ecosystem. From the standpoint of the recovery of the bear population, removed bears are equivalent to dead bears. "Research/Management Accident" includes bears which die during attempts to put collars or tags on them or which are accidentally killed when, for example, being moved to a more remote area.
The IGBC memo makes it clear that the data were compiled hurriedly and thus, some mistakes should be expected. The IGBC memo’s author recognizes the incompleteness and the discrepancies of various agencies’ records, and advocates preparation of a fuller, more nearly complete list. The truly surprising finding is that such information was not already accessible to the IGBC -- which is charged with coordinating the recovery of this population -- before Congressional inquiries began.

There was considerable difficulty in reconciling the site-specific information from the State of Wyoming with that of the IGBC. For example, the State of Wyoming reported at least seven deaths near the Thoroughfare Plateau in the Teton Wilderness of the Bridger-Teton National Forest which were apparently unknown to the IGBC. A death reported by the State of Wyoming near Baldy Mountain in the Palisades Ranger District of the Targhee NF was not reported by the Targhee. The methods used in this analysis may even underestimate the differences: a match between Wyoming and IGBC reports was assumed if the deaths were in the same general area (within about five miles) and in the same year; larger deviations were considered matches, if other factors, such as location on a certain stream, were the same. However, there were still considerable discrepancies. Thus, the number of matches listed in the discussion below is probably a maximum -- and the number of reported bear deaths therefore a minimum -- unless one of the reports includes more deaths that there actually were. Using the standards just described, there were seven areas within the CGWR that appeared to have clusters of mortalities. (See Figure 10.)

Policy makers are also handicapped by lack of data on reasons for "management control" deaths, which accounted for 19 percent of the grizzly mortalities reported by Wyoming and 35 percent of those reported by the IGBC. A manager wishing to reduce human/grizzly conflict is left with little useful data upon which to base management decisions if the reason for the management control is omitted from the record. Management decisions might be quite different if, for example, the cause of past management controls was the habituation of bears to human handouts or animal carcasses by outfitters, rather than the presence of confirmed sheep killers. However, from the standpoint of the grizzly population, it is irrelevant how a bear was removed from the ecosystem: by death (shooting or drug overdose) or alive (removal to a zoo or British Columbia), and such information may be less important to managers.

In short, the best available data on grizzly mortalities are incomplete, contradictory, and do not provide sufficient information for informed decisions. Moreover, the tenure of managers in the Forest Service, Park Service, or Fish and Wildlife Service may be quite short. Thus, relying primarily on memory and personal familiarity with an area is insufficient for assuring recovery of the grizzly population.
Despite the weaknesses and discrepancies in the data, grizzly mortalities over the last 10 years show concentrations in seven areas in the GYUS. These areas are therefore sites where activities by humans are having demonstrated effects on the natural ecosystem. The following discussion describes the bear deaths, and briefly discusses known activities which might affect the likelihood of grizzly recovery. Failure to discuss a particularly development activity means that no major conflict between that activity and grizzly survival was known by the Subcommittees to occur. There may be development conflicts of which the Subcommittees are unaware.

**Gardiner, Montana**

Three deaths were reported in this area by both the State of Wyoming and the ICBC, and four additional deaths were reported by the ICBC. Most of these deaths are in the zone classified as grizzly bear Management Situation II, but one is outside the Situation areas altogether. This last death, in 1982, area of "common sightings", while the others were in either high or highest density use. (See Figure 4, p. 76.)

Of the seven ICBC reported deaths, one was a 1982 management control near Crystal Creek Mountain, with no reason given. Two others, in 1981, were also management controls (again with no reason given); at the Gardiner town dump. Two deaths (in 1977 and in 1979) were management controls taken because of cattle predation. These were the only two management controls listed in the ICBC memo for which a reason was clearly stated. In 1981, a grouse hunter was attacked and killed a bear in self-defense. Finally, a 1981 death was an illegal kill in which the bear was shot and left on a road.

The area downstream from Gardiner, along the Yellowstone River, provides important habitat for both bald eagles and trumpeter swans. It is also heavily used for sport fishing. The entire area is important winter range for the northern Yellowstone elk herd.

There are some heavy insect infestations of timber near Gardiner, suggesting possible future forest service timber sales to control the outbreak. Most of the infestations are at least five miles from past mortalities, but one is near the 1982 site of a management control, and the Gallatin National Forest is planting a logging operation very close to, if not on, this site. There is an oil and gas lease at Sheep Mountain, about eight miles from the nearest grizzly mortality, and another lease near Steamboat Mountain, roughly four miles from the 1982 mortality. However, there are no wells at either site. There has been extensive mining and prospecting in the area around Gardiner and the nearby town of Jardine.
### TABLE 21. IGBC Data on Grizzly Mortalities Near Gardiner, Montana

(*) is judged to be a match with data provided by State of Wyoming.

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Sex</th>
<th>Age</th>
<th>Remarks/Collar Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/22/83</td>
<td>T95, BEE, Sec 16</td>
<td>M</td>
<td>16</td>
<td>Mgmt control</td>
</tr>
<tr>
<td>5/22/83</td>
<td>T95, BEE, Sec 16 (Town Dump)</td>
<td>F</td>
<td>12</td>
<td>Mgmt control</td>
</tr>
<tr>
<td>7/29/82</td>
<td>T76, BEE, Sec 27 (Reported as T85, but site on Miner Creek requires T76)</td>
<td>F</td>
<td>2</td>
<td>Mgmt control</td>
</tr>
<tr>
<td>10/16/81</td>
<td>T95, BEE, Sec 5</td>
<td>F</td>
<td>22</td>
<td>Illegal, shot</td>
</tr>
<tr>
<td>9/13/81</td>
<td>T95, KVE, Sec 31</td>
<td>F</td>
<td>8</td>
<td>Self-defense grizzly</td>
</tr>
<tr>
<td>10/19/79</td>
<td>T85, R7X, Sec 20</td>
<td>M</td>
<td>7</td>
<td>Mgmt control: cattle</td>
</tr>
<tr>
<td>9/20/77</td>
<td>T85, R7X, Sec 21</td>
<td>M</td>
<td>11</td>
<td>Mgmt control: cat.</td>
</tr>
</tbody>
</table>

With no further information on the reasons for the three unexpected management controls or the illegal shooting, it is difficult to generalize about the human/bear conflicts around Gardiner.

**Cooke City, Montana**

There have been eight grizzly deaths in the Cooke City area in the last 15 years. Seven deaths were reported by the State of Wyoming and six by the IGBC, with an apparent agreement on five of these deaths. Some of the deaths in this area occurred in Situation I, others in Situation II. The area is classified partly as highest density use and partly as common sightings. (See Figure 4, p. 24.)

The IGBC provided records for a total of six of these eight deaths. Three of these were management controls, with no reason given. Three were illegal, with carcasses found in 1976, 1978, and 1981. Two of these were left at the town dump, and one was found on a mouse carcass. (Whether the mouse was attacked and killed by the bear or whether the mouse was a hunter’s kill was not stated.) Two of these kills occurred in September, and for the third the date was unknown.

The Gallatin National Forest plans timber sales in an area that has been the site of several bear deaths, and is near the site of several additional deaths. There are some mines in the general area, and the IGBC reported that the Cooke City area was once an important mining area, and continues to be a major reserve of metals. Zinc is produced at some of the mines.

### TABLE 22. IGBC Data on Grizzly Mortalities Near Cooke City, Montana

(* is judged to be a match with data provided by State of Wyoming. 7 = information not known or not provided by IGBC memo.)

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Sex</th>
<th>Age</th>
<th>Remarks/Collar Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/5/85</td>
<td>Silver Gate</td>
<td>F</td>
<td>4</td>
<td>Mgmt control, #67</td>
</tr>
<tr>
<td>7/31/82</td>
<td>T95, R14X, Sec 25</td>
<td>F</td>
<td>15</td>
<td>Mgmt control</td>
</tr>
<tr>
<td>7/31/82</td>
<td>T95, R14X, Sec 25</td>
<td>M</td>
<td>14</td>
<td>Mgmt control</td>
</tr>
<tr>
<td>9/9/81</td>
<td>T95, R15E, Sec 18</td>
<td>M</td>
<td>5</td>
<td>Illegal, shot on mouse</td>
</tr>
<tr>
<td>7/7/80</td>
<td>T95, R15E, Sec 31</td>
<td>M</td>
<td>3</td>
<td>Illegal, shot, left at</td>
</tr>
<tr>
<td>9/21/76</td>
<td>T95, R14X, Sec 29</td>
<td>M</td>
<td>4</td>
<td>Illegal, shot at dump</td>
</tr>
</tbody>
</table>

(2 additional deaths reported by State of Wyoming in this area)

With no further information on the reason for the three unexpected management controls, it is difficult to generalize about the human/bear conflicts around Cooke City, but it seems that illegal kills may be an important problem in this area.

**Crandall Creek/Sunlight Creek, Shoshone National Forest, Wyoming**

There appear to have been nine grizzly deaths in the Crandall Creek/Sunlight Creek area of the Shoshone National Forest over the last 15 years, according to the State of Wyoming, but only two were reported by the IGBC. Most occurred in Situation I, although a few were in Situation II. The area is ranked largely as high or highest density use. (See Figure 4, p. 24.)

In 1982, a bear was shot illegally, while a 1984 kill is still under investigation. Wyoming reported three deaths around Sunlight Creek plus 16 deaths in the Crandall Creek area for 1982, but the IGBC memo notes that there may be some duplicate counting (without

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21 S. Geological Survey response to Subcommittees' questions Maps of mines and metallic resources.
Forest Service managers identified Sunlight Creek as a heavily used sport fishery. A study of a nearby area (the Clark’s Fork drainage) showed that grizzly use was seasonal, with most of the use in spring and fall, and that these bears also used the Crandall Creek area. The study also showed that the Clark’s Fork area is important to mosees, and that grizzlies prey upon these mosees during the fall. Sunlight Creek is also the site of a long-standing proposal by the Bureau of Reclamation for a hydroelectric dam. This proposal has never been authorized or funded, but its implementation and the attendant increase in human activity could pose a threat to resident bears.

If the IGBC is correct, and the Wyoming map contains a substantial number of duplications, this area might be less important in overall grizzly mortality. The 1982 death listed in the table below, plus another to the south, were the only ones reported by the IGBC in the Shoshone National Forest for 1982. In contrast, the Shoshone National Forest listed (without giving location) four deaths in 1982 from poaching and one from unknown causes. Given this particularly confusing situation, it is difficult to generalize about the human/bear conflict in this area, but it is possible that illegal killings are a problem in this area.

TABLE 2: IGBC Data on Grizzly Mortalities Near Crandall Creek and Sunlight Creek, Shoshone National Forest, Wyoming

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Sex</th>
<th>Age</th>
<th>Remarks/Collar Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/12/84</td>
<td>TSHR, RIOVI, Sec 10</td>
<td>Sub</td>
<td>Unknown, collar #108</td>
<td>adult</td>
</tr>
<tr>
<td>6/1/82</td>
<td>TSHR,RINDS, Sec 34</td>
<td>M</td>
<td>Illegal, shot</td>
<td></td>
</tr>
</tbody>
</table>

(Additional death reported by State of Wyoming; IGBC suggests some duplicate counts)

220Shoshone National Forest response to Subcommittees' question 16


222Shoshone National Forest response to Subcommittees’ question 16
TABLE 24. ICBC Data on Grizzly Mortalities Near the Thoroughfare Plateau, Teton Wilderness, Bridger-Teton National Forest, Wyoming (*= judged to be a match with data provided by State of Wyoming; 7 = information not known or not provided by ICBC memo.)

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Sex Age</th>
<th>Remarks/Collar Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/3/85</td>
<td>Teton, R100V, Sec. #</td>
<td>F+7</td>
<td>Illegal, shot</td>
</tr>
<tr>
<td>11/3/81</td>
<td>Teton, R110, Sec. 16</td>
<td>H+3</td>
<td>Illegal, at outfitter's camp</td>
</tr>
<tr>
<td></td>
<td>Hawks Nest, Camp Bur.</td>
<td></td>
<td>Detta (reported as R105V, but should be R110)</td>
</tr>
<tr>
<td>9/16/80</td>
<td>Schultz Camp, Pass Creek</td>
<td>H+11</td>
<td>Illegal, mistaken identity</td>
</tr>
<tr>
<td>9/26/77</td>
<td>Phelps Pass</td>
<td>F+16</td>
<td>Illegal, at hunter's camp</td>
</tr>
</tbody>
</table>

(7 additional deaths reported by Wyoming)

The ICBC reported all five deaths as management control actions (or similar terms), without elaboration. Although some explanations for these actions can be ruled out by the setting (e.g., conflicts with grazing and hunters), it is not possible to draw specific conclusions about the cause (or need for) management control from this record.

The area in and around Fishbowl Bridge provides food and nesting sites for both bald eagles and trumpeter swans. Visiting cranes from the Grays Lake experimental flock (the first whooping cranes in the Park in decades) were seen in this area in 1985. As the name Fishing Bridge suggests, Yellowstone Lake and the Yellowstone River both experience very intense fishing pressure.

Recreational development is highly concentrated around Fishing Bridge. Including numerous campsites, picnic areas, boat docks, two amphitheaters, two stores, two restaurants, a shower and laundry, two lodges, a post office, two gas stations, and a ranger station. At Fishing Bridge itself, camping is allowed only in hard-sided vehicles (trailers, recreational vehicles, station wagons, etc.) because of the danger from bears. It seems likely that the bear deaths are related to the heavy tourism pressure in the area, but whether the conflicts were at fishing sites, the campgrounds, etc., is not clear. That three of the five management controls occurred during the heavy August visitor season tends to support this hypothesis.

TABLE 25. ICBC Data on Grizzly Mortalities Near Fishing Bridge, Yellowstone National Park, Wyoming (* = judged to be a match with data provided by State of Wyoming.)

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Sex Age</th>
<th>Remarks/Collar Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/18/86</td>
<td>Fishing Bridge</td>
<td>H+7</td>
<td>Mgmt. control, #8</td>
</tr>
<tr>
<td>10/16/86</td>
<td>Lake Lodge</td>
<td>M+2</td>
<td>Mgmt. control</td>
</tr>
<tr>
<td>8/12/78</td>
<td>Bridge Bay</td>
<td>M+4</td>
<td>Mgmt. control, #715</td>
</tr>
<tr>
<td>8/11/77</td>
<td>Bridge Bay</td>
<td>M+10</td>
<td>Mgmt. control</td>
</tr>
<tr>
<td>9/19/76</td>
<td>Fishing Bridge</td>
<td>F+11</td>
<td>Mgmt. control, #715</td>
</tr>
</tbody>
</table>

(5 additional deaths reported by Wyoming)

Falls River/Conant Creek, Targhee National Forest, Wyoming and Idaho

There appear to have been 10 deaths in the Falls River/Conant Creek area in the last 10 years. Of the 10 deaths reported by the State of Wyoming, four were also reported by the ICBC memo. Night and Eberhardt classify some of this area as highest density, other portions as high density, and the remainder as common sightings. (See Figure 4, p. 24.) The entire area is Situation 1.

Two of the four deaths reported by the ICBC were suspected illegal kills and one was self-defense. The fourth was suspected accidental drug overdose, although the sex and age of the bear were not known.

This area is home to a large number of nesting trumpeter swans and bald eagles. (See Map B.) It also provides year-round habitat for both species. There are heavy insect infestations in tamarack in much of this area. In some of the heavily infested areas there have been designated wilderness and therefore cannot be logged. It appears that at least three of the bear deaths may have occurred at sites which have already been logged, and one of these sites, if it has not been logged already, is scheduled to be. (When the bear deaths occurred with respect to logging operations is unclear from the data available to the Subcommittees.) There are also two applications for oil and gas drilling permits, one in the lower Falls River area, and the other in the lower Conant Creek area. Each is roughly four miles from the nearest mortality site. There is also an oil and gas lease just three miles south of a grizzly mortality site, straddling the Idaho-Wyoming State line. There is no well at this site.
Owes and Williams\textsuperscript{224} reported seven grizzly deaths in this area between 1976 and 1986 that were estimated to be associated with sheep grazing allotments. It is impossible to determine how many match the deaths reported by the ICBC or the State of Wyoming. In Situation I areas, the Taghee National Forest has chosen not to renew sheep allotments that have been violated, has required special maintenance procedures at sheep camps to reduce the attractiveness of these camps to bears, and has converted one sheep allotment to a cattle allotment -- all measures which should reduce the risk of bear mortalities\textsuperscript{223}. The new policy of not renewing violated permits and the conversion of existing sheep permits to cattle permits, together with poor economic conditions in the sheep industry, will probably reduce grizzly mortalities in this area in the future.

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Sex</th>
<th>Age</th>
<th>Remarks/Cause Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/11/82</td>
<td>Teton, Blaine, Sec. 17</td>
<td>F*</td>
<td>15</td>
<td>Self-defense hunter</td>
</tr>
<tr>
<td>9/20/79</td>
<td>Montoly Peak</td>
<td>M*</td>
<td>12</td>
<td>Suspected illegal kill</td>
</tr>
<tr>
<td>7/17/81</td>
<td>Indian Lake, Squirrel Meadow</td>
<td>M*</td>
<td>2</td>
<td>Suspected illegal kill, #30</td>
</tr>
<tr>
<td>8/21/76</td>
<td>Teton, Blaine, (Sec 287)</td>
<td>F*</td>
<td>7</td>
<td>Possible drug overdose</td>
</tr>
</tbody>
</table>

(6 additional deaths reported by Wyoming)

Mount Helena, Montana, to Henry's Lake, Idaho.

There appear to have been 13 deaths in the Mount Helena/Henry's Lake area in the last 10 years. Ten deaths were reported by the State of Wyoming, and eleven by the ICBC, with apparent agreement on seven of these deaths. The area is a patchwork of Situation I, II, and III. Most of the deaths occurred in areas ranked highest density, but at least three were in areas of common sightings. (See Figure 4. p. 24.)


\textsuperscript{225}Owes and Williams, Coordinating Livestock and Timber Management With Grizzly Bears, p. 195, 201

Four of the deaths reported by the ICBC were explained as due to management controls, with no further elaboration given, and three more deaths were management accidents, without explanation of whether the agency intended more the bears to another site in the CDR or whether the intent was to remove the bears from the ecosystem (i.e., "kill" them, with respect to the ecosystem anyway). Of the remainder, two were due to a car accident, and two were shot. These last two were shot at a private "tent," perhaps a resort or residence -- presumably (by inference) to defend human lives or property.\textsuperscript{226}

This area is important to bald eagles, trumpeter swans, and some of the young whooping cranes from the Grays Lake National Wildlife Refuge experimental flock. The fishing pressure is among the most intense in the entire CDR, and focuses mainly on Hebgen Lake and the Madison River in Montana, and Henry's Lake and Henry's Fork of the Snake River in Idaho.

Like Fishing Bridge recreational development in this area is intense. There are a number of campgrounds, resorts, second homes, recreation facilities, boat docks, and other facilities in the area. (See Map 7.) The town of West Yellowstone in the center of this area, forms a gateway to Yellowstone National Park and provides many essential services to visitors. The problem for grizzly populations is more complex than at Fishing Bridge, because so much of the land in the area is privately owned. In addition, the proposed 357 Yellowstone project lies in this area and one mortality (the 1976 car accident) lies inside the boundaries of the development. This same use area has already been leased for possible oil and gas development.

There are widespread insect infestations of timber in the northern half of the area. Again, it appears that the Targhee and the Gallatin National Forests have plans to log on or near the sites of as many as eight of the 15 deaths in this area. Three of the sale planning areas lie directly between the Situation I habitat in Yellowstone National Park and the distant island of Situation I habitat less than 10 miles to the west. Parts of the proposed sale areas are classified as heavy grizzly use by Knight and Sherard. Logging for other uses could effectively isolate this island of suitable habitat from the mainland of Situation I habitat. Finally, the increased human presence, if it occurs at times or seasons when bears are active, will expose bears to greater risks of fatal confrontations. Depending on the silvicultural system used, habitat fragmentation could be temporary. However, substantial clearings and sustained human traffic could permanently eliminate grizzlies from this habitat.

\textsuperscript{226}If these two were counted as self-defense or property protection, than only one is a rather than three reported by the ICBC due to self-defense/protection protection is unaccounted for in the site specific data.
Geothermal leases cover the southern portion of this area, including the site of two 1977 hunting deaths. There are also oil and gas leases in much of the Henry's Lake/Mount Nez Perce mortality cluster, including the sites of eight grizzly deaths; the site of a ninth is nearby. These oil and gas leases are nearly all in the northern portion of the mortality cluster, on the Gallatin National Forest, with roughly a third of the acreage in Situation I habitat and the rest in Situation II. Most of the leased area is ranked as high or highest density use by Knight and Everhardt. While these are currently on producing wells in the area, energy development, in combination with the proposed timber sales could require the bears to

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Sex</th>
<th>Age</th>
<th>Remarks/Collar Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/21/73</td>
<td>T18S, B3E, Sec 36</td>
<td>M</td>
<td>6</td>
<td>Mgmt. control</td>
</tr>
<tr>
<td>9/24/73</td>
<td>T13S, B3E, Sec 34</td>
<td>F</td>
<td>13</td>
<td>Mgmt. control, #30</td>
</tr>
<tr>
<td>10/3/73</td>
<td>T13S, B3E, Sec 34</td>
<td>F</td>
<td>6</td>
<td>Mgmt. control</td>
</tr>
<tr>
<td>11/8/73</td>
<td>T12S, B3E, Sec 10</td>
<td>M</td>
<td>4</td>
<td>Car accident</td>
</tr>
<tr>
<td>11/30/73</td>
<td>T18S, B3E, Sec 34</td>
<td>M</td>
<td>12</td>
<td>Mgmt. control</td>
</tr>
<tr>
<td>12/3/73</td>
<td>T18S, B3E, Sec 34</td>
<td>M</td>
<td>4</td>
<td>Car accident</td>
</tr>
<tr>
<td>10/10/73</td>
<td>T12S, B3E, Sec 10</td>
<td>M</td>
<td>1</td>
<td>Mgmt. Control</td>
</tr>
<tr>
<td>10/3/73</td>
<td>T18S, B3E, Sec 10</td>
<td>M</td>
<td>1</td>
<td>Mgmt. Control</td>
</tr>
<tr>
<td>10/2/73</td>
<td>T13S, B3E, Sec 34</td>
<td>M</td>
<td>5</td>
<td>Mgmt. control</td>
</tr>
<tr>
<td>12/3/73</td>
<td>T18S, B3E, Sec 34</td>
<td>M</td>
<td>5</td>
<td>Mgmt. control</td>
</tr>
<tr>
<td>12/3/73</td>
<td>T18S, B3E, Sec 34</td>
<td>M</td>
<td>5</td>
<td>Mgmt. control</td>
</tr>
</tbody>
</table>

Unlike the damage to bald eagles from DOT, the fate of the grizzly bear in the GMTV does not hinge on one great over-riding threat. There are many causes, but patterns among the various deaths can be used as a guide to preventing future deaths.

**Geothermal Data**

The inconsistencies of the various sources concerning grizzly mortalities present a serious problem both for estimating the population of bears at any given time and for managers wishing to use the information in management decisions. Additional data on each grizzly mortality would improve estimates and allow for better management decisions. These additional data include:

1. Statistics on each death: sex, age, approximate weight, date of death (as accurately as possible), and collar or tag number, if any, carcasses in which decomposition has proceeded too far to yield this information should be reported as such.
2. The discovery date and location of each death (using legal descriptions, or some other mapping system of equal or better accuracy).
3. The cause of each death, using forensic techniques if necessary (Probable cause or causes) could be recorded, but known causes should be distinguished from estimates.
4. The bear's actions at the time of death (if possible); this may be important for understanding the history and cause of the
death, and should not be subject to opinions on the relevance of the bear's actions.

The.core_. for management control actions (including non-fatal actions) should become part of the record of grizzly bear management in the GVRD. Such information is far more important to understanding the cause of the death than is a precise description of the method used to dispatch a bear. Non-fatal control actions which remove a bear from the GVRD (to a zoo or to Canada, for example), as they are equivalent to a mortality, for the ecosystem. Finally, non-fatal control actions where a bear is moved within the GVRD are also important because they indicate problem areas and problem bears, both of which may require additional management attention in the future.

The overriding problem with grizzly mortality data is that no agency or group appears to be responsible for maintaining the records. Discrepancies are thus likely to continue. This lack of basic data seriously hampers efforts to increase grizzly bear populations and to reduce human-bear confrontations. The accuracy and comprehensiveness of grizzly mortality data would be greatly enhanced by designating a lead agency responsible for maintaining records of past and all future bear deaths, and for resolving as many discrepancies among existing records as possible.

Preventing Grizzly Bear Deaths

New human intrusions into an area around a mortality cluster are particularly important, and each federal agency having management responsibility should evaluate management decisions allowing new entries carefully. The existing data show a reasonably clear pattern; as they already exist on the Thoroughfare Plateau and the Falls Creek/Conant Creek area, special efforts to reduce the cause of the conflicts can reduce grizzly mortalities. In the Falls Creek/Conant Creek area, current policy has already begun to reduce the likely human/bear confrontations over grazing; these efforts could be continued or even accelerated. On the other hand, there have recently been complaints about poor enforcement of regulations protecting hunters and grizzlies from each other at the Thoroughfare Plateau.

The data for Gardiner, Cooke City, and Crandall Creek/Sunlight Creek are too vague to suggest definite action. Better data... including new information on the past deaths... is needed to identify causes and suggest appropriate control actions. The data on bear deaths around Fishing Bridge are almost useless for making management recommendations. If a pattern emerges when the causes of the management controls are studied, specific steps should be taken to address those problems. In the ongoing debate concerning Fishing Bridge and whether it should be closed, bear mortality data should be part of the debate.

22Callatin National Forest response to Subcommittee's question 20.
FEDERAL AGENCY COORDINATION AND INFORMATION

Numerous Federal agencies are active in the OSBR, including the Forest Service, the National Park Service, the Fish and Wildlife Service, the Bureau of Land Management, the Bureau of Reclamation, the Army Corps of Engineers, the Geological Survey, the National Oceanic and Atmospheric Administration, and more. Coordination is especially important in such an area, so as to avoid duplicative and contradictory programs. This section describes the major legal requirements for inter-agency coordination, identifies and examines the numerous coordinating groups which have been formed, and discusses the information "systems" of the four major Federal agencies in the OSBR that are used to facilitate management and coordination. There are two major findings:

1. The existing coordinating committees are not comprehensive in either agency membership or approach. There is little likelihood of coordinated management of Federal lands in the Yellowstone ecosystem under the existing structure.

2. The existing information is inadequate to analyze the site-specific impacts of proposed actions or to resolve management conflicts. The Forest Service organizational structure is better designed for providing ecosystem-wide data than the structure of the other Federal agencies.

LEGAL REQUIREMENTS

Several laws require Federal agencies to consult with one another in planning their activities. The National Environmental Policy Act provides for coordination in assessing environmental effects of major Federal actions. The laws guiding multiple-use management planning for the NPS and the Forest Service have more explicit direction on inter-agency cooperation. The Endangered Species Act authorizes the use of the Fish and Wildlife Service to restrict, modify, and even prevent Federal actions which would jeopardize the continued existence of rare species. Finally, the National Historic Preservation Act requires Federal agencies to consult with the Advisory Council on Historic Preservation for cultural and historic sites potentially affected by Federal projects. These four laws provide major direction on inter-agency coordination in Federal land management. Although other laws require coordination on specific issues or in specific circumstances, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved.

A Federal agency undertaking a project which requires an environmental statement must, therefore, consult with other Federal agencies which have expertise on the possible impacts; for example, the Fish and Wildlife Service is consulted when the Forest Service prepares an environmental statement on proposed oil and gas drilling in a National Forest.

Federal Land Policy and Management Act

The Federal Land Policy and Management Act of 1976 (FLPMA) requires BLM to coordinate with other Federal agencies (Federal, State, and local) in developing land use plans. Section 202(c)(9) specifically requires the Secretary of the Interior to coordinate the land use inventory, planning, and management activities of or for such lands with the land use planning and management programs of other Federal departments and agencies and of the States and local governments within which such lands are located.

In addition, section 202(e) directs that

The Secretary shall allow an opportunity for public involvement and by regulation shall establish procedures to give Federal, State, and local governments and the public adequate notice and opportunity to comment upon


and participate in the formulation of plans and programs relating to the management of the public lands.

**Resources Planning Act/National Forest Management Act**

The Forest Service is similarly specifically required to coordinate with other government agencies in planning for activities in the National Forests. The Forest and Rangeland Renewable Resources Planning Act of 1974 (43 U.S.C. 5400) provides detailed guidance for National Forest planning. Section 6(a) requires National Forest plans to be coordinated with the planning processes of other government agencies, while Section 6(c) requires procedures for agency comment on Forest Service proposals. In particular, section 6(a) directs that:

the Secretary of Agriculture shall develop management plans for units of the National Forest System coordinated with the land and resource management planning processes of State and local governments and other Federal agencies.

Section 6(c) requires:

the Secretary, by regulation, shall establish procedures to gain the Federal, State, and local governments and the public adequate notice and an opportunity to comment upon the formulation of standards, criteria and guidelines applicable to forest service programs.

**Endangered Species Act**

The Endangered Species Act of 1973 (224) as amended, generally directs Federal agencies to ensure that their actions do not jeopardize the continued existence of any species. Section 7 identifies the procedures for agencies to follow when an action might threaten a species. Specifically, section 7(a) states:

(a) The heads of all Federal agencies shall assume responsibility for the preservation of historic properties which are owned or controlled by such agency. Each agency shall undertake, consistent with the mission of the agency, any preservation, as may be necessary to carry out this section.

(b) With the advice of the Secretary of the Interior and in cooperation with the State historic preservation officer for the State involved, each Federal agency shall establish a program to locate, inventory, and nominate to the Secretary all properties under the agency’s ownership or control by the agency, that appear to qualify for inclusion on the National Register.

(c) The head of the responsible Federal agency shall, to the maximum extent feasible, undertake such planning and actions as may be necessary to minimize harm to a national historic landmark, and shall afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking.


Section 104 of the Act also directs the agencies to consider the effects of their actions on historic sites included in or eligible for the National Register, and to obtain comments from the Advisory Council on Historical Preservation on such actions.

INTER-AGENCY COORDINATION

The several federal agencies with activities in the GYF have various coordination mechanisms in place. The most obvious example is the comments provided by the National Parks and the Wildlife Refuges to the various National Forests on the Forest plans being prepared under PPRA and SNPA. Since these plans will guide National forest management on all forests (including those in the GYF) for the next decade or more (up to 15 years), the comments and suggestions of other agencies may influence the management of the Yellowstone ecosystem.

On the other hand, forest planning is highly decentralized, with only general direction provided by the Washington Office staff of the Forest Service. More direction is provided by the Regional Offices but the CVR includes National Forests from three Forest Service Regions (the Beaverhead, Gallatin, and Custer in Region 2; the Absaroka and Bridger-Teton National Forests in Region 4). While there are informal meetings between neighboring National Forests, there is no provision for formal coordination of Forest plans and activities in adjoining areas. Thus, coordination of Forest Service activities in the CVR is not organized to ensure consistent actions and efforts. In addition, some agencies feel that they have had inadequate opportunities for reviewing Forest Service activities, the Advisory Council on Historic Preservation, for example, stated that many activities occur without an adequate opportunity for the Council to comment on the proposed actions.

Finally, there is no analysis of the cumulative effects of activities, such as timber harvesting and oil and gas drilling, on the various federal lands and resources in the CVR (such as water quality and wildlife habitats). For example, timber sales in Montana proposed by the Gallatin National Forest south of West Yellowstone may restrict grizzly bears’ access to habitat in the Targhee NF west of the proposed sales. Similarly, some grunting on BLM and private lands in the watersheds above Red Rock Lakes National Wildlife Refuge has caused “severe irritation” of Red Rock Creek. Only a comprehensive review of activities in the CVR can assure that the activities in one area do not have undesirable and unintended consequences in another.

Advisory Council on Historic Preservation response to Subcommittees’ questions, p. 8, 9

Forest Service response to Subcommittees’ question 26

Coordinating Committees

The federal agencies in the CVR meet frequently to coordinate their activities. There are numerous formal and informal meetings between agencies; for example, most National Forests meet periodically with staff from the relevant State Fish and Game Departments, the National Park Service, the Fish and Wildlife Service, the BLM, and Ranger Districts on adjoining National Forests. There are also meetings in which the various federal agencies participate, such as the semi-annual Teton County Intergovernmental Meeting and the annual Wyoming association of outfitters and guides meeting.

In addition to these meetings, there are several groups which have been formed to address special management concerns of lands and resources in and around Yellowstone NF. Table 28 displays the groups identified in the agencies’ responses to the Subcommittees’ questions. None of the groups include all the agencies in the area, and most were identified by only one or two agencies. The group with the broadest Federal participation is the Greater Yellowstone Coordination Committee; however, this Committee apparently excludes the Caribou National Forest and any BLM offices, and which Fish and Wildlife Service unit(s) participate was not specified. This group is presently developing the Greater Yellowstone Plan, to bring together the management plans for Yellowstone and Grand Teton National Parks, and for the Beaverhead, Gallatin, Custer, Shoshone, Bridger-Teton, and Targhee National Forests. The Plan is aggregation is expected to be completed in late 1986. In addition, most of the groups address specific animal species or management concerns without considering the broader implication of these issues.

Table 28 was difficult to aggregate because of inconsistent responses. For example, the Bridger-Teton NF identified the “Jackson Elk Studies Group” as meeting once a year, while the National Elk Refuge and Grand Teton NF identified the “Jackson Hole Cooperative Elk Studies Group” as meeting quarterly. It is difficult to determine if these are distinct groups or different reports of the same group. The Greater Yellowstone Ecosystem Bald Eagle Working Group presents another example of inconsistent reporting; the “ridgetop NF” reported that the group meets once a year, the Caribou NF and the Montana NF stated that the group meets twice a year, and the Idaho BLM reported that the group meets three to four times a year. The incomplete agency responses to the Subcommittees’ questions, in combination with the CVR is perhaps the most serious problem in interpreting Table 29. Some respondents provided little information on the committees to which they belong. For example, the Custer NF identified numerous general meetings but no specific committees, while...
<table>
<thead>
<tr>
<th>Identified Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater Yellowstone Coordinating Committee</td>
</tr>
<tr>
<td>International Bear Study Group</td>
</tr>
<tr>
<td>Wyoming Grizzly Bear Study Group</td>
</tr>
<tr>
<td>Montana Grizzly Bear Study Group</td>
</tr>
<tr>
<td>Idaho Grizzly Bear Study Group</td>
</tr>
<tr>
<td>Nevada Grizzly Bear Study Group</td>
</tr>
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<td>Yellowstone Grizzly Bear Study Group</td>
</tr>
<tr>
<td>Greater Yellowstone Ecosystem Field Operations Group</td>
</tr>
<tr>
<td>Grizzly Bear Research Group</td>
</tr>
<tr>
<td>Greater Yellowstone Ecosystem Wild Eagle Working Group</td>
</tr>
<tr>
<td>Yellowstone National Park</td>
</tr>
</tbody>
</table>

Table 18. Coordinating Committees in the Yellowstone Area

The Shoshone NF only reported participating in the Greater Yellowstone Coordinating Committee. However, the Bridger-Teton NF reported that the GYCC and Shoshone were both members of the Yellowstone Subcommittee of the Interagency Grizzly Bear Committee and of the Greater Yellowstone Ecosystem Bald Eagle Working Team. The Bridger-Teton NF was the only respondent to identify other participants. Thus, group membership shown in Table 18 might not be comprehensive, with important members not identified.

Species-Oriented Analysis

The general approach to coordinated management adopted by the federal agencies in the GYCC focuses on measures for individual animal species. Such individualized efforts fit within the Forest Service’s “indicator species” approach to measuring species diversity in the National Forests. (See the discussion of indicator species under Grizzly Bears in Chapter 1.) The Shoshone NF was the only respondent to identify other participants. Thus, group membership shown in Table 18 might not be comprehensive, with important members not identified.

A more telling problem of the species-oriented approach is that it is likely to reduce the coordinated, comprehensive approach to National Forest management. Protection or mitigation measures for wildlife are likely to be viewed as constraints on activities, because they may well impinge on proposed developments. For example, grizzly use of the north side of Mount Wash, might force restrictions on, or even the cancellation of, the proposed ski development. Yet the area also includes elk and moose ranging grounds and moose winter range. A more comprehensive approach to analyzing impacts, and thus focusing on mitigation and monitoring wildlife, could serve to emphasize fragile or critical habitats and wildlife needs. This would increase the coordination among local management units and areas which are less important to animals and water quality.

The effectiveness of the species-oriented approach is also limited, because more than one committee with Federal participants from the GYCC appear to exist for several of the animal species. There are possibly three groups with overlapping membership and areas (both geographic and subject) for bald eagles, trumpeter swans, and grizzly bears. While these several committees may address differing aspects of the problems, there could be unnecessary duplication in their efforts. A comprehensive coordinated approach with subcommittees formed as needed, as is used for grizzly bears, could provide more complete coverage with less potential duplication.
Cumulative Effects Analysis

Coordination among Federal agencies in the COVR (and elsewhere) is important because the effects of various activities may be inextricable when each is considered alone, but the effects of all activities on the same or adjacent sites, when taken together, could be significant. The federal agencies are currently developing a model for assessing the cumulative effects on grizzly bears of human activities on the lands of the various agencies. This model may prove a useful tool for examining such impacts, but the model focuses only on grizzly bears. Grizzlies are an "indicator species" for most of the COVR National Forests, but as discussed above, they are imperfect indicators of the health of the Yellowstone ecosystem. Thus, while a cumulative effects model for grizzlies is a useful first step, it is not sufficient for evaluating the cumulative effects of human activities on the Yellowstone ecosystem.

The Grizzly Bear Cumulative Effects Model

The Forest Service, Yellowstone NP, and the Interagency Grizzly Bear Study Team are developing a "Cumulative Effects Assessment" intended to assess the effects of human activity on bear habitat, distribution, and mortality, a quantitative model (the Cumulative Effects Model) is being developed to assess these effects. The model contains three submodels, each considering several contributing variables. The model is being designed to clarify choices for managers and predict the effects on the bear population under various alternative management practices and decisions.

The validity of the Cumulative Effects Model, like any other model, depends substantially on the accuracy of its assumptions. Such a model could prove extremely useful, but as described by Weaver et al., it appears to perpetuate some of the same false assumptions that have marred past efforts at grizzly management. Indeed, other observers have already suggested the need for stringent peer review of the model's assumptions. The model includes several assumptions which have contrary evidence in the literature.

1. Assumption: Situation II habitat is high-quality habitat while Situation II habitat is low-quality habitat. However, grizzly use, as shown in Figure 4 (p. 24), does not follow the situation maps. In fact, some Situation II areas, such as Fishing Bridge, include highest use grizzly areas. Rather, it appears that Situation II defines a range of areas with substantial conflict between bears and humans.

2. Assumption: Habitat type and cover type accurately predict the food and cover value of an area to grizzlies. Reid and Gehman document two examples where habitat quality evaluations suggested that the areas were unimportant to bears, while independent ground surveys showed tracks, feeding sites, day beds and other tangible evidence of use.

3. Assumption: The distribution of mortalities does not affect long-term demographic trends that would significantly alter the mortality indices. Pitts et al. reported that mortality rates are sensitive to climatic conditions. With increased likelihood of mortality during dry years, drought reduces the availability of natural foods and thus the bears range farther and come into more contact (and conflict) with humans.

There are several additional assumptions for which there is not directly contrary evidence, but which either obscure important facts of bear ecology, or severely limit the usefulness of the model. Such assumptions include:


21. Pitts, J. D. Climate, Carrying Capacity, and the Yellowstone Grizzly Bear. p. 11.
4. Assumption: The value of a given area of habitat is related to the length of use by the bears. However, bears are probably more food-stressed at certain seasons of the year and the assumption ignores the possibility that a habitat might provide food briefly but at a critical time, such as in the early spring before the snows have left, when only a limited variety of foods is available. In some extent, this assumption may be countered by the weight the model gives to the presence of protein-rich foods.

5. Assumption: Where there is little human presence, food availability, concentrated foraging sites, and unique habitat in contributions to habitat quality. The authors cite a paper in press to qualify the assumption regarding denning sites, but the assumption about cover is not explained. However, cover can provide not only resting sites, but may itself provide food (e.g., squirrel caches), respite from heat, and opportunities to hide young cubs. In dry years, when some foods are less available, and bears are more prone to wandering, cover may be particularly important.

6. Assumption: Habitat fragmentation — distant areas of high quality habitat are not significant habitat fragmentation is ignored in the model. However, grizzly bears avoid areas with human presence, distant habitat areas may be unusable if they are separated by areas with human activities which prevent the bears from traversing the intervening ground.

7. Assumption: The Interagency Grizzly Bear Study Team data on bear locations accurately represent grizzly use in the area. This assumption may be true, but there are substantial inconsistencies between IGBC mortality data and mortality data from the Wyoming Game and Fish Department, and these two in turn disagree with several other sources. Relying on a single source for such information may be unnecessarily risky, when other sources are also available.

8. Assumption: Legally killed bears or mortalities associated with research activities can be ignored. This may limit the predictive ability of the model, since a substantial number of mortalities (27 percent of the human-related deaths reported by Wyoming Game and Fish and 84 percent of those reported by the IGBC) would be excluded. Further, the model

24 Weaver et al. A Cumulative Effects Model p. 237
24 Weaver et al. A Cumulative Effects Model p. 238
24 Weaver et al. A Cumulative Effects Model p. 243

could not be applied to Yellowstone NP, since at least 10 of the 14 deaths reported by the IGBC fall into this category.

Despite the problems associated with its numerous assumptions, the Cumulative Effects Model may prove useful in certain limited situations. It should not, however, be perceived as an alternative to examination by competent field biologists of an area proposed for development. On-site evidence, such as scat, tracks, and feeding sites, should override a prediction of low risk or low habitat quality by the model. In addition, the model should be "field tested" by comparing predicted results with field observations. The model's main utility is probably in predicting obvious problems and conflicts, but with the weaknesses in the assumptions, an absence of predicted conflict cannot be considered a sign of low risk to grizzly bears.

INFORMATION MANAGEMENT

Commodity Resource Data

One significant problem for inter-agency coordination in the COYR and elsewhere, is the inconsistent and incomplete data on the activities which occur on Federal lands. Data on the sale or leasing of commodities, generally from the National Forests or BLM lands, tend to be more comprehensive than for other activities. Still, there are significant reporting difficulties for even the market commodities. For example, BLM is generally responsible for minerals activities in the National Forests, and maintains data on leases, claims, and related activities; however, the Forest Service is responsible for controlling surface access and surface activities, while the Minerals Management Service is responsible for collecting payments (bids, rents, royalties, etc.) from leases. The Forest Service generally has access to BLM data. However, the volume and organization of data on leases and claims in the COYR (an estimated 300 pages of computer printouts for leasing in Idaho and 50 pages for mining claims in Wyoming) makes understanding the size and specific information on energy and minerals activities in the National Forests a challenge for the 14 Forest Service employees (averaged in recent years) who manage all energy and minerals activities in the COYR National Forests.

Grazing on Federal lands provides another example of inconsistent information reporting. Both Forest Service and BLM generally use Animal Unit Months (AUMs) for grazing leases and permits. However, the Beartooth, Carbon, and Targhee Forests reported sheep grazing in numbers of animals rather than in AUMs. In addition, the Beartooth

244Shoshone National Forest response to Subcommittees' question p. 3
2484BLM response to Subcommittees' questions p. 17, 20
244Forest Service responses to Subcommittees' questions p. 3
and Caribou Forests and all three RJN State Offices did not distinguish permitted use level from actual use.

The attention paid to commodity activities by the Forest Service and RJN tends to limit the focus of these agencies on information on non-commodity resources. For example, there is substantial knowledge about the vegetation on commercial timberland, but there is little information about vegetation on other lands, such as wilderness areas. For the CVBR, vegetation data was provided for the 1.76 million acres of commercial timberland in the National forests, but this is only 17.5 percent of the 10.07 million acres of National Forest land in the CVBR. Similarly, the non-commodity focus of the National Park Service limits information gathering concerning potential commodity resources in Yellowstone and Grand Teton National Parks. The Park Service maintains limited data on timber in these Parks. Thus, for the CVBR as a whole, there is virtually no information on vegetation on 8.31 million acres of National Forests, on the 2.55 million acres of National Park land, or on the other Federal, State, or private lands in the area. However, it is important to know how much area is covered by what species of plants, and how much of the total area is open and how much is timbered, to understand the importance of commercial timberland for the various animals which use timbered habitats, and to analyze the impacts of timber harvesting on the animals of the CVBR.

Non-Commodity Resource Data

The federal agency data on non-commodity resources, such as recreation, wildlife, and cultural resources is much less complete and more difficult to compare than the data for the commodity resources. Cultural resources, for example, appear to be identified only when a site is uncovered through project planning or on the ground activity. The National Park Service, the Federal agency most clearly charged with providing recreation facilities, maintains comprehensive data only on the number of people entering the Parks and on the number staying overnight. There is no long term program of information collection on the types of recreation (fishing, backpacking, tent camping, etc.), or its extent or location. It is difficult to manage recreation or understand its impacts on wildlife populations and habitats without such knowledge.

The Forest Service has much more recreation data, but there are consistency problems. Some Forests have not maintained their data over time; the Caribou, NY, for example, maintained no hunting data for years prior to 1981.255 In addition, the artificial categories used for aggregating the data limit their usefulness. For example, there is not a category for backpacking; backpacking is included in "hiking and hiking" which also includes jogging and sightseeing; while traveling Forest Service data are also not very site specific, unless the

255"Caribou National Forest response to Subcommittees' question 17"
wildlife, recreation, and more. Research by the Park Service is
within the purview of each Park Superintendent; there is no indepen-
dent research organization for the National Park Service. Thus,
studies tend to be limited by the tenure of the Superintendents. A
separately funded research organization, with explicit direction for
research in the National Parks, could improve the information on
recreation, vegetation, and animals in the Parks by allowing more
comprehensive and longer-term studies.
SUMMARY OF FINDINGS

This report examined the lands and resources in and around Yellowstone National Park. Numerous Federal and some State agencies provided information in the House Interior Subcommittees on Public Lands and on National Parks and Recreation. The report summarized and evaluated that information. These are the findings of the report.

THE YELLOWSTONE FOSSILS

1. With the recent return of peregrine falcons and shopping cranes, the wolf is the only major vertebrate lacking from the ecosystem as it was in 1872, when Yellowstone National Park was established. However, the populations of many animals have been reduced by human activities in the area, and further effects on their populations appear likely.

2. Grizzly bears are an important indicator of the health of the Yellowstone ecosystem. Because: (a) their heavy use areas correspond with important habitats for many other animals; (b) grizzlies are more sensitive to human disturbance than most other species in the area; and (c) grizzlies often die in human-bear encounters. Therefore, grizzly population trends are likely to be leading indicators of the effects of human activities on the ecosystem.

3. The "Management Situation" zones used for considering grizzly bear requirement is inadequate to assure the continued survival of the Yellowstone grizzlies, because it accurately portrays neither important habitat areas nor areas used by grizzlies.

DEVELOPMENT ACTIVITIES

1. Recreation is the most important economic activity occurring on federal lands in the Committee's Greater Yellowstone Region (CGYR). Excluding the substantial phosphate mining in the Caribou National Forest, recreation creates nearly two-thirds of the direct jobs supported by the CGYR National Forests.

2. The most significant effects of development activities on the ecosystem result from access. Roads can degrade water quality, and many animal species depend on clean water. In addition, human activities can disturb many animal species, particularly grizzly bears. Despite these effects, road construction and access decisions are determined by resource specialists, rather than as an inte-

3. The "Management Situation" concept used for grizzlies is not particularly useful for preventing grizzly bear deaths. Many of the grizzly mortality clusters are outside 111 area, which have the highest level of grizzly protection.

4. Data on activities and locations are incomplete and inconsistent, hampering coordinated management efforts for the area. Data are particularly poor for non-commodity resources, but even commodity data is not aggregated in a manner which facilitates a comprehensive analysis. Similarly, the categories used, particularly for recreation, are not especially useful for examining the activities which are important.

5. Many of the commodity resource programs in the CGYR National Forests - timber harvesting, water developments, grazing, and energy and mineral development - are of minor importance. The jobs in these industries (except phosphate mining) are few, compared to recreation-related jobs. The payments to counties resulting from these activities are unimportant, because changes in receipt-sharing are fully offset by changes in payments in lieu of taxes.
FEDERAL AGENCY COORDINATION AND INFORMATION

1. The existing coordinating committees are not comprehensive in either membership or approach, and therefore are inadequate for providing complete, coordinated management of the Yellowstone ecosystem. In addition, there are multiple committees focusing on a single animal species, suggesting duplication and fragmented efforts.

2. Data on the ecosystem and on development activities are inadequate to evaluate management choices. The existing data are incomplete and inconsistent among the Federal agencies in the area. Little, if any, information requested by the Subcommittees had already been compiled for the area as a whole, including data on grizzly bears.

3. Existing administrative boundaries and organizations hamper comprehensive, coordinated understanding and management of the ecosystem. Regional boundaries fragment the area, and individual units include disjunct lands, with little regard for the ecology of the area.

4. Only Forest Service research is independent of land managers, whose relatively brief tenure limits the long-term scope of research. Thus, the research efforts of other agencies are generally insufficient to provide the understanding needed for comprehensive land and resource management of the Yellowstone ecosystem. Long-term research, from economics to vertebrate biology, is hindered or even prevented by the lack of a separate research branch outside the land management structure.
APPENDIX I QUESTIONS ASKED OF EACH AGENCY

The Subcommittees on Public Lands and on National Parks and Recreation attempted to question every federal agency active in the CVP about their major activities, in land management, data collection, and any other responsibility which might affect the ecosystem in retrospect. It is clear that at least one significant agency was omitted: the Minerals Management Service in the Department of the Interior. This agency is responsible for the royalty collections for energy and mineral resources for energy and mineral resources on public and acquired lands, on Indian reservations, and on the Outer Continental shelf.

In addition, the three State governments were questioned about their activities of the State fish and wildlife agencies in the area. Replies from both State and Federal agencies were voluminous. Many agencies included one or more maps in their replies, and many had a series of attachments to expand on their answers.

Each agency received a preface with its questions which included a map of the area to be covered, and described the reply format which would best suit the Subcommittees’ needs. Prefatory remarks given below are those sent to the Forest Service, the remarks are typical, though perhaps more detailed than for some agencies with less responsibility for land and resource management in the CVP. Prefatory remarks for other agencies will be included under each agency, listing only if the preface differed substantially from that sent to the Forest Service. In addition, Sub委员会 staff and CRS analysts met with representatives of the Forest Service and of the Department of the Interior to assure that the intent of the questions was clear and that the information requests were feasible.

SAMPLE PREFACE TO QUESTIONS—FOREST SERVICE

The following questions refer to areas listed in the following table and indicated on the enclosed map. The data should generally be displayed by Ranger Districts, and preferably separated data for the discontinuous portions of Ranger Districts, as identified. When information does not exist at the Ranger Districts, responses by the Forest Supervisor’s Office, the Regional Office, or even the Washington Office may be acceptable, but provide answers from the level closest to the field whenever feasible. Identify where the response to a given question was prepared, if not at the Ranger Districts. Also, note the relevant time period covered by the answer if it varies from the time period requested or if no time period was specified.

Where replies call for maps, the following options are preferred:
1. USGS maps at 1:250,000, with overlays for each different subject. [The eight maps are Bozeman, Billings, Ashton, Cody, Driggs, Thermopolis, Preston, and Lander, these might be laid together to provide a comprehensive picture of the entire area.] This option would be the most convenient for the Committee.
2. Standard sizes of USGS quadrangles as base maps, the quadrangles included in the map legend are just detailed enough to do the job. Overlays that can be superimposed on the same base map would be much appreciated. Even if option 1 is chosen, other maps of other sizes may be needed for particular questions.
3. The Forest Service Recreation Maps. Overlays that can be superimposed on the same base map would be much appreciated.

National Forests & Ranger Districts of Interest to the Committee

Beaverhead National Forest
Madison Ranger District (Provide data separately for the three discontinuous pieces: east of the Madison River, west of the Madison River, and northwest of Ennis)

Custer National Forest
Big Timber Ranger District
Bozeman Ranger District (Provide data separately for the two discontinuous pieces: the Gallatin Mtns, and south of 1-90)

Gardiner Ranger District
Helena Lake Ranger District
Livingston Ranger District (Provide data separately for the two discontinuous pieces: the Crazy Mountains, and south of the Yellowstone River)

Shoshone National Forest
Bear Tooth Ranger District (Provide data separately for the two discontinuous pieces: contiguous to the Shoshone NF, and contiguous to the Crow Indian Reservation)

Clarks Fork Ranger District
Graybull Ranger District
Lander Ranger District
Wyoming Ranger District

Wind River Ranger District
Questions for the Forest Service

Employment and Local Effects
1. How many direct and indirect jobs, and how much local economic activity, result from the major activities which occur on the National Forests; distinguish jobs and economic activity resulting from (a) timber harvesting, (b) grazing, (c) energy and mineral leasing, exploration, and development (distinguish oil, gas, geothermal, minerals, and mining, if possible), (d) fishing, (e) hunting (distinguish by hunted species, if possible), (f) downhill skiing, and (g) other recreation (distinguish park and outfitters from other local businesses which benefit from recreation and tourism)?

2. How many Forest Service employees (in FTEs) are associated with each of these activities, and what is the total Forest Service employment (separately for each Ranger District and for each Forest Supervisor’s Office)? What proportion of the Forest Service budget is associated with each of these activities? In each Ranger District and each Forest Supervisor’s Office, use the attached form to gather job responsibilities and professional experience of all management personnel and resource specialists.

3. Identify Forest Service payments made to each county by each National Forest in the area annually for the past decade

4. Identify the location of local sawmills and other timber purchasers. What percentage of their timber supply comes from each Ranger District? What other supply sources provide timber in the area? What is the mill capacity (based on 2 shifts per day and a 3-day week), and what has been the annual production for the past decade? How many employees work in each mill?

Timber Management
5. For the past decade, identify the volume and value of timber sold and of timber cut annually, by timber species. Separate the timber sales by volume, sales and harvests from the standard commercial sales and harvests. Display on maps the commercial timber sales areas from which timber has been sold or cut in the past decade.

6. For the past 3 years, identify annual timber receipts (separate deposits to the National Forest Fund from other deposits), expenditures and cash costs, and other impacts (quantifiable effects on recreation, water quality, wildlife, etc.) For expenditures and cash costs, separate by the following items: timber sale preparation & administration, resource support, R.O. other reforestation & timber sale improvement, and purchaser credits. Provide estimates of average cost allowances in timber sale appraisals, excluding logging and milling costs (that is, such cost allowances as slash disposal, erosion control, snag disposal, temporary roads, and scaling costs). Estimate the percentage of costs necessary to maintain non-industrial timber programs (such as firewood permits, pine cone collection, and Christmas tree sales). Also, identify the annual acreage treated with each herbicide used in the past decade for reforestation or for
Intermediate timber stand treatments (including release). What percentage of this has occurred in Situation I and Situation II areas?

For all commercial timberlands (lands identified as suited for timber production in the Forest Planning process), identify the total acreage and the acreage in each age class by species. For each commercial timber species, identify (a) the standard rotation age used by the Forest Service, (b) the most common rotation ages used by private landowners in the area, (c) the age when the mean annual increment culminates, and (d) the natural rotation age (when insects, diseases, and/or old age typically kill the majority of the trees).

Describe -- in words, maps, and tables -- the extent of insect and disease infestations. Describe the options for controlling these infestations (pesticides, prescribed fire, salvage cutting, etc.). Identify the strengths (including research evidence) and limitations of each option. How much each has been used annually in the past 5 years, and the percentage that has occurred in Situation I and Situation II areas. Describe forest service policy on pesticide/herbicide use and the agency's integrated pest management program. Identify the acreage planned for herbicide or pesticide treatment in the next decade, and how much of the planned acreage is in Situation I and II areas.

For timber sale plans for the next decade, identify (a) the planned commercial timber sale area locations (on maps), (b) the anticipated volume and receipt, (c) the expected expenditures and cash costs, and (d) other likely benefits and costs. Identify any currently roadless areas (including those released in wilderness acts) which are included in timber sale plans for the next decade. Identify harvesting restrictions that will be put into sale contracts to minimize human-grizzly bear encounters. Finally, identify planned annual timber sale levels for the next 5 years.

Range Management

10. Identify number of grazing permits, the number of AUMs, the months of use, permit fees, and range condition, separate this information for free use versus paid permits and for low/normal versus sheep/goat. Identify annual investments in the various types of structural and non-structural range improvements for the past decade include acreage of pesticide and herbicide applications, for each chemical used. Identify the total fees collected and the FY95 grazing fee per AUM. How did the FY95 Forest Service grazing fee compared with fees for private grazing in the area? How many ranchers use Forest Service grazing permits? What portion of their grazing is under Forest Service permits? How many of these ranchers also use BLM permits or leases?

11. Identify annual livestock losses to grizzly bears, other predators, brucellosis, poisonous plants, and other such agents over the past 5 years. How much federal money has been spent annually in the past decade on these programs? Describe (and provide any data on the effectiveness of these programs: What is the population of wild horses and burros, and how has it changed in the past decade? How many AUMs of forage do wild horses and burros consume annually, and what is the carrying capacity for these animals?

References:

12. Identify and locate (on maps) all water project applications, licenses, and permits (excluding FPR projects). Provide any analyses of the benefits and costs of proposed projects. How have possible cumulative impacts (on fisheries and on other resources) of multiple projects in a given watershed been analyzed?

13. Identify any existing studies about relationships between surface waters, groundwater recharge zones, groundwater, and the hydrothermal features of this area. What analyses have been conducted to identify these relationships and the possible impacts of timber harvesting, energy drilling, mining, site area development, and other activities on water quality and groundwater recharge?

14. Identify and locate (on maps) all oil leases, gas leases, and geothermal leases; applications for leasing; applications for exploration; and exploration in the past decade (identify those which were successful), and applications for development; developments in the past decade, and any developments which have been abandoned.

NOTE: provide only the data maintained by the Forest Service. data maintained by the BLM is being provided under a separate cover.

What standard provisions are included in leases for environmental protection? (Be sure to include restrictions to protect grizzly bears.) What analyses are conducted prior to leasing to determine sensitivity of an area to exploration and drilling? Identify all applications for exploration and/or development which have been denied in the past decade, and the rationale for the denial. Does the Forest Service have the authority to override a BLM decision to issue a lease or permit? Identify all such occurrences in the past decade in the area. Identify any legal challenges to lease stipulations (either too restrictive stipulations or a lack of necessary stipulations) in the past decade, and their current status.

15. Identify and locate (on maps) all mining claims and mineral leases, by type of mineral being claimed or leased; any claims or leases which have been abandoned; and any active exploration and/or development.

NOTE: provide only the data maintained by the Forest Service. data maintained by the BLM is being provided under a separate cover.

Identify all claims which have been denied in the past decade, and the rationale for the denial. Does the Forest Service have the authority to override a BLM decision to issue a lease, permit, or claim? Identify all such occurrences in the past decade in the area. What
standard provisions are included in leases for environmental protection? (Be sure to include restrictions to protect grizzly bears.)

Fish and Wildlife Management

16. Identify fishing recreation visitor days (RVDs) annually for the past decade. Locate (on maps) the areas of concentrated fishing use. What is the economic value of a fishing RVD used in Forest Planning? How does this compare to expenditures by fishermen? What programs exist to eliminate or minimize the impacts of timber harvesting, energy and mineral exploration and development, road construction, and other activities on fishing? What are the policies and practices used to eradicate undesirable fish and/or rehabilitate lakes for native fish? Describe the extent of Forest Service participation in stocking lakes with native or introduced fish species.

17. Identify hunting RVDs annually for the past decade. What species are hunted, and how much hunting effort is focused on each species? Identify areas with particularly intense hunting pressures. What is the economic value of a hunting RVD (separate for the major categories of hunting) in Forest Planning? How does this compare to expenditures by hunters? Identify all physical barriers (such as fences, roads, and other developments) which affect wildlife populations, including traditional migration routes for elk or other animals. What programs exist to minimize or eliminate the harmful impacts of timber harvesting, energy and mineral exploration and development, road construction, and other activities on hunting? Identify any poaching problems (including locations if applicable), and steps which have been taken to minimize these problems. What policies or plans are in place to control the possible spread of brucellosis?

18. Locate (on maps) all grizzly bear-human conflicts in the past 5 years. Locate (on the same maps) Situation 1, II, and III areas. Identify the rationale for the boundaries between these areas. Are these boundaries changed when bears are sighted in areas previously unknown use? How many grizzlies have been killed in the national forests in the past decade (locate on maps)? Identify the principal causes of known grizzly deaths (such as natural causes, road kills, human self-defense, poaching, livestock protection, etc.), and the number attributable to each cause in the past decade. What Forest Service programs exist to protect people from grizzly bears and to protect grizzly bears from people? What analyses have been conducted to examine the cumulative impacts of timber harvesting, energy and mineral exploration and development, recreation, and other activities on grizzly populations?

19. Locate (on maps) bald eagle and trumpeter swan concentration areas in the National Forests. Provide a brief description of the preferred nesting habitat for these species. What Forest Service programs exist to protect these species? What is the extent of Forest Service involvement in peregrine falcon recovery efforts? Describe Forest Service habitat management programs for these and other species. What Forest Service programs exist to protect endangered and
JOB RESPONSIBILITIES AND PROFESSIONAL EXPERIENCE

The following information should be identified for each professional or technical employee, please complete a separate form for each employee. Under Responsibilities, District Rangers, Forest Supervisors, and their deputies should identify themselves as "Line Officers." Others should rank their areas of responsibility, with a "1" being the most important area. Rankings should be limited to 3 or fewer subjects. Experience should be identified as the number of years working in each of the areas, for any volunteer, including volunteer work or special projects. Finally, under Education, each person should specify each degree attained, and a specialty or emphasis studied, if there is one.

JOB TITLE: ____________________________

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QUESTION FOR ANIMAL AND PLANT HEALTH INSPECTION SERVICE (APHS):

1. Briefly describe the effects of the disease brucellosis and its means of transmission. What policies and plans are in place to control the possible spread of the disease? Describe the effects of recent court actions on any plans for thinning herd of elk or buffalo as a means of controlling the disease. Have there been any documented cases of brucellosis transmission from wild to domestic animals in the area? (See enclosed map.)

2. Does the agency engage in any other activities inside the area indicated? Very briefly, describe any other activities of the agency within the area indicated on the Committee's map.

QUESTION FOR NATIONAL ORGANIC AND ATMOSPHERIC ADMINISTRATION AND NATIONAL MARINE FISHERIES SERVICE (NOMAF):

Very briefly, describe any activities of the agency within the area indicated on the Committee's map. Has the agency commented on the Committee's map? If so, please provide copies of these comments.

QUESTIONS FOR THE ARMY CORPS OF ENGINEERS:

Very briefly, describe any activities of the agency within the area indicated on the Committee's map. Has the agency commented on the Committee's map? If so, please provide copies of these comments.

QUESTIONS FOR THE ENVIRONMENTAL PROTECTION AGENCY:

Very briefly, describe any activities of the agency within the area indicated on the Committee's map. Has the agency commented on the Committee's map? If so, please provide copies of these comments. Describe EPA's review of the EI's for the Forest Service plans in the area, and for the EI's for the other agencies' activities in the same area. Provide EPA's evaluations of those EI's. (Summaries and recommendations are sufficient.) What extent have cumulative effects been examined by the agencies?

QUESTIONS FOR THE FOREST SERVICE:

Very briefly, describe any activities of the agency within the area indicated on the Committee's map. Has the agency commented on the Committee's map? If so, please provide copies of these comments.
QUESTIONS FOR FEDERAL ENERGY REGULATORY COMMISSION

The following questions refer to areas indicated on the enclosed map.

1. How many low head hydroelectric facilities have received licenses or permits in the area? What studies have been done on the cumulative impacts of these projects? Provide copies of any such studies.

2. Is there a shortage of electricity in the area? Will there be in the foreseeable future? To whom would any power generated be sold? What is the current price of electricity (per kilowatt-hour) in the tri-state area?

3. What are your activities in this area for other energy resources, including other hydroelectric projects?

4. Can FERC issue a permit or a license in the area over the objections of the Forest Service? Fish and Wildlife Service? Bureau of Land Management? National Park Service? Bureau of Indian Affairs? Tribal governments? The State? The county? Distinguish between objections raised by an agency over projects proposed for land owned by the agency and projects located on other land that would merely affect the agency's own land. Give examples of agency objections that have stopped projects on their own or other land's.

5. Has the agency commented on Forest Service plans for any of the National Parks indicated on the Committee map? If so, please provide copies of these comments. Very briefly, describe any activities of the agency within the area indicated on the Committee's map.

QUESTIONS FOR THE ADVISORY COUNCIL ON HISTORIC PRESERVATION

Very briefly, describe any activities of the agency within the area indicated on the Committee's map, please include a listing of any particularly important historic or cultural resources in the area, and include their location on a map. Was the ACHP commented in the past on federal agencies' management of historic and cultural resources in the area? If so, what has been the effect of these comments? Has the agency commented on Forest Service plans for any of the National Parks indicated on the Committee map? If so, please provide copies of these comments.

QUESTIONS FOR THE U. S. FISH AND WILDLIFE SERVICE

The following questions are for the Fish and Wildlife Service, and refer to the Gres Lake National Wildlife Refuge and the National Elk Refuge, unless otherwise indicated. Some questions regarding the general biology of various species (in whatever part of the enclosed map) are also included.

Employment

1. How many direct jobs outside the CWS (if any) result from the major activities which occur on the National Wildlife Refuges?

Employment, district jobs, resulting from (a) grazing and timber harvesting (if any), (b) energy and mineral leasing, exploration, and development (distinguish oil, gas, geothermal, minerals, and mining, if possible), (c) fishing, (d) hunting (distinguish by hunted species, if possible), (e) skiing, and (f) other recreation (distinguish packers and outfitters from other local business which benefit from recreation and tourism).

2. How many FWS personnel (in FTEs) are associated with each of the above activities, and what is the total FWS employment (separately for each refuge)? For all management personnel of resource specialists at the refuges or who work on species in the area, give their job titles (and a phrase identifying their primary duties if the title doesn't convey their responsibilities), trade level, and a brief summary of their professional experience (education and years of experience relevant to their current duties).

Leasing and Mining

1. Identify and locate (on refuge maps) any oil, gas, and geothermal leases, applications for leasing, applications for exploration and exploration in the past decade (identify which were successful), applications for development, developments in the past decade, and identify any developments which have been abandoned. Give the total acreage of these areas, Identify all applications which have been denied in the past decade, and the rationale for the denial. State any restrictions that have been or will be included in contracts or leases in Situation 1, 2, or 7 above.

2. Identify all Federal receipts (including all funds returned to other governments) and all expenditures (excluding the inter-governmental transfers) associated with oil, gas, and geothermal leasing, exploration, and development in the past decade.

3. Identify and locate (on maps) any mining claims and mineral leases, by type of mineral, being claimed or leased, any claims or...
leases which have been abandoned; and any active exploration and/or development. Identify all claims which have been denied in the past decade, and the rationale for the denial. State any restrictions that have been or will be included in contracts or leases in Situation I, II, or III grizzly bear areas.

**Hunting and Fishing**

1. Identify the fishing recreation visitor days (RVs) annually for the past decade on the Refuges. Where are the favorite fishing sites? (Label them on maps.) What is the economic value of a fishing RV? How do FWS estimates of value compare to expenditures by fishermen? How many other recreation RVs (such as camping) are associated with fishing? Have timber harvesting, energy and mineral exploration and development, and other activities affected fishing? If so, how and where? What actions have been taken to minimize or eliminate possible impacts?

2. Identify hunting RVs annually for the past decade on the Refuges, and distinguish elk hunting from other hunting RVs. What other species are hunted, and how much hunting effort is focused on each species? Identify areas with particularly intense hunting pressures. What is the economic value of a hunting RV (separate for the major categories of hunting)? How does this compare to expenditures by hunters? How many other recreation RVs (such as camping) are associated with hunting? Have timber harvest, energy and mineral exploration and development, and other activities affected hunting? If so, how and where? How do roads affect hunting values and animal populations? Identify all physical barriers (such as fences, roads, and other development) which affect traditional migration routes for elk or other animals. What actions have been taken to minimize or eliminate potential harmful impacts? Identify any poaching problems (including locations if appropriate), and steps which have been taken to minimize these problems.

3. Identify the RVs annually for the past decade for other significant recreational activities on the Refuges -- including camping and picnicking, backpacking/wilderness use, skiing, dispersed winter use, dispersed summer use, etc. Identify the location for all developed recreation sites. What other animal populations (including elk, bald eagles, trumpeter swans, listed and candidate endangered and threatened species, and other animals) are known to be affected by recreational activities? What FWS policies and programs exist to eliminate or minimize the detrimental impacts of recreation on wildlife? Identify which roads are most heavily used for recreation access, and what use restrictions exist and the rationale for these restrictions.

**Other Wildlife**

What policies or plans are in place to control the possible spread of broomline? Describe the effects of recent court actions on any plans for shooting herds of elk as a means of controlling the disease. What are the implications of any documented cases of broomline transmission from wild to domestic animals in the area?

10. Locate (on maps covering the entire area of enclosed map) all grizzly bear sightings and all human-bear encounters in the past 3 years on all Federal, State, and private lands. Locate (on overlays, if possible) Situation I, II, and III areas. Explain the rationale for the boundaries between these situation areas. Do these boundaries change when bears are sighted in areas with previously unknown use? On overlays, show the boundaries of the "critical habitat" proposed by the FWS under the Endangered Species Act in the past decade. Explain discrepancies between critical habitat boundaries and the Situation I, II, and III boundaries. How many grizzlies have been killed on Federal Refuges in the past decade? (Locate kills on the maps.) Describe the principal causes. Have known grizzly bear deaths been related to road kills and human self-defense, livestock protection, poisoning, etc. and the number attributable to each cause in the past decade? Do conditions (other than self-defense) can a grizzly bear be shot legally? Locate (on maps) all bald eagle nesting sites on private, State, and other Federal land on the Committee map. What reproductive successes (and failures) have these bald eagles had? How has human activity affected bald eagle reproduction? Has the FWS made any recommendations to the Forest Service regarding timber management as it affects bald eagles? Describe any bald eagle habitat management programs.

12. Briefly describe the status of the experimental population of whooping cranes at Devils Lake WMA. What other parts of the area indicated on the Committee map do these birds use? If the population of whoopers in the area continues to expand, how will their use of the area indicated on the map expand? Historically (if such information is available) what areas on the map did whoopers use before their population crashed?

13. Locate (on maps) all trumpeter swan nesting sites on private, State, and other Federal land in the indicated area. What other species (and species) have these swans had? How has human activity affected trumpeter swan reproduction? What has been done to protect the swans? Describe any trumpeter swan habitat management programs. Has the FWS made any sp. if so recommendations to the Forest Service or the F.I.R.S. Service regarding trumpeter swan management?: I ... copies of the recommendations and the responses from other agencies.

14. Identify any other endangered or threatened species that have been seen in the western Wyoming, southwestern Montana, or eastern Idaho. Locate the critical habitat for any of these species extending into the area indicated on the enclosed map? For which have recovery plans been published? For candidate species (excluding vertebrates, invertebrates, and larks) are found in the area?
15. What are FWS management policies on introduced, non-native species? Describe any regular monitoring to locate introduced species such as eastern brook trout. What are the policies on eradicating undesirable fish with such substances as Rotenone? What techniques are used in rehabilitating lakes for re-introduction of native fish? What are policies on predator control on Refuges? Describe any measurements that may exist on the effectiveness of these policies.

Other Agencies
16. What activities of the Bureau of Reclamation have affected the Refuge in the area? Does the FWS anticipate any potential problems from proposed actions of the Bureau in the area? What authority does the FWS have to alter proposed actions?

Recreational Use
17. Has FWS commented formally on any of the seven draft National Forest Plans (for the Beaverhead, Gallatin, Custer, Shoshone, Bridger-Teton, Caribou, and Targhee National Forests) or on the land use plans of the other Federal agencies in the area? If so, provide copies of formal comments. Does FWS plan to comment on any other Forest Plans in the area? If so, which ones? When will these comments be available? In the final plans which have been issued (apparently only for the Targhee National Forest to date), have your comments had a discernible impact on the proposed activities? Has FWS commented formally on activities in the area of the Committee on the actions of any other Federal agencies? If so, provide a copy of the executive summary, or the actual document if no summary is available.

Roads
18. For all existing roads on the Refuge, identify their location (on maps), their mileage by maintenance level, and the annual maintenance costs. (If any road is maintained by an agency other than the Fish and Wildlife Service, give the name of the agency, and outline its responsibilities.) Specify the principle use of each of these roads for the past 5 years, and describe any proposed changes in their use. Identify use restrictions and their rationale.

19. What is FWS policy on wildlife suppression in the area? Identify the acreage burned annually for the past decade, the losses resulting from fire (identify the method of calculating the losses), and the annual suppression and re-suppression costs.

Coordination
20. What are the cultural resources or historic sites in the area? What are the prehistoric sites and, briefly, describe what inventories have been made of the sites. Describe Fish and Wildlife Service policy on historic sites within Refuges.

21. Briefly describe any regular meetings of professional staff with officials of state, federal, or local agencies on management issues related to the area indicated on the Committee map. How often or how regularly do these meetings occur?
water projects outside the Parks pose problems for fish or other resources inside the Parks?  
5. What are the current estimates on the grizzly population for the entire area indicated on the Committee map? What is the age structure of the population? What, currently, are thought to be the principles of causes of death? Indicate, on maps, the sites of man-caused bear deaths over the last five years. What effect is the Park Service making to reduce these causes? Approximately how many bears spend the entire year in the Parks and how many are substantially dependent on resources outside the Parks? If oil, gas, or geothermal leasing are increased around the Parks boundaries, what sort of impacts, if any, would such activity pose to bears? (Quantity if possible). If NPS predicts that bear deaths would increase, what would be the chief cause of such deaths (e.g., direct interactions with workers, road kills, loss of habitat, or other)? Describe the issues surrounding Fishing Bridge. Will the area be closed, and if so, how will its closure affect grizzly populations and human-bear encounters? What will the impact of this closure be on communities and communities outside the Park?  
6. Are any of the breeds of elk in YNP essentially independent of resources outside the Park? What are the physical barriers to the migration of elk to or from the Park? Indicate these barriers on a map. Can the herds transmit brucellosis? Is the disease native to this species in this area? Have there been any documented cases of brucellosis transmission from wild to domestic animals in the area? Are any controls being planned to stop transmission of the disease? Describe and analyze recent court actions regarding control of brucellosis.  
7. Locate (on maps) trumpter swan nesting sites in the parks. What have been the principle causes of nesting failures over the last five years? What steps has NPS taken to reduce such problems? Do swans winter in the parks? Where? Are any sites in the area important feeding areas for swans? If so, where and in what season?  
8. Locate (on maps) bald eagle nest sites in the parks. Have any of the eagles failed to produce fledglings due to human interference? If so, what are plans or policies for reducing such interference? How dependent is the bald eagle population inside the Parks on recruitment from eagles fledged outside the Parks?  
9. What are NPS management policies on introduced, non-native species? Is there regular monitoring to locate introduced species such as eastern brook trout? What are the policies on eradicate不再是问有 such substances as thistles? What techniques are used in rehabilitating lakes for re-introduction of native fish? What are policies, if any, on predator control on Park lands? Describe any measures that may exist on the effectiveness of these policies. Identify any poaching problems (including locations if appropriate), and steps taken to minimize these problems.

**Visits Impacts**  
10. Describe the Parks' current situation regarding intensive visitor use or overuse. In what areas is overcome a serious problem? How are the Parks managing and controlling any such problem? What are the Parks' current structural facilities adequate (e.g., sewers, roads, road equipment, etc)? If not, what are the deficiencies?  
11. How in visitor use in the 1 Park system areas projected to increase in the next 25 years? What plans does the agency have for managing the influx (e.g., facilities, public transportation, and so on)? What steps (e.g., trail permits, limiting entrances, raising fees, changes in development) can take to reduce the impact of visitors on the Park's natural resources?  

**Comments on Activities of Other Agencies**  
12. Has the Park Service commented formally on any of the seven draft National Forest Plans (for the Beaverhead, Gallatin, Custer, Shoshone, Bridger-Teton, Caribou, and Targhee National Forestal) or the land use plans of other federal agencies in the area? Is so, provide copies of formal comments. Does NPS plan to comment on any other Forest Plans in the area? If so, which ones? When will these comments be available? In the final plans which have been issued to date, have your comments had a discernible impact on the proposed activities? If so, how?  
13. Has NPS commented on the oil, gas, or geothermal leasing plans of the other Federal or the State agencies? If so, please provide copies of these comments. Based on geological information so far available, which areas of proposed leasing could have the greatest impact the Parks' natural resources?  

**Management Policies**  
14. Briefly describe what is known and what is suspected about relationships between surface water, groundwater recharge zones, ground water, and the hydrothermal features of Yellowstone National Park. Are there any water sources both internal and external to the Park. What analyses have been conducted to identify these relationships and the possible impacts of timber harvesting, energy drilling, mining, ski area development, and other activities on water quality and groundwater recharge? Describe how the cumulative effects have been considered.  
15. For all existing roads, identify their location (on maps), their mileage by administrative level, and the annual maintenance costs. (If any road is maintained by another agency, give that agency, and outline its responsibilities). Identify the annual use of each of these roads for the past 5 yrs. Identify sections of each road that are closed and their rationale. Identify (and locate on maps) mileage of planned road construction and reconstruction for the next decade and for the next 50 yrs. Identify the primary reason for the road construction and reconstruction. Identify (and locate on maps)
planned temporary or permanent road closures, and identify the rationales for the planned closures.

16. What is NPS policy on wildfire suppression in the area? Identify the approach burned annually for the past decade.

17. What are the cultural resources or biotic sites in the area? What are the prehistoric sites and, briefly, describe what inventories have been made of the sites. Describe Forest Service policy on historic sites within wilderness areas.

18. What policies or activities have been carried out as a result of the designation of the area as a World Heritage Site and Biosphere Reserve? In what way do these activities differ from actions that would have been carried out without such designation?

Coordination

19. Briefly describe any regular meetings of professional staff with officials of other Federal, State, or local agencies on management issues related to the area indicated on the Committee map. How often or how regularly do these meetings occur?

QUESTIONS FOR U.S. GEOLOGICAL SURVEY

1. Indicate, on maps, areas of known or potential oil, gas, and geothermal resources. Also indicate areas of commercial mineral deposits, showing on the map what minerals are thought to be present in these leasing interest for any of these energy resources in the area? Explain.

2. In which of these areas is the resource extractable with technology currently available? How many of the deposits which are technically extractable are also economically profitable under current or reasonably foreseeable market conditions? Would any of the methods required for profitable exploitation require waivers from current law (e.g., substantial surface disturbance inside Wilderness areas)?

3. Identify the USGS study(s) cited previously by Yellowstone National Park Superintendent Barbee, and apparently conducted by the Melin Park lab, linking the groundwater supply for Yellowstone Park with the Gallatin National Forest. Describe the status of this or any similar studies; identify the researchers, and present any preliminary findings.

4. If any portion of the Overlook Belt lies within the area outlined, indicate the area of overlap.

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3. Very briefly, describe any activities of the agency within the area indicated on the Committee's map.

Coordination

4. Briefly describe any regular meetings of professional staff with officials of other Federal, State, or local agencies on management issues related to the area indicated on the Committee map. How often or how regularly do these meetings occur?

QUESTIONS FOR BUREAU OF INDIAN AFFAIRS

The following questions refer to the Wind River Indian Reservation, the portion southwest of U.S. 287, and generally above 7000 feet elevation.

Religious Freedom

1. In the area of religious significance to the Shoshone or Arapaho tribe? Briefly describe the religious, cultural, and ceremonial use of the area. On a map, indicate generally the areas of major significance. (If this information is considered confidential by the tribe, then provide whatever is available at a suitable level of detail.)

2. Are there areas in adjacent National Forests that are also used for such purposes? If so, indicate these areas on a map, and describe briefly the uses. Are there any disputes over the boundaries of the reservation in this area? Describe any dispute.

3. What are agency policies regarding newly discovered modern or prehistoric burial sites? Describe the actions the agency takes when such a site is discovered in, for example, the process of road construction. Describe any consultations that have taken place with the tribal government or religious leadership under the American Indian Religious Freedom Act (2 U.S.C. 1901 et seq.) or the Antiquities Act (16 U.S.C. 431-434), or the Archaeological Resources Protection Act (16 U.S.C. 410a et seq.) regarding burial sites or any other land management issues in the area.

Natural Resources and Subsistence

1. Does the tribe depend on the area for subsistence use? If so, what are the uses, and what is the current status of the resources? Are there any resource conflicts such as water rights or hunting, and if so, what are they? Have steps been taken to address these concerns? Does the reservation need assistance in meeting these goals? If so, what sort of assistance?

2. Are some of the animals (e.g., grizzlies, elk, bald eagles, trumpeter swans, buffalo, endangered species, etc.) of special concern in Yellowstone National Park, used in religious, ceremonial, or cultural activities of the tribe? Are these animals still present on the reservation? Are attempts being made to reintroduce them or upgrade their populations on reservation land, and is the tribal government involved in these efforts? Describe any such restoration activities.
mineral leasing, exploration, and development (distinguish oil, gas, geothermal, minerals, and mining, if possible); (d) hunting, (e) fishing, (f) hunting (distinguish by hunted species, if possible); (g) downhill skiing, and (h) other recreation (distinguish packers and outfitters from other local business which benefit from recreation and tourism).

2. How many R3M employees (in FTEs) are associated with each of these activities, and what is the total R3M employment in the area?

3. To what extent is the R3M associated with each of these activities? For all management personnel and resource specialists that deal with planning in this area, give their primary duties if the title doesn't convey their responsibilities, their grade level, and a brief summary of their professional experience—education and years of experience relevant to their current duties.

**Payments and Planning**

1. Identify all payments made by the R3M or NPS to State and local governments in the area annually for the past decade; be sure to include all receipt-sharing payments as well as Payments in Lieu of Taxes.

2. What is the status of R3M planning for public lands in this area? What proportion of the area has Resource Management Plans, and what were these plans called? What other plans exist that apply to the public lands in this area? Provide details on the public comments which were received on each of these plans. Identify the R3M administrative units which encompass the lands identified on the enclosed maps, and the boundaries of these administrative units.

**Range Management**

1. Identify number of grazing leases and permits, the number of AUMs, the number of use, permit limits, and range condition. Separate this information for free use versus paid permits and for cow/horses versus sheep/goats. How many cooperative agreements exist between R3M and livestock operators? Identify annual Federal investments in the various types of structural and non-structural range improvements for the past decade, including acresage of pesticide and herbicide application for each chemical used. Locate (on maps) all existing structural improvements which can benefit or restrict wildlife populations. Identify fees collected (in FTEs) and the fees per AUM in 1985. How did these fees compare with fees for private grazing in the area? How many ranchers are dependent on R3M grazing leases or permits? What proportion of grazing, for each rancher with a R3M permit of lease, is under these permits or leases? How many of these ranchers also use Forest Service permits?

2. Identify livestock losses to grazing bears, other predators, brucellosis, poisons, plants, and other such agents. What are R3M policies regarding predator control? Describe the efforts of R3M to gather data and evaluate the effectiveness of these policies. What is the population of wild horses and burros, and how has the population changed in the past decade? How many AUMs are forage for wild horses and burros consumed.

**Questions for Review of Land Management**

The following questions refer to the public lands indicated on the enclosed maps, unless otherwise specified.

3. Employment

a. How many direct and indirect jobs are created by direct and indirect activities which occur on the public lands, if possible, distinguish jobs and economic activity resulting from oil and gas leasing, mining, timber leasing, exploration, and development (distinguish oil, gas, geothermal, minerals, and mining, if possible), hunting, fishing, downhill skiing, and other recreation (distinguish packers and outfitters from other local business which benefit from recreation and tourism)?

4. Lease and permit limits and range condition. Separate this information for free use versus paid permits and for cow/horses versus sheep/goats. How many cooperative agreements exist between R3M and livestock operators? Identify annual Federal investments in the various types of structural and non-structural range improvements for the past decade, including acresage of pesticide and herbicide application for each chemical used. Locate (on maps) all existing structural improvements which can benefit or restrict wildlife populations. Identify fees collected (in FTEs) and the fees per AUM in 1985. How did these fees compare with fees for private grazing in the area? How many ranchers are dependent on R3M grazing leases or permits? What proportion of grazing, for each rancher with a R3M permit of lease, is under these permits or leases? How many of these ranchers also use Forest Service permits?

5. Identify livestock losses to grazing bears, other predators, brucellosis, poisons, plants, and other such agents. What are R3M policies regarding predator control? Describe the efforts of R3M to gather data and evaluate the effectiveness of these policies. What is the population of wild horses and burros, and how has the population changed in the past decade? How many AUMs are forage for wild horses and burros consumed.
and what is the carrying capacity for these animals? What are BLM management policies on introduced, non-native species such as eastern brook trout? What are the policies on eradicate undesirable fish with such s-balances as Rotomone? What techniques are used in rehabilitation? 4 lakes for re-introduction of native fish?

Survey and Mineral Leasing
1. For all Federal land in the area indicated on the enclosed map, identify and locate (on maps) all oil leases, gas leases, and geothermal leases, applications for leasing, applications for exploration and exploration in the past decade (identify which were successful), applications for development, developments in the past decade and identify any developments which have been abandoned. What standard provisions are included in leases for environmental protection? (be sure to include provisions to protect grizzlies.) What analyses are conducted prior to leasing to determine sensitivity of an area to exploration and drilling? Identify all applications which have been denied in the past decade, and the rationale for the denial. Does the BLM have the authority to issue a lease or approve an application in national forests, regardless of Forest Service recommendations?

Hunting and Fishing
1. For the public lands, identify hunting recreation visitor days (RVDA) annually for the past decade. What species are hunted, and how many RVDA are associated with each species? What is the economic value of a hunting RVDA (separate by major category of hunting, if possible)? How does this compare to expenditures by hunters? How many other recreation RVDA (such as camping) are associated with hunting? How much hunting effort occurs in Situation I and II (grizzly bear) areas? Is hunting success different (better or worse) in these areas? What actions are taken to minimize the impacts of timber harvesting, energy and mineral exploration and development, road construction, and other activities? Describe any poaching problems and steps which have been taken to minimize these problems. What policies or plans are in place to control the possible spread of newscrews? How many fishing RVDA have there been annually over the past decade?

10. Identify, by timber species, the volume and value of any timber sold and of any timber cut annually, and the acreage cut annually, for the past decade. Provide normal data for the past decade, on herbicide and pesticide use (for forestry) by chemical

Coordination
11. Briefly describe any regular meetings of local task force with officials of other Federal, State, or local agencies on management issues related to the area indicated on the Committee's map. How often or how regularly do these meetings occur?

Questions For the Bureau of Reclamation
1. What is the policy of the agency regarding release of water into the area encompassing the Red Rock Lakes NWR? All proposals to shift the upstream dam to a peaking power system interfere with current peaking power needs. Under what circumstances would this be feasible? What are the technical, economic and environmental impacts of the power needs? How many Federal permits are required to make the commitment?

2. Are there other dams in the area proposed for such conversion? If so, what studies have been done on the effects of such conversion on natural resources such as native fish or water-dependent birds?

3. Very briefly, describe any other activities of the agency within the area indicated on the Committee's map.

Coordination
4. Briefly describe any regular meetings of professional staff with officials of other Federal, State, or local agencies on management issues related to the area indicated on the Committee's map. How often or how regularly do these meetings occur?

Questions For the Bureau of Mines
Very briefly, describe any activities of the agency within the area indicated on the Committee's map.

Questions For the Office of Surface Mining
Very briefly, describe any activities of the agency within the area indicated on the Committee's map.

Questions For State Fish and game Agencies
The following questions refer to State lands in the areas indicated on the enclosed map, unless otherwise specified. Where replies call for maps, the Committee would appreciate the use of the enclosed map and overlays that can be superimposed on it.

1. For State and private lands, identify the fishing and hunting recreation (RVDA or other appropriate measure) annually for the past five years, distinguish among major types of wildlife recreation, such as elk hunting, antelope hunting, trout fishing, etc. Identify the
most popular areas for these types of wildlife recreation. What is the economic value used by the agency for a fishing or hunting RSP? Identify (and quantify) the known, local impacts of timber harvesting, energy and mineral exploration and development, developed recreation, and other activities on fishing and hunting. What state programs exist to eliminate or minimize the impacts of these activities on fish and wildlife populations?

2) For state and private lands, locate (on maps) all grizzly bear sightings and all human-bear encounters in the past five years. How many grizzly have been killed in the past decade (locate on maps). What are the principal causes of known grizzly deaths? What state programs exist to protect people from grizzlies and to protect grizzly free people? Have analyses been conducted to examine the cumulative impacts of timber harvesting, energy and mineral exploration and development, recreation, and other activities on grizzly populations? Does the state agree with the locations of situation I and Situation II grizzly areas on federal lands?

1) Locate (on maps) all significant habitat areas for bald eagles, trumpeter swans, and whooping cranes on state and private lands. Describe population trends and any known causes of declines. What state programs exist to protect these species?

Does the state have an endangered and threatened species program? For the "H", identify (in the enclosed map) the species listed under consideration; highlight species which are not included on the federal list. What state programs exist to protect these species? If the state is making significant efforts on other non-federal species in this area, outline these programs briefly.

Has the Department commented formally on any of the seven draft National Forest Plans (for the Beaverhead, Gallatin, Custer, Shoshone Bridger-Teton, Caribou, and Targhee National Forests)? If so, provide copies of formal comments. In the final plan which has been issued (apparently only for the Targhee National Forest to date), have your comments had a discernible impact on the proposed activities? Has the Department commented formally on managers or development plans of the other Federal agencies (National Park Service, Fish and Wildlife Service, BLM)? If so, provide copies of formal comments. Has the Department had adequate opportunity to comment on these plans? Have the Department's comments had any discernible influence on the plans or the activities of the agencies?

APPENDIX II

FOREST SERVICE PAYMENTS TO COUNTIES

The Forest Service returns 25 percent of its gross receipts to the counties within which the National Forests are located. This receipt-sharing provision was enacted in 1908 to compensate counties for the tax-exempt status of the National Forests. However, Forest Service deposits to the General Treasury are less than the gross receipts because the Forest Service is authorized to use timber sale receipts for several special purposes, particularly for road construction and for reforestation and other timber sale area improvements. The counties' shares of Forest Service receipts are calculated based on these expenditures are deducted from gross receipts, and thus the counties actually receive more than 25 percent of Forest Service deposits to the General Treasury.

The Forest Service payments are distributed according to the proportion of a National Forest's acreage in each county, rather than to the specific counties where the receipts are generated. The gross receipts for each National Forest are allocated among the counties where that Forest is located. For example, Latah County, Idaho, contains 45 percent of the Targhee National Forest's lands (76,690 acres out of 1,603,715 total acres), so Latah County payment would be calculated on a 45 percent of the Targhee's gross receipts. Latah County would also receive payments (calculated in the same manner) from the Challis and Salmon National Forests, since these Forests also have lands in the county.

FOREST SERVICE PAYMENTS TO COYER COUNTIES

Forest service payments to counties in the CoW must be estimated, because several counties have National Forest lands both inside and outside the CoW. Table 29 shows the estimated National Forest acreage in the CoW for each county. Estimated Forest service payments to counties with National Forest land in the CoW were calculated for each Forest, using the percentage of the county's National Forest land inside the CoW. For example, approximately 8.9 percent of the Targhee National Forest land in Clark County, Idaho, is paid about $5,200 to Clark County (8.9 percent of $54,250) for its National Forest land in the CoW. Table 29 shows that the total

(2) Act of May 23, 1908, Ch. 192, 35 Stat. 251; 16 U.S.C. 500. While all federal lands are exempt from local property taxes, this Act applied only to the National Forests.
TABLE 29

<table>
<thead>
<tr>
<th>County (# of NFs)</th>
<th>SF Acres</th>
<th>1982</th>
<th>1983</th>
<th>1984</th>
<th>1985</th>
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</thead>
<tbody>
<tr>
<td>Idaho</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bear Lake (1)</td>
<td>3,650</td>
<td>$ 3</td>
<td>$ 4</td>
<td>$ 3</td>
<td>$ 4</td>
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<td>Bonneville (2)</td>
<td>482,714</td>
<td>59.3</td>
<td>60.6</td>
<td>67.9</td>
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<td>Caribou (3)</td>
<td>243,150</td>
<td>27.0</td>
<td>24.6</td>
<td>20.3</td>
<td>26.3</td>
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<tr>
<td>Clark (1)</td>
<td>19,900</td>
<td>4.5</td>
<td>0.8</td>
<td>1.2</td>
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<tr>
<td>Fremont (1)</td>
<td>521,960</td>
<td>86.5</td>
<td>80.1</td>
<td>121.1</td>
<td>123.1</td>
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<td>Madison (4)</td>
<td>54,293</td>
<td>13.3</td>
<td>13.9</td>
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<td>$180.5</td>
<td>$139.4</td>
<td>$254.1</td>
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<td>SUM Total</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sevierhead (1)</td>
<td>54,810</td>
<td>$ 2</td>
<td>$ 3</td>
<td>$ 5</td>
<td>$ 3</td>
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<td>Carbon (2)</td>
<td>934,350</td>
<td>20.8</td>
<td>23.6</td>
<td>28.8</td>
<td>23.6</td>
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<td>82.7</td>
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<td>164,320</td>
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<td>17.2</td>
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<td>Sweet Grass (2)</td>
<td>333,335</td>
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<td>20.0</td>
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<td>Montana Total</td>
<td>2,495,150</td>
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<tr>
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<td>$59.6</td>
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<td>Hot Springs (1)</td>
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<td>3.4</td>
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<td>7.0</td>
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<td>65.5</td>
<td>90.1</td>
<td>57.3</td>
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<td>103.2</td>
<td>64.4</td>
<td>71.8</td>
</tr>
<tr>
<td>Sublette (2)</td>
<td>1,169,506</td>
<td>75.0</td>
<td>51.5</td>
<td>104.4</td>
<td>68.2</td>
</tr>
<tr>
<td>Teton (1)</td>
<td>1,370,018</td>
<td>102.7</td>
<td>35.9</td>
<td>123.1</td>
<td>120.9</td>
</tr>
<tr>
<td>WYoming Total</td>
<td>4,111,966</td>
<td>$475.7</td>
<td>$548.2</td>
<td>$442.3</td>
<td>$412.1</td>
</tr>
<tr>
<td>COVR Total</td>
<td>10,070,400</td>
<td>$741.5</td>
<td>$810.9</td>
<td>$594.1</td>
<td>$553.1</td>
</tr>
</tbody>
</table>

Forest Service county payments due to the presence of National Forest land in the COVR averaged more than $470,000 annually from 1982 through 1985, and nearly exceeded $1 million in 1984. Table 29 provides estimates of Forest Service payments to counties due to National Forest lands in the COVR. However, the receipts being shared might not have been generated in the COVR. Under the Forest Service system for sharing receipts, activities in one county can affect payments to other counties. Receipts from timber harvesting in the COVR on the Targhee NF, for example, will contribute to payments to Lewis County, which has no land within 10 miles of the COVR. On the other hand, receipts from timber harvesting in the Lassen NF, 78 miles from the COVR, will increase payments to the Idaho counties in the COVR. Thus, Forest Service payments to COVR counties are not directly proportional to Forest Service receipts from activities in the COVR National Forests.

FILL PAYMENTS TO COUNTIES

Forest Service payments to counties can only be spent on roads and schools in the counties where the National forests are located, under provisions established by each State. These payments often account for a substantial portion of the county budgets for these purposes. However, budgets cannot depend solely on Forest Service receipt sharing, because Forest Service payments to counties fluctuate widely from year to year. Payments to counties from the Reclamation Service for example, fell by 61 percent in one year, from $312,463 in 1981 to $119,813 in 1982.

Many counties are protected from the extreme annual fluctuations in Forest Service payments to counties by the Payments in Lieu of Taxes Act (PILT), enacted in 1976. This program compensates counties for the tax-exempt status of most federal lands. Under this Act, the RIM generally pays counties $0.75 per acre for most types of Federal land (including National Forests). To avoid double compensation for the counties, PILT payments are reduced by Forest Service payments to counties (and by other Federal revenue-sharing programs). Changes in Forest Service payments are, therefore, exactly offset by changes in PILT payments. However, PILT payments cannot fall below a minimum of $0.10 per acre, and the fall offset between Forest Service and PILT payments, therefore, only occurs when Forest Service payments are less than $0.65 per acre (less than the standard $0.75 per acre minus the $0.10 per acre minimum). Figure 11 illustrates Forest Service and PILT payments per acre at various levels of Forest Service gross receipts.
acre from Forest Service and PILT payments. When Forest Service receipts fall, counties receive less than $0.75 per acre; however, when receipts rise, as they have been since 1982, counties receive more than $0.75 per acre.

FIGURE 11. Forest Service and PILT Payments Per Acre to Counties

Federal Payment (dollars/acre)

Forest Service Revenues (dollars/acre)