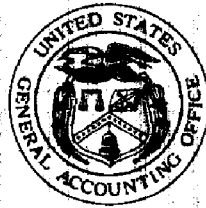


August 1994

ECOSYSTEM MANAGEMENT

Additional Actions Needed to Adequately Test a Promising Approach



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United States
General Accounting Office
Washington, D.C. 20548

**Resources, Community, and
Economic Development Division**

B-256275

August 16, 1994

Congressional Requesters

As agreed with your offices, this report addresses (1) the status of federal initiatives to implement ecosystem management, (2) additional actions required to implement this approach, and (3) barriers to governmentwide implementation.

As arranged with your offices, unless you publicly announce its contents earlier, we will make no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to the appropriate congressional committees; the Director of the White House Office on Environmental Policy; the Secretary of the Interior and the Directors of the National Park Service, Bureau of Land Management, Fish and Wildlife Service, and National Biological Survey; the Secretary of Agriculture and the Chief of the Forest Service; and the Director of the Office of Management and Budget. We will make copies available to others upon request.

This report was prepared under the direction of James Duffus III, Director, Natural Resources Management Issues, who may be reached at (202) 512-7756 if you or your staff have any questions. Other major contributors to this report are listed in appendix IV.

A handwritten signature in cursive script, reading 'Keith O. Fultz'.

Keith O. Fultz
Assistant Comptroller General

B-256275

List of Requesters

The Honorable George Miller
Chairman, Committee on
Natural Resources
House of Representatives

The Honorable Gerry E. Studds
Chairman, Committee on Merchant Marine
and Fisheries
House of Representatives

The Honorable Charlie Rose
Chairman, Subcommittee on Specialty Crops
and Natural Resources
Committee on Agriculture
House of Representatives

The Honorable Norm Dicks
House of Representatives

Executive Summary

Purpose

Even though many laws have been enacted to protect individual natural resources—air, water, soils, plants, and animals, including forests, rangelands, threatened and endangered species, wetlands, and wilderness areas—ecological conditions on many federal lands have declined. As a result of these declines and the recognition that some historic levels of natural resource commodity production and other natural resource uses cannot be sustained indefinitely, federal land managers have had to substantially decrease production of some renewable commodities, such as timber, and other uses, such as recreational activities, on some land units. These reductions have, in some instances, disrupted local economies and communities, contributing to intractable conflicts between ecological and economic values and concerns.

Since the late 1980s, many federal agency officials, scientists, and natural resource policy analysts have advocated a new, broader approach to managing the nation's lands and natural resources called "ecosystem management." This approach recognizes that plant and animal communities are interdependent and interact with their physical environment (soil, water, and air) to form distinct ecological units called ecosystems that span federal and nonfederal lands. In response to congressional requests, GAO identified (1) the status of federal initiatives to implement ecosystem management, (2) additional actions required to implement this approach, and (3) barriers to governmentwide implementation.

Background

The federal government owns about 30 percent of the nation's total surface area. To manage its holdings, it relies primarily on four agencies—the National Park Service, the Bureau of Land Management (BLM), and the Fish and Wildlife Service (FWS) within the Department of the Interior and the Forest Service within the Department of Agriculture. These agencies, the numerous land units they manage, and the many laws governing their management form the current federal land management framework that has evolved over the last century. As agreed with the requesters, GAO limited the scope of its work primarily to the relevant activities of these four agencies.

The federal land management framework is part of a larger national land and natural resource use framework. In addition to other federal and state land management agencies, this larger framework includes many federal and state agencies that have regulatory or tax authority or financial or

technical assistance programs that can greatly influence the use of natural resources and other activities on private lands and in marine waters.

Proponents of ecosystem management believe that coordinating human activities across large geographic areas to maintain or restore healthy ecosystems—rather than managing legislatively or administratively established land units and individual natural resources—would, among other things, better address declining ecological conditions and ensure the sustainable long-term use of natural resources, including the production of natural resource commodities. Hence, proponents believe that this approach would help to avoid or mitigate future ecological and economic conflicts by providing greater flexibility to coordinate activities over larger land areas. Therefore, ecosystem management would not necessarily alter the federal land management agencies' basic legislative mandates—sustaining multiple uses of federal lands and protecting natural resources. Rather, it would change these agencies' approach to fulfilling their stewardship responsibilities through a better scientific understanding of these mandates' relationship to one another. Compared with the federal agencies' current approaches to land management, this new approach will require greater reliance on ecological and socioeconomic data, unparalleled interagency coordination, and increased collaboration and consensus-building among federal and nonfederal parties within most ecosystems.

Results in Brief

Over the past 2 years, all four of the primary federal land management agencies have independently announced that they are implementing or will implement an ecosystem approach to managing their lands and natural resources, and each has been working to develop its own strategy primarily within its existing framework of laws and land units. In addition, the administration is proposing in its fiscal year 1995 budget, among other things, to fund the initial stage of a governmentwide approach to ecosystem management, including four ecosystem management pilot projects. It is also considering various principles for its governmentwide approach, including managing along ecological rather than political or administrative boundaries.

Implementing the initial stage of a governmentwide approach to ecosystem management will require clarifying the policy goal for ecosystem management and taking certain practical steps to apply the principles being considered by the administration. These steps include (1) delineating ecosystems, (2) understanding their ecologies, (3) making

management choices, and (4) adapting management on the basis of new information. In taking these steps, the federal government will have to make difficult policy decisions about how it can best fulfill its stewardship responsibilities.

The administration's initiatives to implement ecosystem management governmentwide face several significant barriers. For example, although ecosystem management will require greater reliance on ecological and socioeconomic data, the available data, collected independently by various agencies for different purposes, are often noncomparable and insufficient, and scientific understanding of ecosystems is far from complete. While ecosystem management will require unparalleled coordination among federal agencies, disparate missions and planning requirements set forth in federal land management statutes and regulations hamper such efforts. And although ecosystem management will require collaboration and consensus-building among federal and nonfederal parties within most ecosystems, incentives, authorities, interests, and limitations embedded in the larger national land and natural resource use framework—many beyond the ability of the federal land management agencies individually or collectively to control or affect—constrain these parties' efforts to work together effectively.

GAO's Analysis

Federal Agencies Are Beginning to Implement Ecosystem Management

The administration's fiscal year 1995 budget proposal requests \$610 million in discretionary spending for ecosystem management initiatives. Most of this money is to accelerate three ongoing interagency restoration efforts that are being designated as pilot ecosystem management projects: (1) the old-growth forests of the Pacific Northwest, (2) south Florida, including the Everglades and Florida Bay, and (3) the urban watershed of the Anacostia River in Maryland and the District of Columbia. Another \$90 million in mandatory spending is to be used to fund a fourth pilot project—Alaska's Prince William Sound, damaged by the March 1989 oil spill from the supertanker Exxon Valdez.

The budget document also states that the administration is considering the following principles: (1) managing along ecological boundaries, (2) ensuring coordination among federal agencies and increased collaboration with state, local, and tribal governments; the public; and the

Congress, (3) using monitoring, assessment, and the best science available, and (4) considering all natural and human components and their interactions.

In 1993, the White House Office on Environmental Policy, created in the same year by the President, established an Interagency Ecosystem Management Task Force to implement an ecosystem approach to environmental management. A draft "Ecosystem Management Initiative Overview," prepared and approved by the task force, summarizes the efforts of the agencies to clarify goals, translate principles, and derive lessons from ongoing ecosystem management efforts that can be applied to other ecosystems. The task force has also formed an interagency work group to examine major issues that influence the effectiveness of ecosystem management—such as the budget process, legal authorities, and information management—and to make recommendations to the task force for improvements.

Additional Actions Are Needed for Implementation

Implementing the initial stage of the governmentwide approach to ecosystem management will require clarifying the policy goal for ecosystem management and taking certain practical steps to apply the principles being considered by the administration.

Neither the administration's fiscal year 1995 budget document nor the task force's draft "Ecosystem Management Initiative Overview" clearly identifies the priority to be given to the health of ecosystems relative to human activities when the two conflict. Definitions developed by BLM, FWS, and others leave no doubt that greater priority will have to be given to maintaining or restoring a minimum level of ecosystem integrity and functioning over nonsustainable commodity production and other uses. The practical starting point for ecosystem management will have to be to maintain or restore the minimum level of ecosystem health necessary to meet existing legal requirements. As the understanding of ecosystems increases through the experience gained from ecosystem management initiatives, including the four pilot projects, needed changes to existing legislative requirements can be sought to better define and achieve the minimum required level of ecosystem integrity and functioning.

Implementing ecosystem management will also require taking practical steps that clearly identify what must be done and which agencies and parties must be involved. These steps include (1) delineating, on the basis of reasonable ecological and management criteria, the boundaries of the

geographic areas to be managed as ecosystems, (2) understanding their ecologies (including their current conditions and trends, the minimum level of integrity and functioning needed to maintain or restore their health, and the effects of human activities on them), (3) making management choices about desired future ecological conditions, about the types, levels, and mixes of activities that can be sustained, and about the distribution of activities over time among the various land units within the ecosystems, and (4) adapting management on the basis of continually researching, monitoring, and assessing ecological conditions.

Barriers Impede Implementation

The administration's initiatives to implement ecosystem management governmentwide face several significant barriers. For example, understanding the ecology of an ecosystem will require collecting and linking large volumes of scientific data. In addition, large volumes of socioeconomic data must be collected, organized, and analyzed to identify important relationships between human activities and ecological conditions and trends and to make necessary or desired trade-offs among ecological and socioeconomic values and concerns. However, available data are often not comparable, and large gaps in information exist. Furthermore, there is still much uncertainty about how ecosystems function—uncertainty that contributes to strong differences in the interpretation of scientific evidence.

Coordination among federal agencies within an ecosystem will be hampered by disparate missions and separate, lengthy planning requirements—both of which are rooted in the existing federal land management framework. For example, in the greater Yellowstone area, adjacent National Park Service and Forest Service lands in the same ecosystem have been managed with very different objectives, in part because the Forest Service receives funding incentives for timber harvesting. Coordinated revision of the agencies' plans under existing separate laws will take several years to accomplish.

Collaboration and consensus-building with state, local, and tribal governments; the public; and the Congress will be constrained by incentives, authorities, interests, and limitations embedded in the larger national land and resource use framework, many of which are beyond the ability of the federal land management agencies to control or affect. For example, participants at an October 1993 Yale University workshop on ecosystem management concluded that federal, state, and local regulatory

agencies and tax authorities often operate in a way that does not support, and in many cases impedes, ecosystem management.

GAO believes that the four pilot projects proposed in the administration's fiscal year 1995 budget afford an opportunity to identify these and other barriers as well as statutory, regulatory, institutional, and procedural options for overcoming them. However, to adequately demonstrate ecosystem management's potential to avoid or mitigate future ecological and economic conflicts, GAO believes that it will be necessary to test the approach in geographic areas where problems or issues of mutual concern have not become as intractable as they have at the four pilot projects and where greater flexibility exists to coordinate activities across ecosystems while still maintaining or restoring their ecological health. The interagency task force is considering additional projects that should provide opportunities to demonstrate this potential.

Recommendations

GAO recommends that the Director of the White House Office on Environmental Policy, through the Interagency Ecosystem Management Task Force, (1) develop a strategy that clarifies the policy goal for ecosystem management, translates the general principles in the administration's fiscal year 1995 budget into practical steps that clearly identify what must be done and which agencies and parties must be involved, and identifies barriers to implementing ecosystem management and options for overcoming them and (2) report progress in implementing this strategy as part of the yearly budget and appropriations process.

Agency Comments and GAO'S Evaluation

GAO requested and received written comments on a draft of this report from the Department of the Interior, the Forest Service, and the White House Office on Environmental Policy, all of which agreed with GAO's analysis. Interior's response included comments from BLM, the National Park Service, and FWS. Interior described the draft as thoughtful and said that it provided much useful guidance. BLM considered the draft well researched and well prepared and stated that it revealed a sound understanding of ecology and its relationship to ecosystem management. According to the National Park Service, the report brings together the current situation regarding ecosystem management, some implementation problems, and options for overcoming them. FWS said that the report provides a well-written and comprehensive analysis of the issues. The Forest Service found the report to be in line with the agency's history and thinking on ecosystem management and subsequent implementation

policy and posture. The White House Office on Environmental Policy termed the draft a well-framed and lucid presentation of the basic facets of ecosystem management.

The Forest Service and the White House Office on Environmental Policy concurred with both of GAO's recommendations, while Interior agreed with the first recommendation and the intent of the second recommendation. However, Interior said it would prefer to see the collective assessment and reporting of progress in implementing ecosystem management included in the interagency task force process rather than in the yearly budget and appropriations process.

While Interior's preference would meet the executive branch's need for a collective assessment of federal agencies' progress in implementing an ecosystem management strategy through pilot projects and other initiatives, it would not make these agencies as accountable to the Congress as GAO's recommendation. In GAO's view, the greater flexibility in at least some of the agencies' budget structures, which the agencies believe ecosystem management requires, needs to be balanced or offset by greater accountability to the Congress for the agencies' ecosystem management expenditures. GAO believes that this accountability can be better ensured by assessing and reporting progress toward achieving measurable performance objectives as part of the yearly budget and appropriations process.

The agencies' comments and our responses are presented fully in appendixes I through III.

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Abbreviations

BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CRS	Congressional Research Service
FACA	Federal Advisory Committee Act
FLPMA	Federal Land Policy Management Act
FWS	Fish and Wildlife Service
GAO	General Accounting Office
NBS	National Biological Survey
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
OTA	Office of Technology Assessment

Introduction

The federal government's share of the nation's total surface area, once as high as 80 percent, is now about 650 million acres, or about 30 percent. Today, four agencies—the National Park Service, the Bureau of Land Management (BLM), and the Fish and Wildlife Service (FWS) within the Department of the Interior and the Forest Service within the Department of Agriculture—manage about 628 million acres, or 97 percent of these federal lands.¹ These lands contain a significant portion of the nation's wealth of natural resources, including, as of about 1980, 38 percent of the nation's forests, 54 percent of the nation's grazing lands, and the sources of many of the nation's streams and rivers. These agencies, the numerous land units they manage, and the many laws governing their management form the current federal land management framework that has evolved over the last century.

The federal land management framework is part of a larger national land and natural resource use framework. In addition to other federal and state land management agencies, this larger framework includes many federal, state, and local agencies that have regulatory or tax authority or financial or technical assistance programs that can greatly influence the use of natural resources and other activities on private lands and in marine waters.

Even though many laws have been enacted to protect individual natural resources—air, water, soils, plants, and animals, including forests, rangelands, threatened and endangered species, wetlands, and wilderness areas—ecological conditions on many federal lands have declined. As a result of these declines and the recognition that some historic levels of natural resource commodity production and other natural resource uses cannot be sustained indefinitely, federal land managers have had to substantially decrease the production of some renewable natural resource commodities, such as timber, and other natural resource uses, such as recreational activities, on some land units. These reductions have, in some instances, disrupted local economies and communities, contributing to intractable conflicts, referred to by the Secretary of the Interior as ecological and economic “trainwrecks.”

Since the late 1980s, many federal agency officials, scientists, and natural resource policy analysts have advocated a new, broader approach to managing the nation's lands and natural resources called “ecosystem management.” This approach recognizes that plant and animal communities are interdependent and interact with their physical

¹Nearly all of the remaining federal lands are administered by the Department of Defense.

environment (soil, water, and air) to form distinct ecological units called ecosystems that span federal and nonfederal lands. They believe that this approach will, among other things, better address declining ecological conditions and ensure the sustainable long-term use of natural resources, including the production of commodities, thus helping to prevent future ecological and economic conflicts from becoming intractable.

The Federal Land Management Framework Has Evolved

The federal government's approach to managing federal lands and their natural resources has evolved in response to changing national social, economic, and ecological concerns and values. The current federal land management framework began to take shape at the end of the 19th century when, after a century of conveying or selling most new territorial lands, the Congress began establishing agencies to manage the remaining federal lands. Over the last 30 years, this framework has evolved to include new responsibilities for protecting individual natural resources.

Federal Lands Were Conveyed for Private Development

During the United States' first century as a nation, the federal government viewed its land management role as temporary. Beginning in 1785, the federal government established a system for surveying and selling its increasingly vast land acquisitions to new states, their settlers, and railroad companies, opening the American frontier.

Toward the end of the 19th century, the federal government had transferred virtually all of its generally productive lands in the eastern, southern, and midwestern United States as well as much of its most productive agricultural, range, and timber lands in the far West to private ownership. It also generally allowed private uses on the remaining federal lands in accordance with local laws and customs.

Federal Lands Were Managed to Sustain or Increase Their Long-Term Productivity

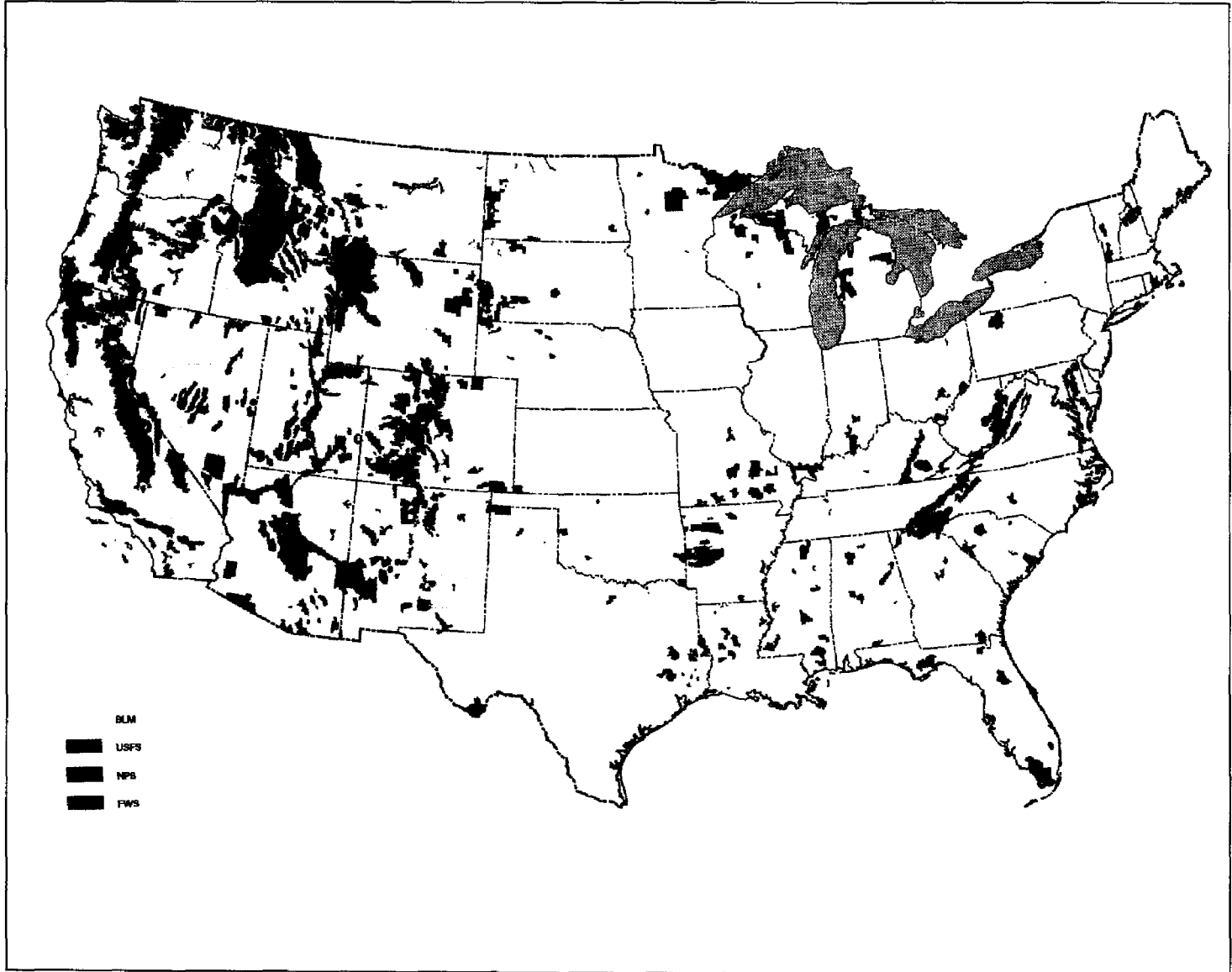
After several decades of rapid development and unrestricted use, many of the nation's lands and natural resources were significantly degraded. Responding to growing national concerns, the Congress began to redefine the federal government's role in land management from temporary to permanent retention and active stewardship. Over the years, this stewardship became focused on sustaining or increasing the long-term productivity of the federal lands so that they might supply desired natural resource commodities and uses into the future.

Throughout the 20th century, this new role—and a new federal land management framework for implementing it—grew as the Congress enacted legislation reserving numerous federal land units for different purposes. Through these laws, the federal government set aside many remaining lands in the West and acquired degraded private lands in eastern areas of the country. These laws generally specified that various existing or newly created federal agencies were to actively manage the land units for the production of specific natural resource commodities and for other uses. These agencies were eventually consolidated into the four principal land management agencies that exist today.

BLM, established in 1946, currently manages about 270 million acres, most of which are range and semiarid lands. Located mainly in the West and in Alaska, these lands have been used primarily for mineral development and livestock grazing under systems originating in 1872 and 1905, respectively. The Forest Service, created in 1905, manages about 191 million acres consisting primarily of national forests and grasslands; the forested lands are managed to a great extent for timber production. These lands are located in 45 states but are also largely concentrated in the West and in Alaska. The National Park Service, established in 1916, manages about 77 million acres, divided into over 360 units in 49 states. These units are managed to conserve their scenery, natural and historic resources, and wildlife for the enjoyment and recreation of current and future generations. FWS manages a loosely structured system, established in 1966, of about 500 wildlife refuges, the first of which was created in 1903. These refuges are concentrated in Alaska and along four major north-south waterfowl migration flyways. They encompass about 89 million acres, which have been managed primarily for the benefit of wildlife, including endangered species and waterfowl. When compatible with the primary purposes for which a refuge was established, other activities such as mining and mineral leasing, recreation (including hunting and fishing), and livestock grazing are generally permitted.

Figure 1.1 shows the location of these agencies' lands in the 48 contiguous states.

Figure 1.1: Lands Managed by Four Primary Federal Land Management Agencies in the 48 Contiguous States



Source: U.S. Geological Survey.

Legislation Creates Production-Oriented Incentives

Beginning early in the 20th century, the Congress enacted legislation creating incentives to provide for specific levels of certain natural resource commodities and other uses from Forest Service and BLM lands. Later legislation directed the agencies to manage lands for multiple purposes and to consider their long-term as well as short-term productivity. Examples of this later legislation include (1) the Multiple Use-Sustained Yield Act of 1960 and (2) the Classification and Multiple Use Act of 1964 as superseded by the Federal Land Policy Management Act of 1976 (FLPMA). These statutes gave authority to the Forest Service and BLM to manage lands for multiple uses to best meet the present and future needs of the American people (the multiple-use principle), and to sustain in perpetuity outputs of various renewable natural resource commodities and other uses (the sustained-yield principle). However, despite this later legislation, the two agencies, in many cases, continued to emphasize the production of commodities as established in prior statutes and in accordance with annual congressional appropriations.

For example, the Forest Service receives most of its operating funds from (1) the receipts of timber sales under the Knutson-Vandenberg Act of 1930, which authorizes national forests to retain a portion of their timber sale receipts to help fund reforestation and other activities as well as regional office and headquarters expenses, and (2) appropriated funds linked primarily to managing and harvesting timber. Therefore, in most national forests—even in some where timber harvesting is uneconomic and other activities and uses are more valuable—forest managers depend on timber sales for funds. For many years, in annual appropriations acts, the Congress also specified “target” levels of timber to be harvested.

Other legislation requires the two agencies to share receipts from the sale or use of natural resources on federal lands with the states or counties within which the activities occur. For example, the Forest Service is required to allot 25 percent of its gross receipts from commercial activities in national forests to states and counties. Similarly, BLM is required to allot varying percentages of its grazing fees, ranging from 12.5 percent to 50 percent, and both agencies allot about 50 percent of their adjusted onshore oil, gas, and other mineral receipts to states or counties. These payments, which are often required by federal law to support specific local activities, such as schools and roads, contribute substantially to some localities’ budgets. This is one reason, in addition to enhancing local employment, that some state and local governments have supported the continued production of high levels of natural resource commodities from federal lands.

Legislation Requires Protecting Individual Natural Resources

Over the last 30 years, increasing scientific and public concern about the declining condition of the nation's natural resources has led the Congress to enact a number of laws to protect individual natural resources on both federal and nonfederal lands. These laws regulate the quality of air and water and require the preservation of plant and animal species, including fish, whose survival is threatened or endangered. As a result, the current federal land management framework has evolved to become a complex collection of agencies, land units, and laws designed to sustain or increase long-term commodity production and uses on federal lands while protecting the natural resources for future generations.

Recognizing that federal lands and activities on them are important to protecting natural resources, the Congress has also enacted several largely procedural laws requiring federal agencies to identify and consider the effects of their activities on natural resources. Primary among these laws is the National Environmental Policy Act of 1969 (NEPA), which established the Council on Environmental Quality (CEQ) in the Executive Office of the President and requires federal agencies, in accordance with regulations promulgated by CEQ, to prepare detailed environmental impact statements for major federal actions that may significantly affect the quality of the human environment. In preparing these statements, the agencies must identify and consider the direct, indirect, and cumulative impacts on natural resources of activities on their lands, both alone and in conjunction with the activities of other agencies and landowners.

Also, FLPMA, the National Forest Management Act of 1976 (NFMA), and the National Parks and Recreation Act of 1978 require BLM, the Forest Service, and the National Park Service, respectively, to develop long-range land use or general management plans for their lands. These plans must not only project resource commodity production and other uses over a number of years but also, consistent with NEPA procedures, identify the likely impacts on natural resources of planned activities.

In addition, the Congress has set aside certain federal lands to protect their natural conditions. For example, to protect and preserve their natural conditions, vast areas have been designated as wilderness and certain rivers have been designated as "wild and scenic."

Federal Land Management Is Part of a Larger National Framework

The current federal land management framework of laws, land units, and agencies is, in turn, part of a larger national land and natural resource use framework that includes not only other federal and state land management agencies but also numerous federal, state, and local agencies with regulatory or tax authority or financial or technical assistance programs that can greatly influence the use of natural resources and other activities on private lands and in marine waters.

States and localities regulate land and natural resource uses by a variety of means including (1) local zoning laws and regulations, (2) state forest practices acts that limit the extent and methods of timber harvesting, and (3) wildlife management programs. Furthermore, state laws govern most decisions on water allocation and use, and states are primarily responsible for devising plans to meet federal air quality standards and for devising water quality standards. Additionally, numerous treaties have given Native Americans control over the use of tribal lands.

In addition,

- the Environmental Protection Agency has authorities and responsibilities under 12 major environmental statutes, including those to protect and enhance air quality (the Clean Air Act) and to restore and maintain the chemical, physical, and biological integrity of the nation's waters (the Clean Water Act);
- the U.S. Army Corps of Engineers has primary legislative authority to regulate activities in wetlands and other waters of the United States and to manage the nation's water resources with such projects as dams, reservoirs, levees, harbors, waterways, and locks;
- Agriculture's Soil Conservation Service provides financial and technical assistance to private landowners to prevent soil erosion;
- numerous commodity stabilization programs in Agriculture provide financial assistance to farmers who produce certain crops;
- Interior's Office of Surface Mining Reclamation and Enforcement is responsible for protecting the public and the environment from the adverse effects of coal mining while allowing access to the coal that is important to the nation's energy needs;
- Interior's Bureau of Reclamation is responsible for planning, constructing, and operating water resource projects in an environmentally and economically sound manner in the interest of the American public; and
- Interior's FWS, in addition to managing wildlife refuges, shares responsibilities with the Department of Commerce's National Marine Fisheries Service for ensuring the protection and restoration of threatened

or endangered plant and animal species under the Endangered Species Act of 1973.

Moreover, land uses can be greatly influenced by state and local property tax laws, which often provide for differential taxation of lands on the basis of use, as well as by federal and state inheritance tax laws, which influence the disposition of lands in estates. Finally, the Fifth and Fourteenth Amendments to the Constitution prohibit the federal and state governments from taking private lands for public uses without just compensation. Courts have ruled that certain government regulations of land use have constituted takings requiring just compensation.

Declining Ecological Conditions Have Led to Conflicts

Despite the enactment of numerous laws to protect individual natural resources, ecological conditions on many federal lands have declined. For example, according to a federal interagency team, many forests in the Pacific Northwest have become so damaged by timber harvesting that species are disappearing and many streams no longer provide adequate habitat for fish.² Similarly, BLM has reported that sedimentation in streams has increased; rangelands have become less productive; plant, animal, and fish habitats have been damaged; the health of forests has declined; and the range and numbers of many native flora and fauna have decreased.³ National Park Service managers have reported diminished scenic views, polluted streams, and destruction of wildlife and its habitat.⁴ Numerous other reports indicate that such problems are neither isolated nor diminishing.

Such declines, coupled with the recognition that some historic levels of resource commodity production and other uses cannot be sustained indefinitely, have required federal land managers to substantially reduce levels of timber harvests, livestock grazing, recreational activities, and other uses on some land units. These reductions, in turn, have had adverse economic and social effects on some nearby communities whose economies are highly dependent on uses associated with federal lands. Other communities have also been adversely affected because they

²Forest Ecosystem Management: An Ecological, Economic, and Social Assessment; Report of the Forest Ecosystem Management Assessment Team, Forest Service and BLM (Portland, Oregon: July 1993).

³Ecosystem Management in the BLM: From Concept to Commitment, Instruction Memorandum No. 94-14 (Dec. 14, 1993).

⁴National Park Service: Activities Outside Park Borders Have Caused Damage to Resources and Will Likely Cause More (GAO/RCED-94-59, Jan. 3, 1994).

depend on commodities—such as the Pacific salmon—whose stocks have been reduced by declining ecological conditions on federal lands.

These adverse effects on local economies and communities have created intense ecological and economic conflicts over federal land management. Concern over declining ecological conditions and reduced commodity production and other uses on federal lands has led to an increasing number of administrative and judicial challenges to federal land managers' decisions by environmental, industrial, and recreational organizations and groups. These challenges have frequently resulted in delayed, altered, withdrawn, or stalemated decisions, such as the court-imposed moratorium on timber harvesting on federal lands in the old-growth forests of the Pacific Northwest. Responding to these challenges has required agency staff to extensively reevaluate prior decisions.

Ecosystem Management May Be a Promising Next Step for Federal Land Management

Federal and other researchers have found that communities of plants and animals, which can include humans, are interdependent and interact with their physical environment (soil, water, and air) to form distinct ecological units called ecosystems that span federal and nonfederal lands. As a result, a growing number of agency officials, scientists, and natural resource policy analysts believe that a new, broader approach—referred to as ecosystem management—is needed to manage lands and natural resources. They believe that maintaining or restoring ecosystems—rather than managing legislatively or administratively established land units and individual natural resources—would, among other things, better address declining ecological conditions and ensure the sustainable long-term use of natural resources, including the production of natural resource commodities. They believe that this approach would thus help to avoid or mitigate future ecological and economic conflicts by providing greater flexibility to coordinate activities over larger land areas. Therefore, ecosystem management would not necessarily alter the federal land management agencies' basic legislative mandates—sustaining multiple uses of federal lands and protecting natural resources. Rather, it would change these agencies' approach to fulfilling their stewardship responsibilities through a better scientific understanding of these mandates' relationship to one another.

Ecosystems Are Complex, Dynamic Ecological Units

Ecosystems are distinct ecological units that are commonly classified according to their "structures." These structures are differentiated from one another by particular combinations of "biological components," such

as plant and animal communities, and “physical components,” including landforms like mountains or plains and water systems like watersheds⁵ and river basins.⁶ Ecosystem structures and components are developed and sustained through the influence of interactive “processes” among components such as climate, nutrient cycles, and dispersion and succession patterns that are characteristic of given ecosystems.

For instance, the old-growth forest ecosystem of the Pacific Northwest has been defined by its characteristic structure of biological components—including over-200-year-old living conifers, standing and fallen dead trees, and associated plants and animals (including two species of threatened birds, the northern spotted owl and the marbled murrelet) that depend on both the living and the dead trees for their survival—and physical components such as mountains. Characteristic processes include heavy rainfall and the decay of woody material that, together, enable trees to grow old enough and large enough to develop cavities and materials for nesting and allow their root systems to contribute to nutrient cycles that sustain the food chain.

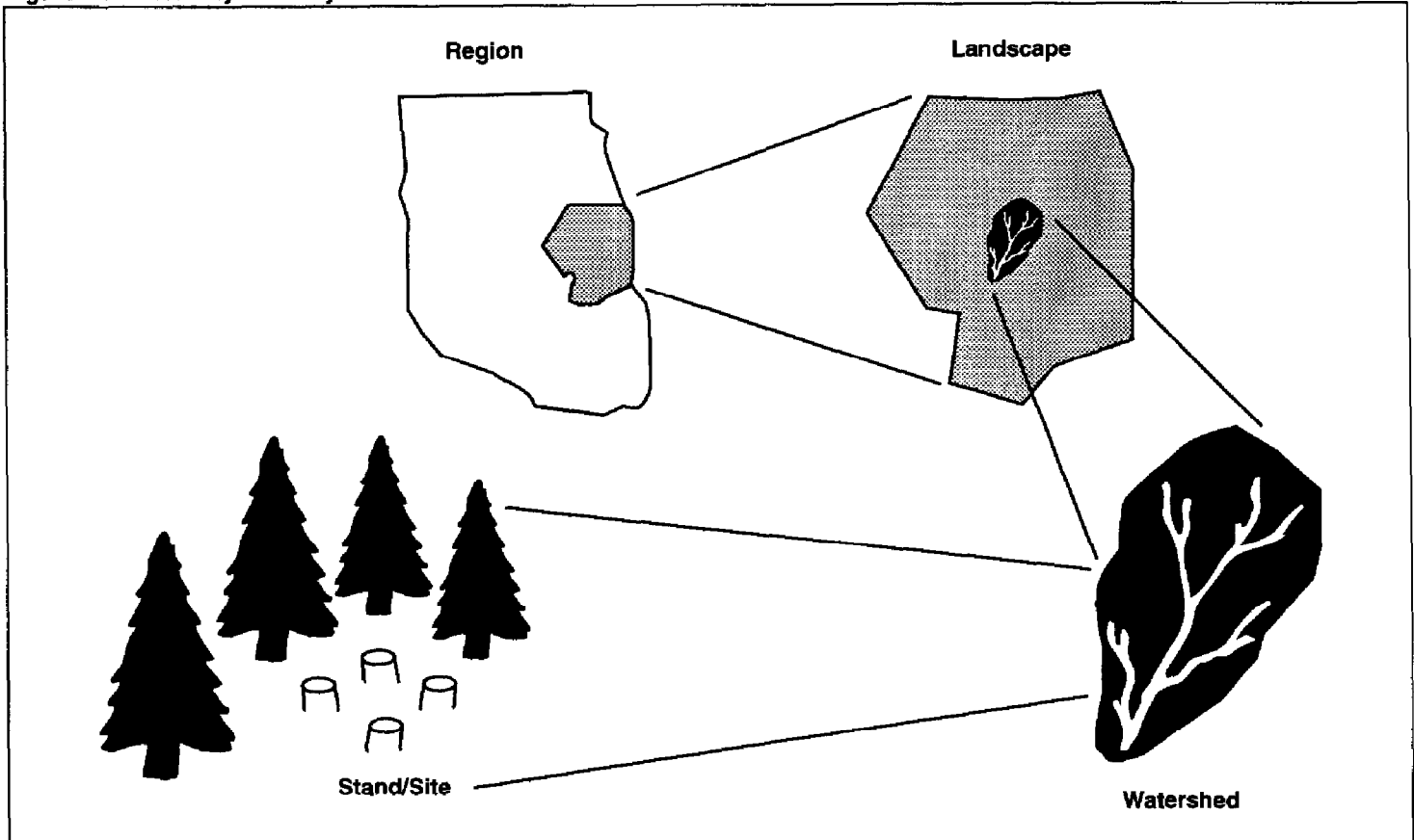
The structures, components, and processes—and even the boundaries—of ecosystems vary over time as a result of natural disturbances, such as fires, floods, and climatic variations. However, ecosystem functioning is generally resilient to the normal range of these disturbances—commonly referred to as the historic range of natural variability. In many cases, ecosystems depend upon such disturbances for their regeneration and continued functioning.

Ecosystems exist at several geographic scales, from large continents to very small sites of a few square feet or less. These different scales form a hierarchy in which several smaller ecosystems may exist within a single ecosystem at the next larger scale. Also, ecosystems are “linked” to one another at any given scale—as well as up and down among scales in the hierarchy—by ecological “functions” that they perform for one another, such as providing moisture or nutrients across their boundaries. This hierarchy of scales is illustrated in figure 1.2.

⁵A watershed is variously defined as the entire region drained by a waterway that flows into a lake, reservoir, or ocean; the total area above a given point on a stream that contributes water to the flow at that point; or the topographic dividing line from which surface streams flow in two directions.

⁶River basins are watersheds drained by a river and its tributaries.

Figure 1.2: Hierarchy of Ecosystem Scales



Source: Adapted from H. Salwasser, "Conserving Biological Diversity: A Perspective on Scope and Approaches," *Forest Ecology and Management*, Vol. 35 (1990).

Maintaining and restoring the "integrity" of the components and the functioning of the processes within ecosystems is important to protecting "biological diversity" (biodiversity)—or the variety of species, the genetic differences among them, and the communities and ecosystems in which they occur. A 1991 report by the Keystone Center, which was based on the deliberations of 60 federal officials and scientists, nonfederal scientists, and representatives from environmental and industry organizations, concluded that preserving biodiversity is critical for a number of reasons.⁷ The report concluded that, among other things, biodiversity (1) supports

⁷Final Consensus Report of the Keystone Policy Dialogue on Biological Diversity on Federal Lands, Keystone Center (Keystone, Colo.: Apr. 1991).

the integrity and resilience of ecological systems on which humans depend, (2) is the source of about half of all prescription drugs and the likely reservoir for many future ones, (3) makes possible improvements in the resistance of desired food and fiber species to pests, disease, and drought, and (4) provides the basis for future increases in productivity. However, a 1992 report by the Office of Technology Assessment (OTA) found, as have numerous other studies, that a large and growing number of species is recognized as being in danger of extinction and that many others suffer from a loss of populations or reductions in their distribution across their natural ranges of habitat.⁸ As the Keystone report noted, the loss of biodiversity has been associated with the diminished integrity of ecosystem structures and components and the functioning of their processes and linkages and can have significant adverse impacts on their ability to provide for material needs of human society.

Humans Are a Component of Ecosystems

Humans are a biological component of most ecosystems, and ecosystem management does not presume that ecosystems have a life and destiny independent of people and their communities. Since ecosystems include humans, human activities and uses are integral to ecosystem management. However, by virtue of new technologies, population growth, and increased use of lands and natural resources, humans have a unique capacity to alter ecosystems through activities that create sudden ecological stresses, profoundly affecting the integrity and functioning of ecosystems.

For instance, the Forest Service has used agricultural production techniques—such as suppressing fires; clearcutting native tree species; and applying herbicides and fertilizers to replacement stands of a single species selected for superior growth characteristics, planted at optimum densities, and periodically thinned—to produce higher levels of timber from federal forests than would have been produced by the natural succession of original stands. However, by altering the processes important to natural succession, these techniques have reduced native biological components and greatly changed forest ecosystem structures. These techniques have also adversely affected other ecosystems by disrupting important functional linkages. For example, increased sedimentation in streams resulting from these techniques has damaged the spawning grounds for Pacific salmon, which are components of both this and the marine ecosystems where they spend most of their adult lives.

⁸Combined Summaries: Technologies to Sustain Tropical Forest Reserves and Biological Diversity, OTA-F-515, (Washington, D.C.: May 1992).

Studies by agencies and nonfederal scientists have found that human activities have brought about much of the decline in ecological conditions on federal lands. In some instances, they have found that commodity production and other uses on federal lands have significantly changed ecosystems. These changes occurred because the activities were concentrated in areas (spatial scale) that were too small or were conducted over time frames (temporal scale) that were too short for ecosystems to absorb or in a manner that fragmented ecosystems, breaking important linkages. They also found that many declining conditions were associated with activities taking place on nearby nonfederal lands. This finding is consistent with several GAO studies over the last decade, including (1) the previously cited 1994 report on activities outside park borders that have caused damage to park resources and will likely cause more and (2) a 1991 report on the Flathead National Forest that found timber harvests on private lands in the northern Rocky Mountains had significant adverse impacts on water quality and wildlife habitat on adjacent national forest lands.⁹

Ecosystem Management Appears to Be a Sounder Approach for Meeting Federal Stewardship Mandates

For these reasons, agency officials and nonfederal scientists agree that federal land management must no longer be focused primarily on individual uses on individual land units or on protecting individual natural resources. Rather, a consensus has emerged that ecosystem management provides a sounder approach for meeting the federal stewardship mandates of protecting natural resources and sustaining long-term commodity production and other uses on federal lands.

Compared with federal agencies' traditional approaches to land management, ecosystem management entails coordinating human activities across larger areas and over longer time frames so as to maintain or restore an ecosystem's integrity and functioning. Healthy ecosystems, in turn, are critical to ensuring the sustainable long-term use of natural resources, including commodity production, and have a much greater potential to support diverse and sustainable local economies. Finally, ecosystem management may provide a scientifically credible forum in which regulatory and procedural requirements for protecting natural resources can be addressed early and jointly, thus reducing the number of challenges to federal land managers' decisions.

⁹Forest Service: The Flathead National Forest Cannot Meet Its Timber Goal (GAO/RCED-91-124, May 10, 1991).

Ecosystem management's emphasis on maintaining and restoring the health of ecosystems does not, however, necessarily mean returning ecosystems to any particular historic condition. The ecology of many areas has been fundamentally—and, in some instances, apparently irreversibly—altered by human activities. Moreover, ecosystem management recognizes that managing natural resources to meet the needs of humans and other species will require both natural and altered areas. Although altered areas, such as farms and single-species tree stands, contain less biodiversity, the nation and some local economies depend on such areas. An ecosystem management approach that recognizes the continuous interactions between natural and altered areas within an ecosystem can accommodate both kinds of land uses while maintaining or restoring the integrity and functioning of the ecosystem. Such an approach is directed at maintaining an ecosystem's ability to recover from natural disturbances and human activities.

Objectives, Scope, and Methodology

The Chairman of the House Committee on Natural Resources; the Chairman of the House Committee on Merchant Marine and Fisheries; the Chairman of the Subcommittee on Specialty Crops and Natural Resources, House Committee on Agriculture; and Representative Norm Dicks asked us to examine ecosystem management and its potential use in managing federal lands and natural resources. As agreed with their offices, this report identifies (1) the status of federal initiatives to implement ecosystem management, (2) additional actions required to implement this approach, and (3) barriers to governmentwide implementation. As further agreed with their offices, we limited the scope of our work primarily to relevant activities of the four primary federal land management agencies.

To identify the status of federal efforts to implement ecosystem management, we reviewed agency directives and met with officials from the National Park Service, BLM, FWS, the Forest Service, the White House Office on Environmental Policy and CEQ in the Executive Office of the President, and other federal agencies involved in implementing an ecosystem approach to managing federal lands and natural resources. We also met with these agencies' field office representatives in the greater Yellowstone and Pacific Northwest old-growth forest areas where the agencies have attempted to coordinate their management activities. Finally, we reviewed the administration's fiscal year 1995 budget as well as the individual budget justifications for the four primary federal land management agencies.

To identify additional actions required to implement ecosystem management, we reviewed the steps and criteria (1) used by the four primary federal land management agencies and other federal agencies when proposing to replace one management strategy with another, including those specifically related to implementing ecosystem management, (2) included in the administration's fiscal year 1995 budget, and (3) identified in other studies and reports. We also drew heavily on the criteria for (1) creating a framework for addressing management problems, (2) ensuring strategic management, and (3) developing a strategic plan in GAO's December 1992 Transition Series reports on Government Management Issues (GAO/OCG-93-3TR), Information Management and Technology Issues (GAO/OCG-93-5TR), Food and Agriculture Issues (GAO/OCG-93-15TR), Veterans Affairs Issues (GAO/OCG-93-21TR), Justice Issues (GAO/OCG-93-23TR), Internal Revenue Service Issues (GAO/OCG-93-24TR), NASA Issues (GAO/OCG-93-27TR), and General Services Issues (GAO/OCG-93-28TR) as well as on the elements of a working definition and goals for ecosystem management identified at the November 1993 National Ecosystem Management Forum convened and facilitated by the Keystone Center (the Keystone Forum). This forum focused on the experience of people working with ecosystem management in the field and at the policy level, as well as on the role of science in ecosystem management initiatives. The forum—which involved approximately 40 participants from federal agencies, the White House Office on Environmental Policy, research institutions, county and state governments, citizen and environmental organizations, tribes, and commodity and user groups—represented a cross-section of interests that must be involved in implementing the concept.

To identify barriers to implementing ecosystem management, we reviewed applicable reports, studies, and articles by executive and congressional agencies and public and private research and policy analysis organizations. These documents included the summary of the Keystone Forum and the report of a national workshop on ecosystem management, held in October 1993 at Yale University (the Yale Workshop). This workshop was convened by the Forest Policy Center, a program of American Forests (formerly the American Forestry Association), and was attended by over 100 resource managers, scientists, and policy analysts representing federal and state agencies, major corporations, and environmental organizations involved in implementing ecosystem management. The focus of this workshop was on building effective partnerships across ownership boundaries. In addition, we met with representatives from academia; various state government associations;

and environmental, natural resource professional, and industry organizations.

We conducted our work primarily from April 1993 through April 1994 in accordance with generally accepted government auditing standards. We obtained comments on a draft of this report from the Department of the Interior, the Forest Service, and the White House Office on Environmental Policy. The agencies' comments and our responses are presented fully in appendixes I through III.

Federal Agencies Are Beginning to Implement Ecosystem Management

Over the past 2 years, all four of the primary federal land management agencies have independently announced that they are implementing or will implement an ecosystem approach to managing their lands and natural resources, and each has been working to develop its own strategy primarily within its existing framework of laws and land units. In addition, in a few geographic areas, often in response to court orders or congressional concerns, the agencies have entered into cooperative agreements with each other or with other federal agencies to address specific ecological concerns. At the local level, some of the agencies' field offices have entered into collaborative arrangements with both federal and nonfederal agencies, as well as with private landowners and other interests, to address transboundary problems or other issues of mutual concern. Efforts by the four agencies, as well as those by 14 other federal agencies, to implement ecosystem management are compiled in an April 19, 1994, Congressional Research Service (CRS) report to the Congress.¹

The September 1993 Report of the National Performance Review: Creating a Government That Works Better and Costs Less, recommended that the President issue an executive order establishing ecosystem management policies across the federal government and that the concept be phased in using selected demonstration projects. Responding to these recommendations, the administration proposes in its fiscal year 1995 budget, among other things, to undertake four ecosystem management pilot projects and states that it is considering managing along ecological rather than political or administrative boundaries.

Agencies Are Adopting Ecosystem Management Policies and Strategies

All four of the primary federal land management agencies have announced that they are using or will use an ecosystem approach in managing their lands and natural resources. For example, on June 4, 1992, the Chief of the Forest Service announced a new policy of multiple-use ecosystem management on the national forests and grasslands. According to the Chief, the announcement was based on the results of experiments to develop more environmentally sensitive ways to manage the forests. In conjunction with this new ecosystem management policy, the Forest Service announced plans to reduce the amount of timber harvested by clearcutting by as much as 70 percent from fiscal year 1988 levels. Since June 1992, the Forest Service has, through its Office of Ecosystem Management, been working to develop a strategy and policies for ecosystem management and internal guidance for doing so. It is also

¹Ecosystem Management: Federal Agency Activities (94-339 ENR).

drafting revisions to the regulations implementing NFMA, to, among other things, better support an ecosystem management approach. Also, in the explanatory notes to its proposed fiscal year 1995 budget, the Forest Service states its intent to accelerate the implementation of ecosystem management through increased funding for research and on-the-ground ecosystem protection and restoration efforts, as well as through a simplified budget structure that reduces the number of main appropriations from 13 to 8 and of funding line items from 72 to 42. The Service believes that this restructuring is the necessary first step to provide support and flexibility for implementing ecosystem management. A specific line item has been requested for ecosystem planning, inventorying, and monitoring.

Similarly, on December 14, 1993, the Director of BLM issued a concept paper entitled Ecosystem Management in the BLM: From Concept to Commitment, which states that the agency has adopted the principles of ecosystem management to guide its management of the public lands and their natural resources. These principles include (1) sustaining the productivity and diversity of viable ecological processes and functions, (2) adopting an interdisciplinary approach to land management in which program advocacy will yield to ecosystem advocacy, and (3) basing plans and management on long-term horizons and goals. This paper culminated an initiative begun about a year earlier to develop the agency's policies and strategy for ecosystem management. In its fiscal year 1995 budget justifications, BLM states that it is continuing to move toward ecosystem management and proposes to streamline its budget structure to focus on larger-scale, integrated resource management issues to provide, among other things, the flexibility needed to support the concept's implementation.

In late 1992, FWS established a working group to develop its policies and strategy for biodiversity management. Later, this effort was expanded to address ecosystem management. In March 1994, FWS sent a concept paper to all employees that outlined how FWS intends to apply principles of an ecosystem management approach to fish and wildlife conservation. Among other things, the paper proposed that teams of staff from various FWS programs be established in 52 ecosystems that FWS has tentatively identified covering all 50 states. In its fiscal year 1995 budget justifications, FWS states that it plans to enhance its biodiversity management efforts to provide for (1) ecosystem-oriented long-range planning and (2) ecosystem management approaches to endangered species conservation. This latter proposal reflects a February 1992 decision by FWS to take a multispecies

approach—rather than a species-by-species approach—to protecting plants and animals. FWS is proposing to implement ecosystem management within the existing budget structure but will reevaluate the need to restructure the budget or its organization in 1995.

The National Park Service recently established a working group to develop its ecosystem management policies and strategy. In its fiscal year 1995 budget justifications, the Service calls for greater emphasis on environmental protection and states that it will pursue new partnerships, alliances, and coalitions to do so. It further states that it will be promoting comprehensive regional ecosystem restoration and management. For example, the more than 20 national park units that are located within the Colorado Plateau have formed a regional partnership to share information, develop cooperative programs based on the ecology of the area, and seek partnerships with interested organizations. The potential zone of cooperation for this partnership includes southwest Colorado, southeast Utah, northeast Arizona, and northwest New Mexico. The Service does not plan to restructure its budget to accommodate ecosystem management.

Midlevel staff from the 4 primary federal land management agencies, together with staff from 16 other federal agencies involved in ecosystem management initiatives, have been meeting periodically on an informal basis since 1992. This group, known as the Interagency Ecosystem Management Coordination Group, has been exchanging information and ideas on ecosystem management approaches and other areas of common interest, such as training.

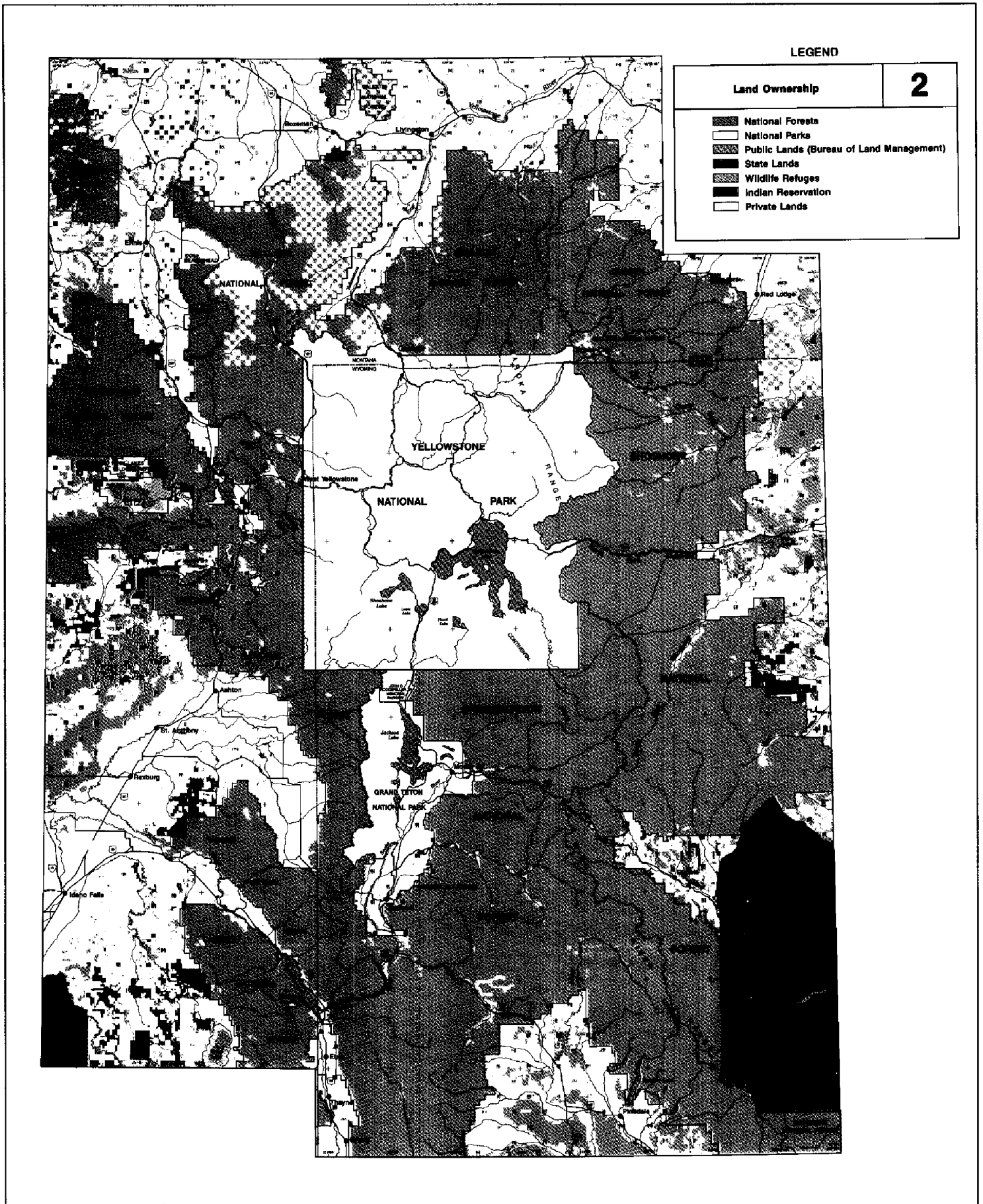
Agencies' Field Offices Are Pursuing Cooperative Efforts

In response to court orders or congressional or agencies' concerns, the federal land management agencies have begun to coordinate their activities across land unit boundaries in a few geographic areas to address specific ecological concerns. Some efforts predate the agencies' recently announced ecosystem management initiatives and strategies. For example, in the early 1960s, the National Park Service and the Forest Service began to coordinate management goals and standards for and activities on the national forests and parks in the greater Yellowstone area (in Wyoming, Montana, and Idaho). Figure 2.1 shows the federal land units in the greater Yellowstone area. Congressional concerns expressed in 1985 gave further impetus to improving coordination in the area. Similarly, the Forest Service, BLM, and several other federal agencies, at the direction of the President, drafted a plan for coordinating the management of federal activities in the old-growth forest ecosystem of the Pacific Northwest (in

Chapter 2
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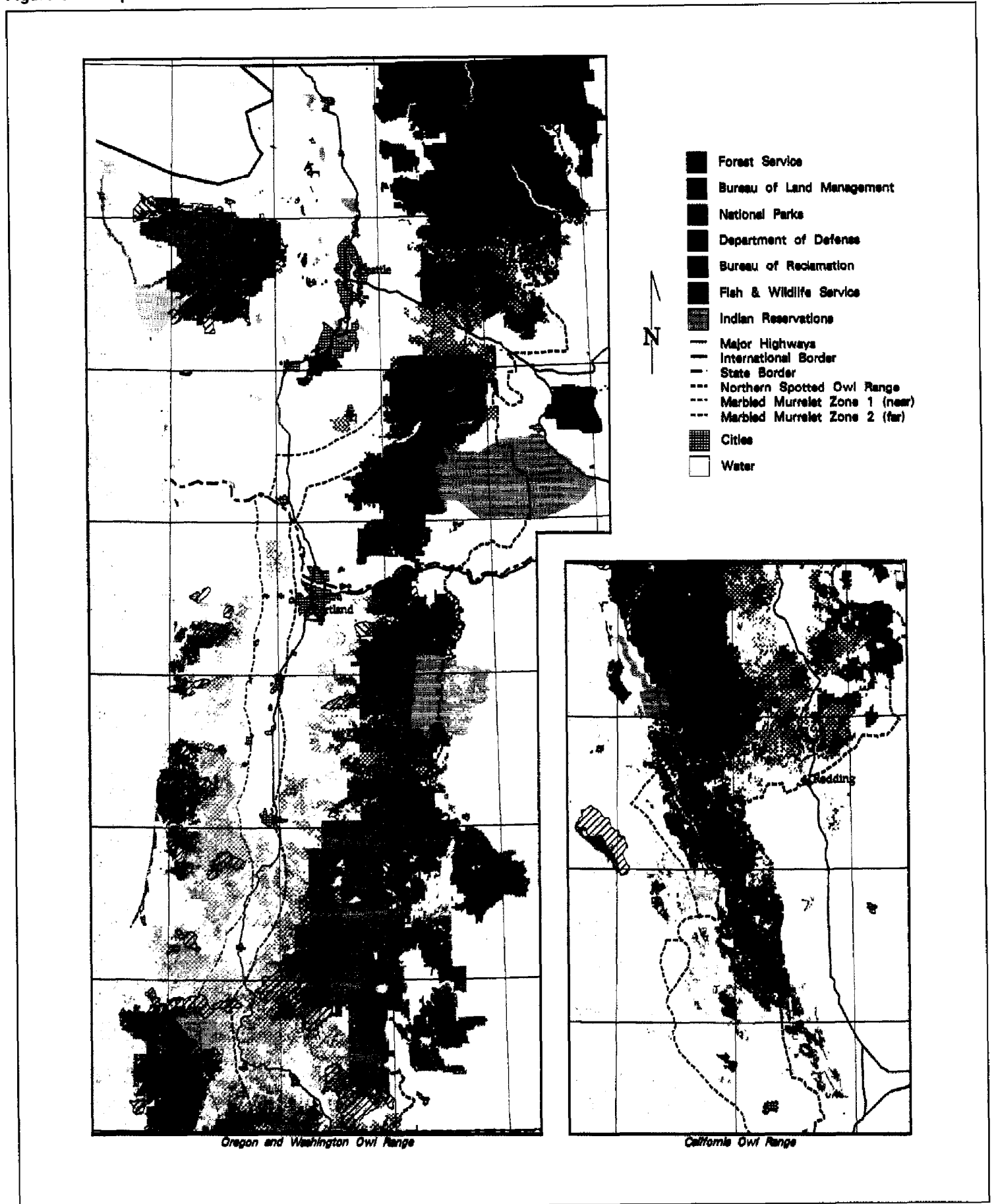
Oregon, Washington, and California). The agencies undertook this effort in response to federal court orders suspending federal timber sales until the sales' cumulative effects on the threatened northern spotted owl could be examined. Figure 2.2 shows these old-growth forest areas in the Pacific Northwest. In southern Utah, BLM and the National Park Service are attempting to better coordinate human activities and uses on their neighboring lands.

Figure 2.1: Map of the Greater Yellowstone Area



Source: Forest Service

Figure 2.2: Map of Pacific Northwest Old-Growth Forests



Source: BLM.

In other locations, agencies are participating in ecosystem studies and activities jointly and with nonfederal entities to identify ways of preventing issues or concerns from becoming intractable conflicts. For example, in California's Sierra Nevada mountains, the Forest Service and the National Park Service are working with state and private parties to, among other things, avoid declines in water quality that are expected to adversely affect fish stocks in the future. The Forest Service, the National Park Service, FWS, and five other federal agencies are working with private groups and state agencies in the southern Appalachian highlands to identify ways of addressing common problems associated with air and water quality, conservation, biological diversity, and sustainable economic growth in an area straddling the borders of six southeastern states (Alabama, Georgia, North Carolina, South Carolina, Tennessee, and Virginia). This area has been designated as a biosphere reserve by the United Nations under its Man and the Biosphere program.² Similarly, the National Park Service is working with other federal agencies and nonfederal parties in another biosphere reserve in southwestern Kentucky to address the effects of regional land use and development on surface and groundwater resources within a zone of cooperation defined by the groundwater recharge area for the Mammoth Cave National Park.

Agencies' field offices have largely directed their initiatives to activities on their own lands. However, some field offices have entered into cooperative arrangements with other public agencies as well as with private landowners. Generally, they have undertaken these efforts to address transboundary problems and other issues of mutual concern. For example, Forest Service and BLM field offices are participating in a partnership with industry, conservation groups, other public agencies, research organizations, and private landowners to protect and restore the ecological health of the Applegate River watershed in southwestern Oregon (encompassing about 500,000 acres) while sustaining economic productivity and community stability. Similarly, all four agencies are party to a recent agreement with state agencies that, in turn, are working with local governments, environmental groups, and industry to develop a coordinated statewide biodiversity planning strategy for ecologically similar regions throughout California. This strategy's long-term goal is to

²The Man and the Biosphere program was established by the United Nations in 1970 to solve management problems arising from interactions between human activities and natural systems. In the United States, 47 areas have been designated as part of an international network of 323 "biosphere reserves." These reserves are unique, multipurpose areas dedicated both to the conservation of characteristic ecosystems and species and to the management of land, water, and other resources for sustainable development to meet human needs. Twelve federal departments and agencies participate in the U.S. national committee, and more participate in the biosphere reserves.

conserve the natural heritage of each major region in the state while sustaining economic growth and development.

Governmentwide Initiatives Are Under Way

In 1993, the White House Office on Environmental Policy, created in the same year by the President, established an Interagency Ecosystem Management Task Force to implement an ecosystem approach to environmental management. The task force was charged with establishing overarching goals for all federal agencies; removing barriers that frustrate more effective, efficient interagency cooperation; and learning from large-scale ecosystem-based management efforts. The task force is chaired by the Director of the White House Office on Environmental Policy and is composed of assistant secretaries from 12 departments and agencies as well as representatives from the Office of Management and Budget and the White House Office of Science and Technology Policy.

Consistent with recommendations in the September 1993 Report of the National Performance Review, the interagency task force developed the administration's fiscal year 1995 budget proposal to fund the initial stage of a governmentwide approach to ecosystem management. This proposal requests \$610 million in discretionary spending for ecosystem management initiatives, or 19 percent (\$99 million) more than in fiscal year 1994 for similar activities. Of the \$610 million, \$433 million, or 71 percent, is to accelerate three ongoing interagency restoration efforts that are being designated as pilot ecosystem management projects. The remaining \$177 million is to collect information to support decision-making for protecting and preserving the nation's biodiversity. In addition, \$90 million in mandatory spending is to be used to fund a fourth pilot project.

The budget document states that under the administration's ecosystem management approach, "emphasis on managing whole ecosystems replaces the piecemeal approach of the past wherein land, water, air, endangered species, and mineral and other resources were primarily dealt with one by one." It also states that several agencies have issued new or revised statements and policies supporting ecosystem management to "maintain the sustainability and biodiversity of ecosystems as well as economies and communities. The human component is fundamental." The document further states that the administration is considering the following principles for ecosystem management:

- Manage along ecological, rather than political or administrative, boundaries.
- Ensure coordination among federal agencies and increased collaboration with state, local, and tribal governments; the public; and the Congress.
- Use monitoring, assessment, and the best science available.
- Consider all natural and human components and their interactions.

One of the four pilot projects—to restore the old-growth forests of the Pacific Northwest—is limited primarily to federal lands and agencies. Another—to restore natural resources damaged by the March 1989 oil spill from the supertanker Exxon Valdez in Alaska's Prince William Sound—involves primarily federal agencies and the state of Alaska. A third—to restore the ecological health of south Florida, including the Everglades and Florida Bay—involves collaboration among federal and nonfederal agencies, private landowners, and other interests. The fourth pilot project—to restore the ecological health of the Anacostia River in Maryland and the District of Columbia—is being led by state and local governments and includes participation by several federal agencies.

In the interim, the interagency task force has been developing definitions, goals, and principles of ecosystem management and identifying barriers to its implementation within the federal government. A draft "Ecosystem Management Initiative Overview," prepared and approved by the task force, summarizes the efforts of the agencies to clarify goals, translate principles, and derive lessons from ongoing ecosystem management efforts that can be applied to other ecosystems. The task force has also formed an interagency work group to examine major issues that influence the effectiveness of ecosystem management—such as the budget process, legal authorities, and information management—and to make recommendations to the task force for improvements.

Additional Actions Are Needed for Implementation

In its fiscal year 1995 budget, the administration proposes to fund the initial stage of a governmentwide approach to ecosystem management. However, implementing this initial stage will require clarifying the policy goal for ecosystem management and taking certain practical steps to apply the principles being considered by the administration. These steps include (1) delineating ecosystems, (2) understanding their ecologies, (3) making management choices, and (4) adapting management on the basis of new information. In taking these steps, the federal government will have to make difficult public policy decisions about how it can best fulfill its stewardship responsibilities.

Implementation Requires Clarifying the Policy Goal for Ecosystem Management

In its budget document, the administration says that its ecosystem management approach emphasizes "managing whole ecosystems" so as to "maintain the sustainability and biodiversity of ecosystems, as well as economies and communities." As experience has shown in the old-growth forests of the Pacific Northwest and elsewhere, it is not always possible to maintain or restore healthy ecosystems and, at the same time, sustain historic types, levels, and mixes of human activities. The administration's budget document does not clearly identify the priority to be given to the health of ecosystems relative to human activities when the two conflict.

Currently, there is no governmentwide legal requirement to maintain or restore ecosystems as such. However, (1) the purpose statement of the Endangered Species Act, which states that a purpose of the act is to provide a means for conserving the ecosystems upon which endangered and threatened species depend, and (2) regulations adopted under NEPA that require all federal agencies to identify and consider the impacts "... on natural resources and on the components, structures, and functioning of ecosystems..." of their activities both alone and in conjunction with those of other nearby agencies and landowners. But neither these nor any other acts or implementing regulations define or delineate ecosystems or specifically require federal agencies to act to maintain or restore the health of ecosystems. Other laws do require federal agencies to give priority to (1) sustaining multiple uses on federal lands and (2) providing minimum levels of protection to individual natural resources. If meeting these mandates depends on healthy ecosystems, then priority will have to be given to maintaining or restoring a minimum level of ecosystem integrity and functioning over production and other uses of resources at nonsustainable levels.

Confusion Exists Over the Goal of Ecosystem Management

In the absence of a clear statement of federal priorities for sustaining or restoring ecosystems and the minimum level of ecosystem health needed to do so, ecosystem management has come to represent different things to different people. As CRS noted in a July 14, 1993, report to the Congress,¹ many disparate groups—from multiple-use supporters to wilderness proponents—are advocating an ecosystem approach to land management in the United States; however, “there is not enough agreement on the meaning of the concept to hinder its popularity.”

This confusion was noted in the report of the November 1993 Keystone Forum on ecosystem management, which stated that “people’s interpretations, and thus perceptions, of ecosystem management varied—sometimes significantly.” Some participants said that ecological values and concerns should take precedence over social or economic considerations, others said that ecological concerns should be secondary to social or economic ones, and still others said that the three are equally important and should be balanced when implementing the concept.² Although Forum participants could not reach a consensus on a specific priority, they generally supported a working definition of ecosystem management with a goal of “preserving, restoring, or, where those are not possible, simulating ecosystem integrity as defined by composition, structure, and function that also maintains the possibility of sustainable societies and economies.”

This goal appears to give priority to maintaining or restoring the integrity and functioning of ecosystems over short-term use levels that cannot be sustained indefinitely. Some participants observed, however, that the federal government should provide a clear national policy and guidance to federal agencies that outlines the goals of ecosystem management.

In its recent draft “Ecosystem Management Initiative Overview,” the Interagency Ecosystem Management Task Force states that the goal of ecosystem management is to “restore and maintain the health, sustainability, and biological diversity of ecosystems while supporting sustainable economies and communities.” While this statement may indicate that greater priority will have to be given to maintaining or restoring the health of ecosystems relative to nonsustainable uses, other

¹Ecosystems, Biomes, and Watersheds: Definitions and Use (93-655 ENR).

²In this report, social and economic values and concerns are hereafter referred to as “socioeconomic considerations.” These considerations include those related to the conditions and trends of local economies and industries; the stability of communities, their populations, and institutions; and aesthetic responses to nature.

definitions leave no doubt. For example, in its December 1993 concept paper, BLM states that “since the production of all goods and services is dependent on ecosystem health, BLM’s overriding objective will be to maintain naturally diverse and sustainable ecological systems.” BLM continues that the “primary goal of ecosystem management is to develop management that conserves, restores, and maintains the ecological integrity, productivity, and biological diversity of public lands.” Similarly, in its March 1994 concept paper, FWS defines ecosystem management as “protecting or restoring the function, structure, and species composition of an ecosystem, recognizing that all components are interrelated.”

We believe that the varied interpretations and perceptions of the goal of ecosystem management must be replaced by a common interpretation of what is to be accomplished within and across ecosystems on the basis of clearly stated priorities.

A Minimum Level of Ecosystem Integrity and Functioning Needs to Be Defined

The Congress has enacted laws to protect individual natural resources—for example to protect and restore plant and animal species whose survival is threatened or endangered; to protect and enhance air quality; or to restore and maintain the chemical, physical, and biological integrity of the nation’s waters—that define minimum levels of protection to be met or assign responsibility for defining these levels to executive branch officials. In addition, the Congress has enacted laws to sustain outputs of various renewable natural resource commodities and other uses.

As a starting point, ecosystem management will need to maintain or restore the minimum level of ecosystem integrity and functioning necessary to meet existing legal requirements. As the understanding of ecosystems increases through the experience gained from ecosystem management initiatives, including the four pilot projects, needed changes to existing legislation can be sought to better define and achieve the minimum required level of ecosystem integrity and functioning.

For example, under the Endangered Species Act, a determination about whether a plant or animal species or a specific population of a species is threatened or endangered generally requires a detailed examination, and efforts to list and protect it can be quite lengthy and expensive. Some agency officials and scientists believe that a multispecies approach focused on broader geographic areas, such as some ongoing FWS efforts, may (1) be more efficient and effective, (2) identify ways to prevent many

species from becoming threatened or endangered in the first place, and (3) result in fewer limitations on human activities. An approach that focuses on ecosystems rather than on individual species or populations may require some changes to, or flexibility in applying, existing law. For example, protection for specific populations of species in ecosystems may have to be adjusted in accordance with their importance in maintaining or restoring the ecosystems' integrity and functioning.

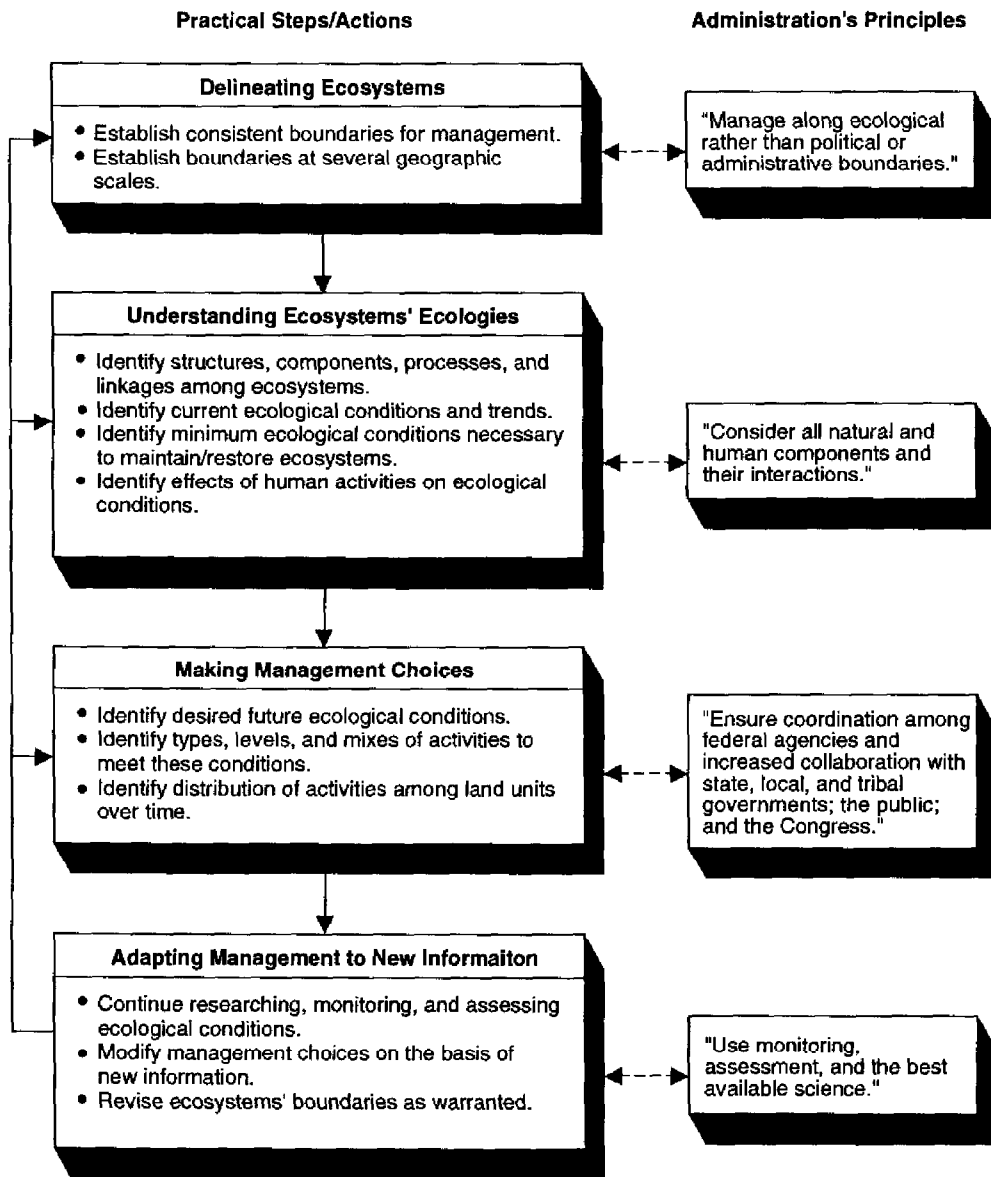
Practical Steps Are Required to Implement Ecosystem Management

The principles for implementing ecosystem management being considered by the administration appear to be consistent with those identified in various scientific and policy studies and reports on ecosystem management, as well as with the elements of the working definition for ecosystem management identified at the Keystone Forum. However, implementing ecosystem management will require translating these principles into certain practical steps that clearly identify what must be done and which agencies and parties must be involved.

On the basis of our review of numerous scientific and policy studies of ecosystem management and consultation with ecosystem management experts representing a wide range of views, we identified four practical steps that we believe need to be taken to implement the principles being considered: (1) delineating ecosystems, (2) understanding their ecologies, (3) making management choices, and (4) adapting management on the basis of new information. Figure 3.1 shows these steps and relates them to the principles in the fiscal year 1995 budget document.

**Chapter 3
Additional Actions Are Needed for
Implementation**

Figure 3.1: Relationships Between Practical Implementation Steps and Ecosystem Management Principles



Ecosystem Boundaries Need to Be Delineated

Although one of the principles in the administration's budget is to "manage along ecological rather than political or administrative boundaries," the existing boundaries of most federal lands were not drawn along ecological lines. As CEQ noted, the impetus for establishing many national parks was to preserve scenic beauty rather than ecological function, and the parks operate under these dual mandates of conservation and recreation. Similarly, many wildlife refuges operate under game management objectives that can conflict with the well-being of other plant and animal species, and consideration for the character of the wilderness, rather than attention to the functioning of ecosystems or the preservation of biodiversity, determined the boundaries of many wilderness areas. Finally, the boundaries of national forests and public lands were generally not established on the basis of ecological considerations.

To date, much attention has focused on delineating the boundaries of ecosystems and, in particular, on determining their appropriate spatial or geographic scale. Such delineations are problematic because (1) several smaller ecosystems may exist within a larger one, (2) ecosystems are interlinked and difficult to separate, (3) boundaries of ecosystems expand and contract over time in response to natural disturbances and human activities and (4) ecosystems are ecological—rather than legislatively or administratively established—units. However, delineating the boundaries of the geographic areas to be managed as ecosystems is a prerequisite to planning for, budgeting, authorizing, and appropriating funds for, and ultimately managing activities on the basis of, ecological units.

In its July 1993 report, CRS concluded that further research will not make the boundaries of ecosystems clearer. Even if not perfectly defined, these boundaries can be delineated for management purposes in a way that meets certain tests of reasonableness to provide a needed starting point. One scientific criterion of reasonableness was articulated by some participants at the November 1993 Keystone Forum, namely, that a geographic area to be managed as an ecosystem be large enough to capture the complexities and linkages among the components and processes of the ecosystem.

Various alternatives have been suggested for meeting this basic scientific criterion. Some scientists have suggested using the physical components of river basins and smaller watersheds as the primary building blocks for delineating and managing ecosystems. They note that the boundaries of river basins and watersheds (1) are relatively well defined, (2) can have major ecological importance, (3) are systematically related to one another

hierarchically and thus include smaller ecosystems, (4) are already used in some water management efforts, and (5) are easily understood by the public. Other alternatives suggested for delineating ecosystems include (1) areas that are large enough to encompass the primary habitat required to sustain the largest carnivore in a region, (2) "biomes,"³ or (3) "ecoregions" and "subregions" based on combinations of similar climate, landforms, and vegetation.

Additional criteria for reasonableness in delineating ecosystems mentioned by several analysts, as well as by participants at the Keystone Forum, are derived from management considerations of spatial or geographic scale. Boundaries should not be so large that managers will not be able to adequately focus on specific local problems or issues of mutual concern. Nor should they be so small that managers will be unable to address the effects on the ecosystem of activities originating across ownership boundaries.

Although not yet precisely or systematically defined, "landscapes" have been recommended by many scientists and analysts as the primary management scale. "Landscapes" are described as dynamic, interacting, and interconnected patterns of habitats affected by climate, landforms, and human activity. They will generally include a mix of government and private lands, often be smaller in size than a state, and frequently cross state boundaries. Since ecosystems exist at several geographic scales in a hierarchy and are functionally linked to one another, analysts believe that ecosystems at the next higher and next lower scales from the primary management scale should also be identified in order to assess whether their integrity and functioning are being affected by activities at the primary management scale and vice versa.

Although we have not examined them closely, the boundaries of the four pilot projects in the administration's fiscal year 1995 budget appear to address at least some of these tests of reasonableness. All generally appear to be (1) based on watersheds or other ecological criteria, (2) large enough to allow for consideration of the effects on the ecosystem of activities originating across ownership boundaries, but (3) small enough to focus on local problems or issues of mutual concern.

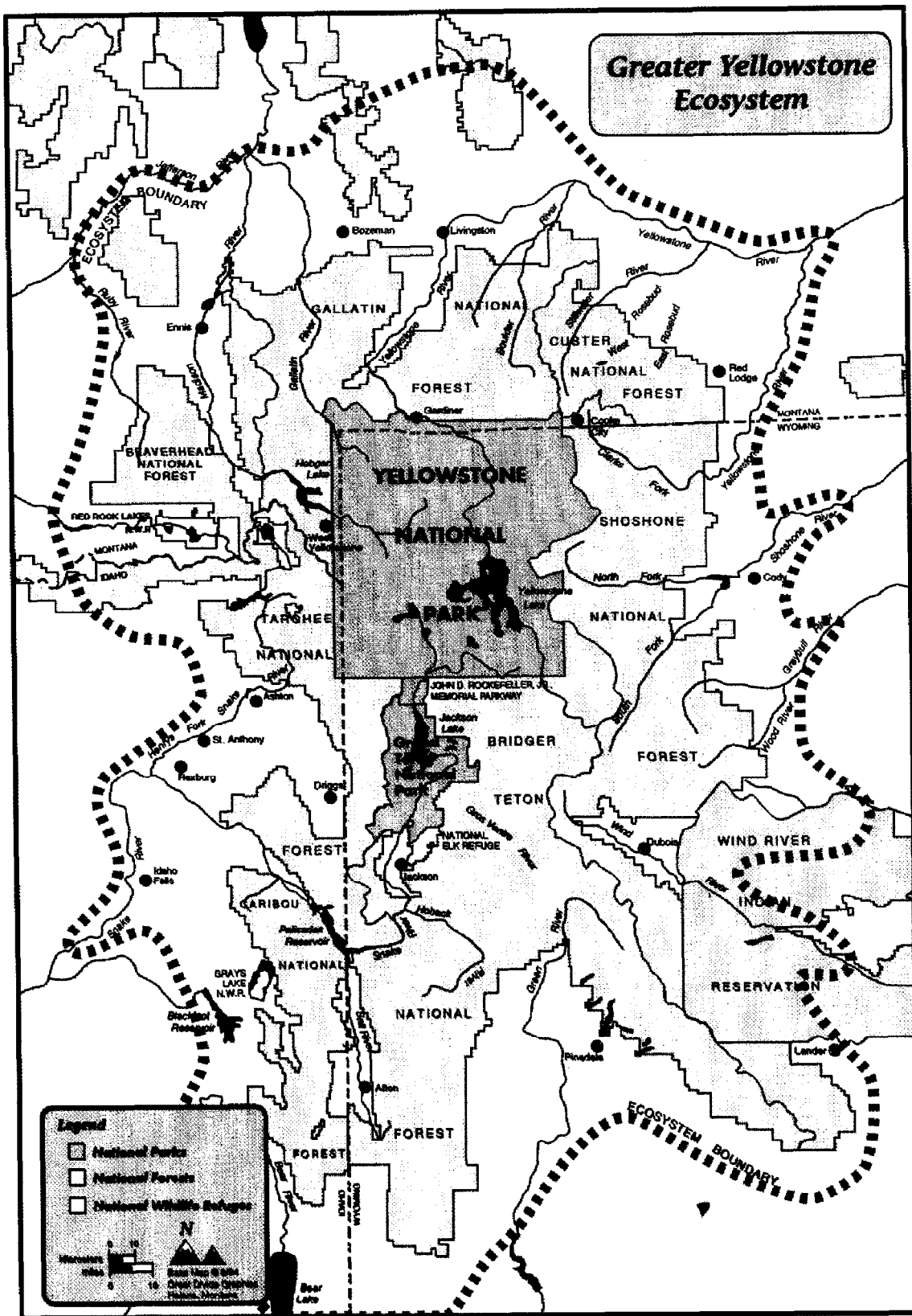
In addition to the four pilot projects, other geographic areas have been identified by agency officials and scientists as potential locations for

³A biome is a major regional community of plants and animals with characteristic life forms and environmental conditions. It is the largest geographical biotic unit and is named after the dominant type of life form, such as tropical rain forest, grassland, or coral reef.

testing ecosystem management. These include the greater Yellowstone area; the southern Appalachian highlands; the Sierra Nevada ecosystem; the Rio Grande Valley (Colorado, New Mexico, and Texas); the Great Lakes; the Great Plains grasslands (Minnesota, North Dakota, South Dakota, Nebraska); the California Central Valley Bay Delta; Monterey Bay; the coastal Louisiana wetlands; and the upper Mississippi/Missouri River flood zone. Figure 3.2 shows the boundary for the Greater Yellowstone Ecosystem suggested by the Greater Yellowstone Coalition, a public interest group.

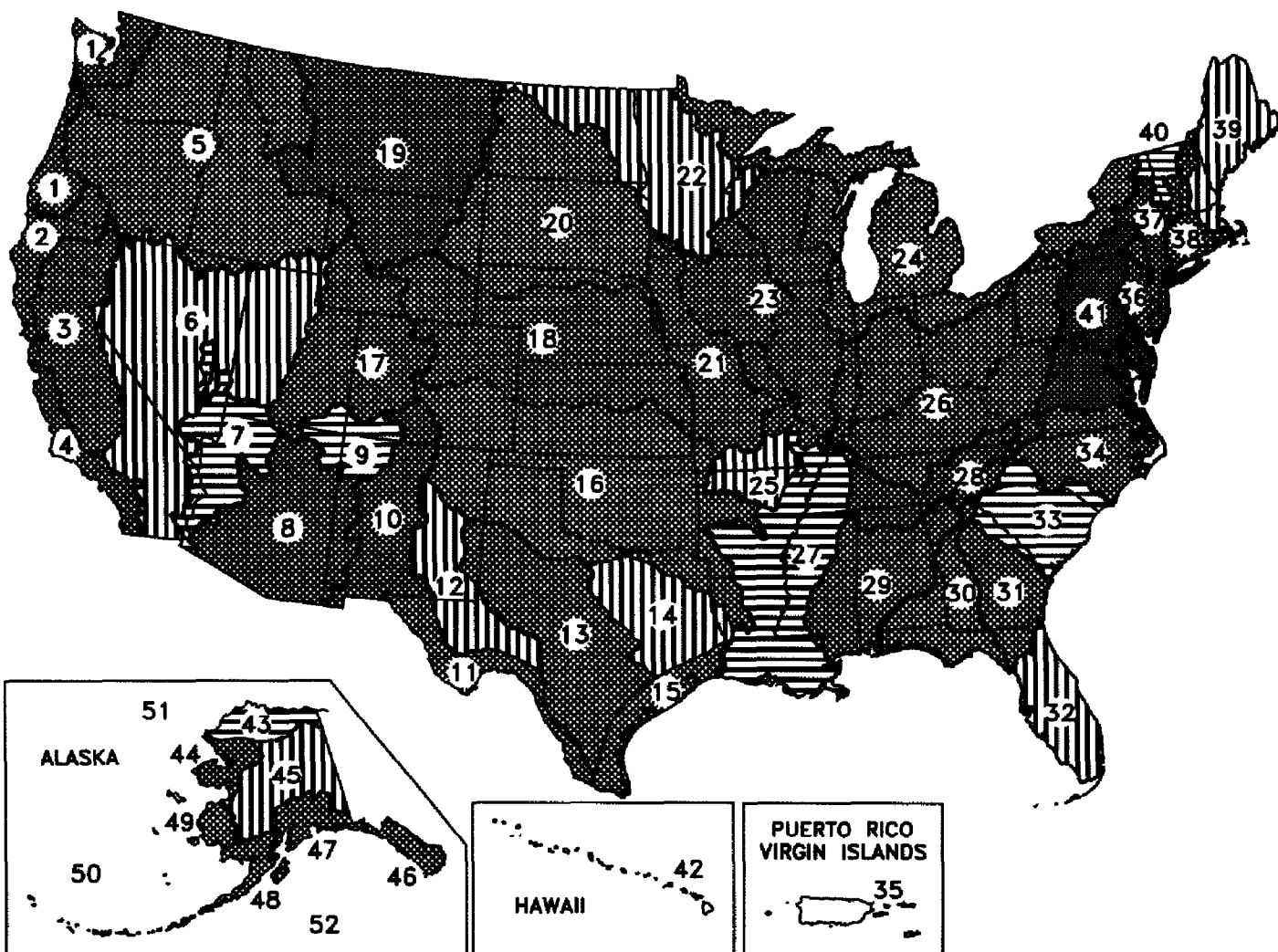
A governmentwide approach to ecosystem management may ultimately require agreement among federal agencies on delineating ecosystem boundaries across the national landscape. However, as FWS notes in its March 1994 draft concept paper on ecosystem management, "Regrettably, at present, there is no ecologically based mapping system that all agencies have adopted to support an ecosystem approach." Similarly, BLM states in its December 1993 concept paper that "Coordination among management agencies is impeded by the fact that federal land management agencies often employ different data standards and resource classification systems." For example, FWS has adopted tentative ecosystem boundaries based on watersheds to organize its activities nationwide and to set ecosystemwide goals and objectives. (See fig. 3.3.) Meanwhile, the Forest Service has developed an ecoregional approach using climate, physiography, water, soils, air, and natural communities. (See fig. 3.4.) The need to delineate ecosystem boundaries across the national landscape is currently being addressed by the Interagency Ecosystem Management Coordination Group.

Figure 3.2: Boundary Suggested for the Greater Yellowstone Ecosystem



Source: Greater Yellowstone Coalition.

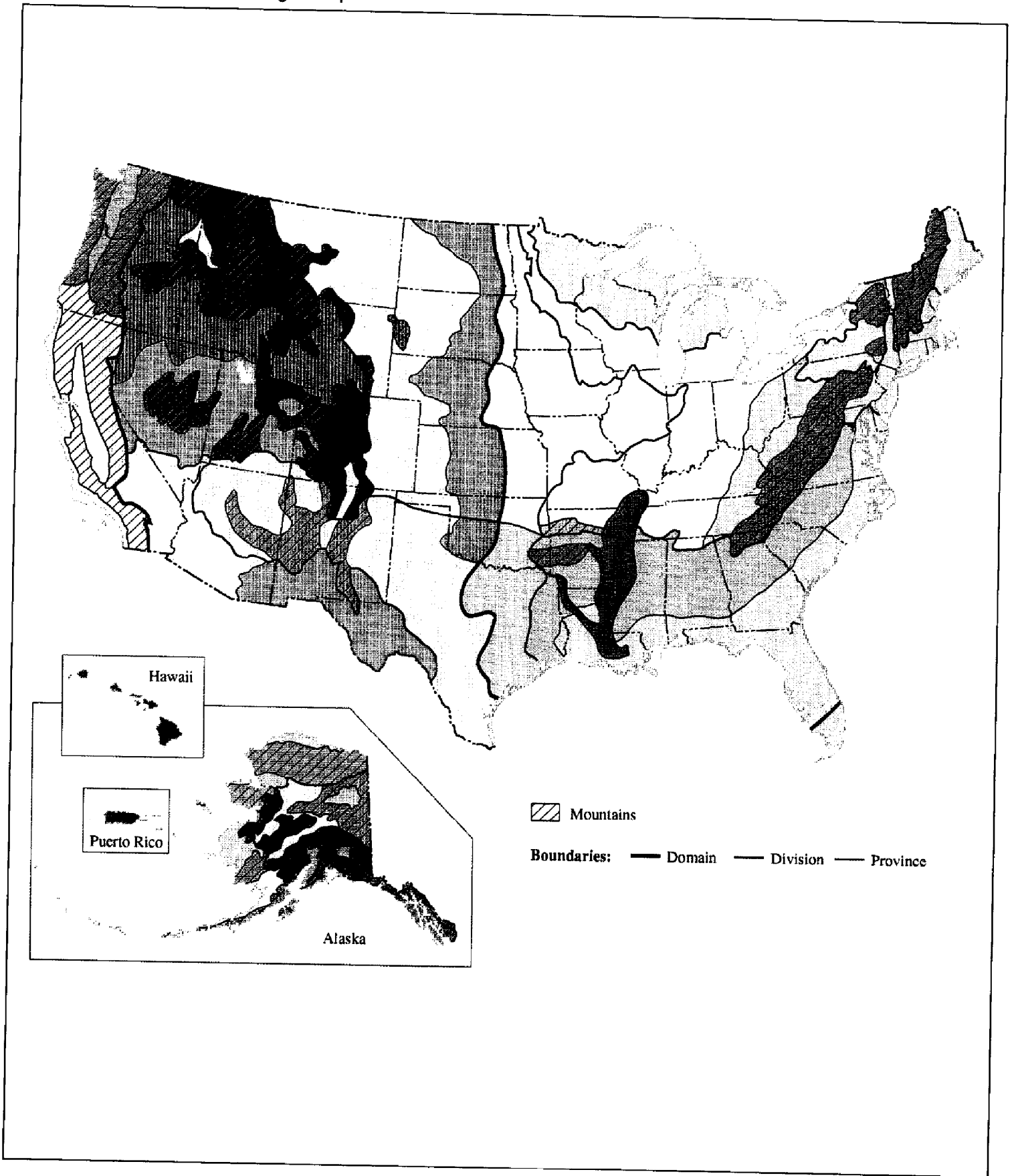
Figure 3.3: Fish and Wildlife Service Ecosystem Unit Map



- | | | |
|--|--|--|
| <ul style="list-style-type: none"> 1. North Pacific Coast 2. Klamath/Central Pacific Coast 3. Central Valley of California/San Francisco Bay 4. South Pacific Coast 5. Columbia River Basin 6. Interior Basins 7. Lower Colorado River 8. Gila/Salt/Verde River 9. San Juan 10. Middle and Upper Rio Grande 11. Lower Rio Grande 12. Pecos River 13. Edwards Plateau 14. East Texas 15. Texas Gulf Coast 16. Arkansas/Red Rivers 17. Upper Colorado River 18. Platte/Kansas Rivers | <ul style="list-style-type: none"> 19. Upper Missouri/Yellowstone Rivers 20. Main Stem Missouri River 21. Lower Missouri River 22. Mississippi Headwaters/Tallgrass Prairie 23. Upper Mississippi River/Tallgrass Prairie 24. Great Lakes 25. Ozark Watersheds 26. Ohio River Valley 27. Lower Mississippi River 28. Tennessee River 29. Central Gulf Watersheds 30. Florida Panhandle Watersheds 31. Altamaha/Sunwanee Rivers 32. Peninsular Florida 33. Savannah/Santee/Pee Dee Rivers 34. Roanoke/Tar/Neuse/Cape Fear Rivers 35. Caribbean | <ul style="list-style-type: none"> 36. Delaware River/Delmarva Coastal Area 37. Hudson River/New York Bight 38. Connecticut River/Long Island Sound 39. Gulf of Maine Rivers 40. Lake Champlain 41. Chesapeake Bay/Susquehanna River 42. Pacific Islands 43. Arctic Alaska 44. Northwest Alaska 45. Interior Alaska 46. Southeast Alaska 47. South Central Alaska 48. Bristol Bay/Kodiak 49. Yukon - Kuskokwim Delta 50. Bering Sea/Aleutian Islands 51. Beaufort/Chukchi Seas 52. North Pacific/Gulf of Alaska |
|--|--|--|

Source: FWS.

Figure 3.4: Forest Service Ecoregion Map



Source: Forest Service.

An Ecosystem's Ecology Needs to Be Understood

Once a geographical area to be managed as an ecosystem has been delineated, its ecology needs to be understood on the basis of the best available data in order to determine how the ecosystem's integrity and functioning can be maintained or restored. This step consists of a set of specific actions that we believe are required to address two principles in the administration's budget document—"considering all natural and human components and their interactions" and "using the best science available." These actions are to determine (1) the ecosystem's structure, components, processes, and functional linkages to other ecosystems, (2) the ecosystem's current ecological conditions and trends, (3) the minimum level of integrity and functioning needed to maintain or restore a healthy ecosystem, and (4) the effect of human activities on the ecosystem.

On November 11, 1993, the Secretary of the Interior transferred biological research and monitoring programs from eight agencies within the Department of the Interior to make operational a new agency called the National Biological Survey (NBS). This agency is tasked with gathering, analyzing, and disseminating the biological information necessary for sound stewardship of the nation's natural resources. According to the administration's fiscal year 1995 budget, the agency will be responsible for providing better, more reliable, objective information on key ecosystems. Therefore, NBS has been designated to develop information that will be needed to improve the understanding of ecosystems' ecologies. In addition, the Interagency Ecosystem Management Task Force's working group is identifying the information needed to understand the ecologies of ecosystems.

The information to be developed by NBS will be critical to federal land management agencies in acquiring an adequate understanding of the minimum levels of integrity and functioning necessary to (1) maintain or restore healthy ecosystems and (2) meet existing legal requirements.⁴ For example, the federal interagency team assigned to examine ecosystem management in the old-growth forests of the Pacific Northwest found that one of the first things that they needed to do before they could draft a plan was to determine how the various agencies' existing statutory requirements for protecting natural resources jointly applied across the different federal land units in the ecosystem. This determination became the basis for identifying and deciding on the minimum level of ecosystem integrity and functioning that needs to be maintained or restored.

⁴A minimum level of integrity and functioning necessary to maintain or restore a healthy ecosystem is also referred to as a "threshold" below which the integrity of the ecosystem is diminished to the point that its functions are not adequately performed.

Management Choices Need to Be Made Within Ecosystems

After gaining an understanding of an ecosystem's ecology, land managers must identify (1) the desired future ecological conditions, (2) the types, levels, and mixes of activities that can be sustained while still achieving these conditions, and (3) the distribution of these activities over time among the various land units within the ecosystem. We believe that these actions are required to address the administration's principle to "ensure coordination among federal agencies and increase collaboration with state, local, and tribal governments; the public; and the Congress."

The extent to which ecosystems receive protection above the minimum levels necessary to maintain or restore their integrity and functioning will depend on public policy decisions involving trade-offs among ecological and socioeconomic considerations and will likely vary by ecosystem. In reaching these decisions, policymakers will need to understand the ecological and socioeconomic considerations involved. Many of the required socioeconomic data—on employment, production, and commerce—are maintained by states, firms, and industry organizations with which collaboration will be necessary.

The extent to which desired future ecological conditions can be maintained or restored and long-term commodity production and use can be sustained will depend in large measure on the extent to which disparate private landowners and government agencies—including not only the federal, state, and local agencies that manage land but also the agencies that regulate, tax, or otherwise influence uses on private land—can reach agreement. As more landowners and others within an ecosystem collaborate, more activities are likely to be coordinated and managed across the ecosystem to address ecological and socioeconomic values and concerns.

Management Needs to Be Adapted to New Information

Just as ecosystems are continually changing over time, so, too, will the understanding of their ecology and, by implication, the management choices based on this understanding. Scientists and policy analysts generally recognize that their understanding of how different ecosystems function and change and how they are affected by human activities is incomplete. For this reason, they see a need for continually researching, monitoring, and evaluating the ecological conditions of ecosystems and, where necessary, modifying management on the basis of new information to better accommodate socioeconomic considerations while ensuring that minimum or desired ecological conditions are being achieved.

Chapter 3
Additional Actions Are Needed for
Implementation

This process, sometimes known as “adaptive management,” has been identified as a requirement for ecosystem management by both BLM and the federal interagency team tasked to examine ecosystem management in the old-growth forests of the Pacific Northwest. It is also reflected in the administration’s principle to “use monitoring and assessment and the best science available.” Thus, applying this principle will require (1) continually researching, monitoring, and assessing ecological conditions as well as the effects of activities on ecosystems and (2) modifying prior management choices on the basis of this new information. This fourth step underscores the continuing, iterative nature of ecosystem management. Figure 3.1 at the beginning of this chapter illustrates the cycle of adaptive management.

Barriers Impede the Implementation of Ecosystem Management

The administration's initiatives to implement ecosystem management governmentwide face several significant barriers. For example, noncomparable and insufficient data—whose limitations stem from uncoordinated, incomplete collection efforts—and scientific uncertainty hinder the understanding of ecosystems' ecologies and of the trade-offs among ecological and socioeconomic considerations. Also, the disparate missions and planning requirements statutorily rooted in the federal land management framework hamper interagency coordination of federal actions across ecosystems. Moreover, incentives, authorities, interests, and limitations embedded in the larger national land and natural resource use framework constrain effective collaboration and consensus-building among private and government parties within an ecosystem but are often beyond the ability of the federal land management agencies individually or collectively to control or affect.

The four pilot projects proposed in the administration's fiscal year 1995 budget afford an opportunity to identify these and other barriers as well as statutory, regulatory, institutional, and procedural options for resolving them. In addition, ecosystem management offers the potential to avoid or mitigate future ecological and economic conflicts. However, to adequately demonstrate this potential, we believe that it will be necessary to test the approach in geographic areas where problems or issues of mutual concern have not become as intractable as they have at the four pilot projects and where greater flexibility exists to coordinate activities across ecosystems while still maintaining or restoring their ecological health. The Interagency Ecosystem Management Task Force is considering additional projects that should provide opportunities to demonstrate ecosystem management's potential for avoiding or mitigating ecological and economic conflicts.

Ecological and Socioeconomic Data Are Inadequate

Agency officials and scientists have noted that ecosystem management will require collecting and linking large volumes of scientific data about ecosystems' structures, components, processes, and functions at several geographic scales to determine current conditions and trends. It will also require consistently collecting, organizing, and analyzing large volumes of socioeconomic data in order to identify important relationships between human activities and ecological conditions and trends and making necessary or desired trade-offs among ecological and socioeconomic values and concerns. Currently, available data are often not comparable, and large gaps in information exist.

In 1992, OTA found that the Forest Service does not have adequate data to support full-scale ecosystem management.¹ CEQ also noted that there are major gaps in knowledge about the status of plants, animals, and ecosystems in the United States.²

Although many of the data that federal agencies and others have collected independently might be aggregated, organized, and shared among them on an ecosystemwide basis, the data are not always comparable. For instance, as a federal interagency team found in developing a plan for the old-growth forest ecosystem of the Pacific Northwest, even the aggregation and sharing of available information was difficult because many of the data had not been collected, analyzed, or tabulated consistently and were therefore difficult to compare. A major effort was required to integrate noncomparable data from various agencies' information systems. The team also noted that many of the available data important to ecosystem management are collected by other federal and state agencies and by The Nature Conservancy,³ whose geographical and other data systems are also often not comparable.

Besides being noncomparable, empirical data are often insufficient. Inventories of many natural resources are incomplete or out of date. For example, the 1992 OTA study found that (1) many inventory data are not available for many national forests, (2) the available data are often classified on the basis of potential commodity production rather than present vegetation, (3) the data may typically be updated only every 10 or 15 years, and (4) the data are often inaccurate.

Furthermore, scientific understanding of ecosystems is far from complete, and there is still much uncertainty about how they function. This uncertainty contributes to strong differences in the interpretation of scientific evidence, such as in the definition of habitat requirements for the northern spotted owl and other species in the old-growth forests of the Pacific Northwest.

¹Forest Service Planning: Accommodating Uses, Producing Outputs, and Sustaining Ecosystems, OTA-F-505 (Washington, D.C.: Feb. 1992).

²Linking Ecosystems and Biodiversity, undated reprint from the 21st annual report of the Council on Environmental Quality (Washington, D.C.: May 8, 1992).

³The Nature Conservancy is a conservation organization whose state-by-state National Heritage Data Center network contains the most comprehensive available information on rare plant and animal species. It is cooperating with NBS in a "Gap Analysis" project to map biodiversity in relation to protected areas, such as wilderness areas or wildlife refuges, as well as to nonprotected areas.

The socioeconomic data needs for implementing ecosystem management are just now being defined, and the available data have not been gathered with ecosystem management needs in mind. Like the ecological data, these data are often noncomparable, insufficient, or uncertain. Many of the existing data have been gathered by many different federal, state, and local agencies and private researchers for many different purposes. Often organized and tabulated in a variety of inconsistent formats, these data are difficult to aggregate by ecosystem. Furthermore, analysts continue to substantially disagree on the conclusions that can be drawn from the data about the socioeconomic effects of different alternatives that might be chosen to maintain or restore an ecosystem's integrity and functioning. For instance, estimates have varied widely on how many jobs might be lost in efforts to protect the spotted owl's habitat as a part of restoring the Pacific Northwest old-growth forest ecosystem, in part, because assumptions have differed. These estimates have varied from fewer than 12,000 to up to 147,000 jobs and, when adjusted for differences in certain assumptions, have still varied from 19,000 to 34,000 jobs.

Finally, representatives of private industry and landowner groups have noted that issues—such as the invasion of privacy and the use of the data collected on ecological conditions and activities to enforce regulations on private lands—are major concerns of some in the private sector in considering the federal government's prospective ecosystem management approach. For instance, the Department of Agriculture collects data on individual farm production that would presumably be useful in analyzing conditions and activities in the ecosystems where farms are located. However, these data are subject to stringent privacy controls established in response to farm owners' concerns. Participants at the October 1993 Yale Workshop on ecosystem management concluded that certain guarantees must be established to allay private landowners' concerns about the use of data collected on private lands. Workshop participants also concluded that a better system is needed for gathering and sharing data on both public and private lands in ecosystems. They recommended that federal and state agencies agree on a common and uniform data base format to facilitate information sharing.

While the newly established NBS will apparently be well positioned to provide many of the ecological data needed for ecosystem management, it is only a few months old and has not yet established a comprehensive system for providing the agencies with data to support their ecosystem management initiatives. Thus, for the immediately foreseeable future,

inadequate data will hinder agencies in developing their understanding of ecosystems' ecologies.

Recognizing the formidable barrier posed by noncomparable and insufficient data, the Interagency Ecosystem Management Task Force has established a Science and Information Issue Area Subgroup under its interagency work group. This subgroup is to focus on developing (1) the lessons to be learned about such problems from mature interagency ecosystem-based activities, (2) ecoregional assessments (see fig. 3.4 for a map of ecoregions), and (3) an ecosystem management research agenda, with an initial reporting date of October 1994.

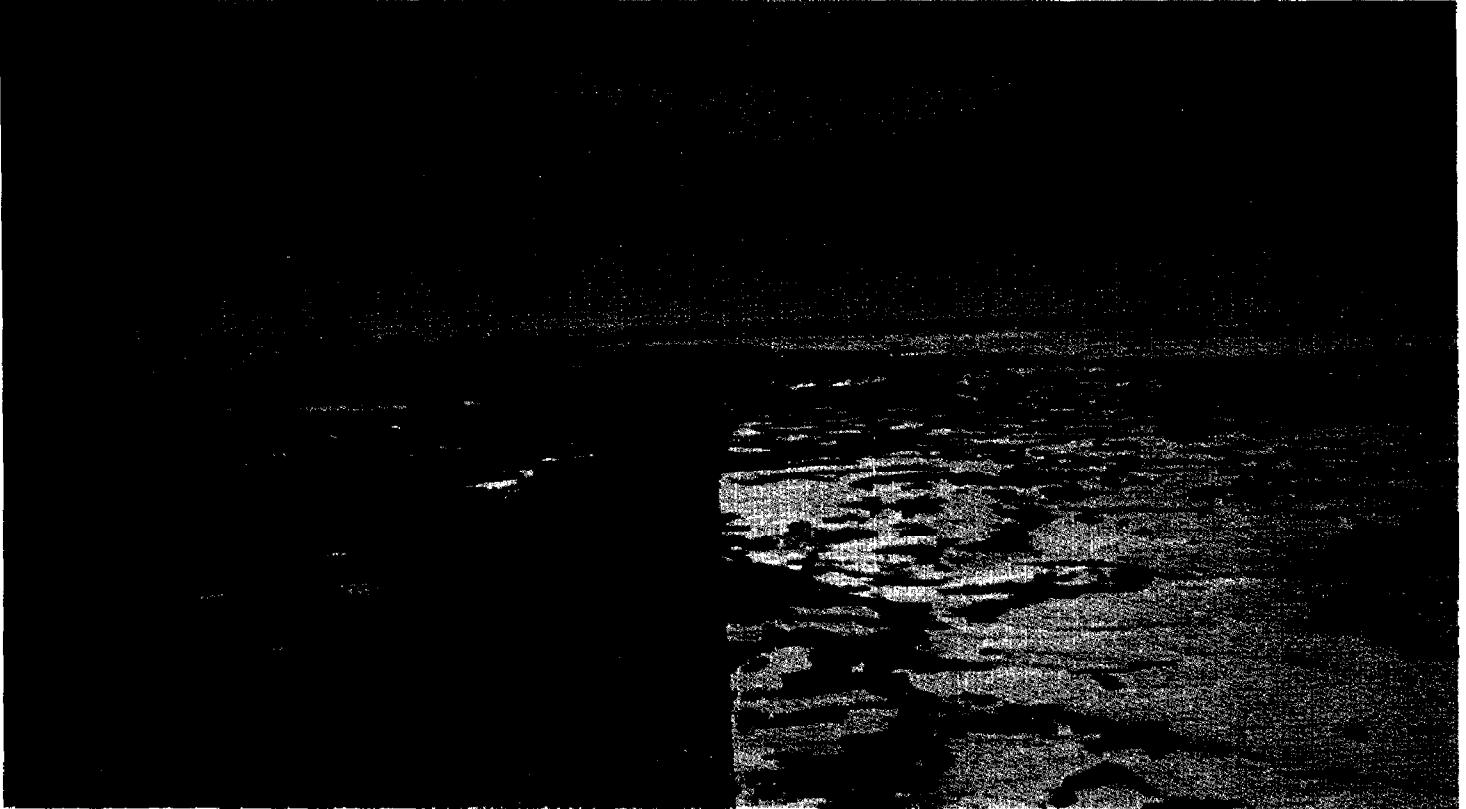
Existing Federal Land Management Framework Hampers Federal Interagency Coordination

Virtually all analysts of ecosystem management note that the approach will require unparalleled coordination of activities among federal agencies managing lands in the same ecosystem. However, federal land management agencies are currently hampered in coordinating their activities within ecosystems because of (1) disparate missions and (2) separate, lengthy planning requirements—both of which are rooted in the existing federal land management framework of laws, agencies, and land units.

Federal land management agencies have disparate missions and user groups. For example, the Forest Service and BLM have legislatively based orientations and incentives toward producing resource commodities, while the National Park Service and FWS have significant statutorily defined conservation and protection mandates. The effect of these different missions is sometimes easily discernible where these agencies' lands are next to one another, as they are along sections of the boundary between Yellowstone National Park, where timber harvesting is prohibited, and the Targhee National Forest in Idaho, where large areas of trees were removed through clearcutting. (See fig. 4.1.)

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Barriers Impede the Implementation of
Ecosystem Management

Figure 4.1: Boundary Between Yellowstone National Park and Targhee National Forest



Source: Greater Yellowstone Coalition, courtesy of Tim Crawford.

In other instances, disparate agency missions lead to conflicting views, such as those held by FWS, on the one hand, and by the Forest Service and BLM, on the other hand, about the listing of species under the Endangered Species Act. For example, the Forest Service opposed FWS' listing of the Jemez Mountains salamander as endangered. This pale brown amphibian, which is between 1-1/4 inches and 5-1/2 inches long, is found only in the Jemez Mountains of north-central New Mexico. The Forest Service believed that the listing would place limitations on the agency's management of the Santa Fe National Forest.⁴ Similarly, the Forest Service did not comply with requirements to protect the northern spotted owl in the Pacific Northwest.

Procedural requirements for long-range planning may also pose significant barriers to interagency coordination. For example, the Forest Service under NFMA, the BLM under FLPMA, the Park Service under the National Parks and Recreation Act of 1978, and FWS under its own authority, separately develop plans for each of their land units, at different times, with disparate objectives, using independently determined interpretations of ecological requirements. This barrier to coordination was noted in a July 1993 report by the interagency team assigned to examine ecosystem management in the forests of the Pacific Northwest. The team further noted that under the agencies' planning statutes, they had to consider requirements of NEPA, the Endangered Species Act, the Clean Water Act, the Clean Air Act, and other laws. They stated that (1) "the objectives of some of these laws are not the same," (2) their "substantive and procedural requirements are not uniform," and (3) "their interpretation falls to different agencies." Even when interagency coordination is being pursued aggressively, as it is in the Applegate River watershed in southwestern Oregon, nonfederal participants have noted difficulty in obtaining timely agreement on planning issues among Forest Service and BLM officials because of separate agency processes and chains of command.

Furthermore, most agency officials agree that implementing ecosystem management will likely require extensive conforming amendments or comprehensive revisions to their long-range plans. However, completing a plan for an individual land unit usually takes a few years, and revising or significantly amending a plan takes nearly as long. For example, in 1991, the Greater Yellowstone Coordinating Committee, composed of the managers of seven national forests and two national parks, developed a

⁴See *Endangered Species: Factors Associated With Delayed Listing Decisions* (GAO/RCED-93-152, Aug. 5, 1993).

“Vision Statement” of desired future conditions for the area to serve as the basis for revising the individual units’ long-range plans. But nearly 3 years later, the revisions have not been completed. Similarly, revising forest plans in the old-growth forests of the Pacific Northwest to reflect the administration’s plan for restoring this ecosystem is likely to take several years.

National Land and Natural Resource Use Framework Constrains Collaboration With Nonfederal Parties

Although coordinating federal agencies’ activities in ecosystems is essential to implementing ecosystem management, it may not suffice to maintain or restore the ecosystems’ integrity and functioning. Many agency officials, scientists, and policy analysts agree that ecosystem management will generally fall short of its goal if it is limited to activities on federal lands. Rather, for ecosystem management to succeed in protecting natural resources and sustaining long-term natural resource commodity production and uses, it will require collaboration and consensus-building among federal and nonfederal parties within the larger national land and natural resource use framework. Federal land management agencies face significant barriers to achieving such collaboration and consensus-building because of constraints inherent in this framework.

Many nonfederal lands are privately owned. Private landowners’ decisions are influenced by factors affecting the profitability of their activities, including land-use regulatory or tax authorities or financial or technical assistance programs. Responsibility for these authorities and programs often rests with states and localities or with other federal agencies whose missions, budgets, authorities, and operations are independent of the federal land management agencies.

The central focus of the October 1993 Yale Workshop on ecosystem management was on building effective partnerships across ownership boundaries. The participants concluded that federal, state, and local regulatory agencies and tax authorities often operate in a way that does not support, and in many cases impedes, ecosystem management. Specifically, they concluded that there was currently a

spotty patchwork of many, often contradictory, laws and regulations. Private landowners find it more and more difficult and costly to comply with the rules of multiple governments, multiple agencies, and multiple purposes—different authorities with competing, and often conflicting directives on protecting water quality, wildlife habitat, fish habitat, [and] . . . air quality

They recommended that a more systematic approach be designed to maintain ecosystems and noted that

the mix of landowners and authorities (e.g., forestry agencies, fish and wildlife agencies, environmental protection agencies, local governments and planning commissions, private industrial and nonindustrial landowners) in the U.S. poses tremendous institutional challenges to coordinated landscape-level management,

and that

a voluntary approach to ecosystem management partnerships must not only recognize the effect of each law in isolation, but examine how and where laws interact and conflict, who is affected, and possible ways of reconciling priorities.

For example, private landowners whose actions attract or sustain a threatened or endangered species by protecting its habitat now run the risk of having their other management activities curtailed in order to avoid the illegal modification or degradation of the habitat. Meanwhile, others who actively eliminate suitable habitat before it can be occupied are able to continue their management activities unencumbered by the requirements of the Endangered Species Act.

Difficulties in building effective partnerships across ownership boundaries encourage private landholders to take actions that may not be consistent with protecting natural resources or sustaining long-term commodity production and other natural resource uses. For instance, in our report on the Flathead National Forest in Montana (cited in ch. 1), we reported that the Forest Service was prevented from achieving planned harvest levels and minimum required ecological conditions on its lands because it had not taken into account high levels of timber harvesting on private lands. Additionally, numerous studies have shown that harvest levels on private lands both there and elsewhere have often been designed to achieve short-term economic goals rather than sustain long-term timber production.

Participants at the Yale Workshop noted that private landowners do not always act to support desired ecological conditions for an area because incentives in the national land and natural resource use framework often are neutral or contrary to achieving these conditions. In particular, they noted the following:

- Federal and state income and inheritance taxes generally do not distinguish between landowners who undertake costly actions supporting desired ecological goals and those who do not. This can create a disincentive to do so.
- Technical assistance to individual landowners and cost-sharing assistance for coordinated management among multiple owners to support ecological goals are inadequate.
- The excessive time and expense associated with exchanging the ownership of public and private lands—in order to shift areas with critical ecological values to public ownership and areas best suited for sustainable production of commodities to private ownership—can deter landowners from participating in such exchanges.
- In the absence of market-based incentives (e.g., conservation credits or tradeable development rights) for influencing the level and distribution of human activities in an ecosystem to achieve minimum or desired ecological conditions, individual landowners currently undertake activities without regard to their cumulative impacts.
- Provisions of federal and state antitrust laws and strictures imposed by the Federal Advisory Committee Act (5 U.S.C., app. 2, sections 1-15) do not facilitate and may limit stakeholders' participation in federal land management agencies' decision-making, nor do they foster the trust that is critical to cooperation.

Unlike the barriers posed by inadequate data and the existing federal land management framework, the barriers presented by the national land and natural resource use framework are often beyond the reach of federal statutory or regulatory action. Many of these barriers can be addressed only by states and localities. Additionally, the Fifth and Fourteenth Amendments to the Constitution prohibit the federal and state governments from taking private lands for public uses without just compensation. Courts have ruled that certain government regulations of land use have constituted takings requiring payment of just compensation. This requirement to pay compensation may limit the willingness or ability of federal and state governments to regulate certain land uses. Moreover, private landholder organizations and others maintain that the taking of private property should generally be considered as against good public policy and reserved only for isolated circumstances of extreme public necessity. Thus, efforts to establish effective collaboration and achieve consensus with other federal and nonfederal parties in support of ecosystem objectives will necessarily require an approach largely based on voluntary cooperation and incentives.

Pilot Projects Should Test Ecosystem Management's Potential to Avoid or Mitigate Conflicts

The four pilot projects proposed in the administration's fiscal year 1995 budget are directed at restoring ecosystems whose integrity and functioning have been significantly altered by human activities. Because these projects are located in areas where ecological and economic conflicts may have become intractable, they may afford less management flexibility for accommodating activities because of the deteriorated ecological conditions. Furthermore, if ecological conditions have already deteriorated and existing court orders have already imposed specific requirements or limitations, there may be less opportunity or likelihood for private and government interests to reach agreement on such issues as (1) the desired future ecological conditions, (2) the types, levels, and mixes of activities that can be sustained, and (3) the distribution of these activities over space and time among the various land units within the ecosystems.

In south Florida, for example, the administration, the state of Florida, and some sugar cane and vegetable growers could not agree on a plan to address the declining ecological health of the Everglades and Florida Bay. The administration announced an agreement in July 1993 in response to a court order, but this agreement was subsequently rejected by one of the state's two largest sugar companies, which controls about 30 percent of the state's sugar crop, as well as by some small growers. Although the state of Florida has since enacted legislation adopting an agreed-upon plan to reconcile many immediate concerns, a long-term ecological standard has not been adopted.

Various agency officials, scientists, and policy analysts have suggested that the ecosystem management approach should be tested in geographic areas where problems or issues of mutual concerns have not become intractable. Such areas would provide greater opportunities for management to devise solutions for maintaining or restoring the health of an ecosystem as well as for sustaining local economies and communities. Testing in these additional areas should provide a better opportunity for demonstrating ecosystem management's potential to avoid or mitigate ecological and economic conflicts—particularly conflicts between species at risk of extinction and local communities.

In responding to a draft of this report, the Department of the Interior indicated that the Interagency Ecosystem Management Task Force intends to test ecosystem management in additional geographic areas. We believe that the additional areas being considered by the task force should provide

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opportunities for assessing ecosystem management's potential for
avoiding or mitigating ecological and economic conflicts.

Conclusions and Recommendations

Conclusions

The administration's initiatives to implement a governmentwide approach to ecosystem management, as well as the four primary federal land management agencies' initiatives, reflect a growing recognition that the current practice of managing individual politically or administratively established land units and individual natural resources is not adequately addressing two basic legislative mandates: (1) sustaining multiple uses of federal lands and (2) protecting individual natural resources. These initiatives are also based on the desire to avoid or mitigate future conflicts between long-term ecological and socioeconomic goals and shorter-term socioeconomic values and concerns by providing greater flexibility to coordinate activities over larger land areas while still maintaining or restoring the areas' ecological health. Therefore, ecosystem management would not necessarily alter the federal land management agencies' basic legislative mandates. Rather, it would change these agencies' approach to fulfilling their stewardship responsibilities through a better scientific understanding of these mandates' relationship to one another.

Because ecosystems exist at several geographic scales, so, too, should efforts to coordinate activities that affect them. Thus, the initiatives by the four primary federal land management agencies to implement an ecosystem management approach within the existing framework of laws and land units, as well as similar efforts by other federal agencies, are important first steps in investigating and experimenting with an ecosystem management approach and should be encouraged. The efforts of federal agencies to better coordinate their activities in the same geographic areas and to develop alliances and partnerships with nonfederal landowners are also important to developing an ecosystem management approach. The land management agencies should continue to pursue these efforts wherever possible because such efforts should help to (1) foster voluntary cooperation among landowners in ecosystems and thereby help to mitigate or avoid ecological and economic conflicts and (2) identify barriers to interagency coordination and collaboration with nonfederal parties and options for overcoming them.

However, fulfilling ecosystem management's potential to protect natural resources and sustain long-term natural resource commodity production and other uses requires that the geographic areas to be managed as ecosystems be large enough to (1) capture the complexities and linkages among the components and processes of the ecosystems and (2) allow for consideration of the effects on the ecosystems of activities originating across ownership boundaries. Hence, the areas to be managed as ecosystems will generally have to be larger than any one federal land unit

or ownership, include private and other nonfederal landholdings, and cross state boundaries.

While the administration's fiscal year 1995 budget proposes to fund the initial stage of a governmentwide approach to ecosystem management, additional actions are needed. These actions include clarifying the policy goal for ecosystem management and taking certain practical steps to apply the principles being considered by the administration.

Neither the administration's fiscal year 1995 budget document nor the draft "Ecosystem Management Initiative Overview" prepared and approved by the Interagency Ecosystem Management Task Force clearly identifies the priority to be given to the health of ecosystems relative to human activities when the two conflict. Other definitions leave no doubt that greater priority will have to be given to maintaining or restoring a minimum level of ecosystem integrity and functioning over nonsustainable commodity production and other uses. The practical starting point for ecosystem management will be to maintain or restore the minimum level of ecosystem health necessary to meet existing legal requirements.

The principles being considered by the administration appear appropriate, but implementing ecosystem management will require translating these principles into certain practical steps that clearly identify what must be done and which agencies and parties must be involved. These steps include (1) delineating ecosystems, (2) understanding their ecology, (3) making management choices, and (4) adapting management on the basis of new information.

However, the results of federal ecosystem management initiatives to date indicate that implementing ecosystem management governmentwide faces several significant barriers, including the following:

- Although ecosystem management will require greater reliance on ecological and socioeconomic data, the available data, collected independently by various agencies for different purposes, are often noncomparable and insufficient, and scientific understanding of ecosystems is far from complete.
- While ecosystem management will require unparalleled coordination among federal agencies, disparate missions and planning requirements set forth in federal land management statutes and regulations hamper such efforts.

- Although ecosystem management will require collaboration and consensus-building among federal and nonfederal parties within most ecosystems, incentives, authorities, interests, and limitations embedded in the larger national land and natural resource use framework—many beyond the ability of the federal land management agencies individually or collectively to control or affect—constrain these parties' efforts to work together effectively.
- Moreover, while ecosystem management should provide a more scientifically informed basis for making policy decisions and more accurately predicting their consequences, it cannot provide scientific answers to what will always be essentially public policy questions, such as (1) the importance or relative priority of maintaining or restoring healthy ecosystems and (2) the types, levels, mixes, and distribution of activities over time among the various land units within an ecosystem.

The four pilot projects proposed in the administration's fiscal year 1995 budget, as well as other ecosystem management initiatives, afford an opportunity to establish outcome-oriented and measurable objectives and milestones for identifying these and other barriers as well as specific statutory, regulatory, institutional, and procedural options for resolving them. In addition, the increased funding and flexibility that are to accompany these initiatives must be accompanied by greater accountability to the Congress.

Recommendations

To effectively implement a governmentwide approach to ecosystem management, we recommend that the Director of the White House Office on Environmental Policy, through the Interagency Ecosystem Management Task Force, develop a strategy that

- clarifies a policy goal for ecosystem management that specifies the priority to be given to maintaining or restoring minimum levels of ecosystem integrity and functioning relative to nonsustainable short-term uses, including commodity production;
- translates the principles in the administration's fiscal year 1995 budget into practical steps that clearly identify what must be done and which agencies and parties must be involved, including (1) delineating the boundaries of the geographic areas to be managed as ecosystems, (2) understanding their ecologies (including their structures and links to each other, their current ecological conditions and trends, the minimum level of integrity and functioning needed to maintain or restore their health, and the effects of human activities on them), (3) making management choices about

desired future ecological conditions, about the types, levels, and mixes of activities that can be sustained, and about the distribution of activities over time among land units within the ecosystems, and (4) adapting management on the basis of new information; and

- identifies barriers to governmentwide implementation of ecosystem management and specific statutory, regulatory, institutional, and procedural options for overcoming them.

We further recommend that progress in implementing this strategy in the pilot projects and other ecosystem management initiatives be collectively assessed and reported as part of the yearly budget and appropriations process.

Agency Comments and Our Evaluation

The Forest Service and the White House Office on Environmental Policy agreed with both of our recommendations: The Forest Service stated that the recommendations need to be addressed if agencies are to succeed in fulfilling ecosystem management's potential, and the White House Office on Environmental Policy stated that the recommendations are consistent and compatible with the core components of the administration's ecosystem management initiative. Interior agreed with our first recommendation and the intent of the second recommendation. However, Interior said it would prefer to see the collective assessment and reporting of progress in implementing ecosystem management included in the interagency task force process rather than in the yearly budget and appropriations process.

While Interior's preference would meet the executive branch's need for a collective assessment of federal agencies' progress in implementing an ecosystem management strategy through pilot projects and other initiatives, it would not make federal agencies as accountable to the Congress as our recommendation. In our view, the greater flexibility in at least some of the agencies' budget structures, which the agencies believe ecosystem management requires, needs to be balanced or offset by greater accountability to the Congress for the agencies' ecosystem management expenditures. We believe that this accountability can be better ensured by assessing and reporting progress toward achieving measurable performance objectives as part of the yearly budget and appropriations process. These objectives should focus on end results and improvement in resource conditions, rather than on near-term commodity output levels (outcomes rather than outputs). BLM agrees, stating in its comments that

Chapter 5
Conclusions and Recommendations

fiscal accountability mechanisms and on-the-ground performance measures must be critical components of the new BLM budget structure.

The agencies' comments and our responses are presented fully in appendixes I through III.

Comments From the Department of the Interior



United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

JUN - 7 1994

Mr. James Duffus III
Director, Natural Resources
Management Issues
Resources, Community and Economic
Development Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Duffus:

We appreciated the opportunity to review the draft report entitled "Ecosystem Management: Additional Actions Needed to Adequately Test a Promising Approach" (GAO/RCED-94-111). We are pleased to see the General Accounting Office address this timely topic, which is of high interest to the Department of the Interior, as well as other Federal land managing agencies. This thoughtful report provides much useful guidance to the agencies that are attempting to implement an ecosystem management approach. As you know, the Department of the Interior, under the guidance of Secretary Bruce Babbitt, has stepped out vigorously to apply ecosystem management concepts to its own lands.

We are pleased that your report recognizes the interagency activities coordinated by the White House Office of Environmental Policy, in addition to the specific programs of the four land management agencies that were the focus of the report. I serve as the Department of the Interior representative to the Interagency Ecosystem Management Task Force, which has been working very hard to develop definitions, goals, and principles of ecosystem management, and to identify barriers to implementation of ecosystem management within the Federal government, all activities recommended in your report. We are in agreement with your first recommendation. We also agree with the intent of the second recommendation, but believe that assessment and reporting of the ecosystem management initiatives should be conducted through the Interagency Task Force process, rather than through the more rigid yearly budget and appropriations process.

Many of the achievements of the Interagency Task Force are too recent to have been included in your draft report, but we believe the final report should recognize them. I am attaching as Enclosure 1 the most recent draft of "Ecosystem Management Initiative Overview," prepared and approved by the Interagency Ecosystem Management Task Force. This document summarizes the effort of the agencies to clarify goals, translate principles, and to learn from ongoing ecosystem management efforts in order to apply the findings to other ecosystems. These accomplishments represent partial fulfillment of your first recommendation.

See comment 1.

See comment 2.

Appendix I
Comments From the Department of the
Interior

In addition, observations and comments from the Bureau of Land Management, National Park Service, and U.S. Fish and Wildlife Service, are included in Enclosures 2, 3, and 4, respectively. The National Biological Survey believes the report is adequate and has no comments.

If you have any questions or need further clarification of our comments, please contact Deborah Williams, Departmental GAO Liaison Officer, at 208-3963.

Regards,



Bonnie Cohen
Assistant Secretary for
Policy, Management and Budget

Enclosures

DRAFT

ECOSYSTEM MANAGEMENT INITIATIVE OVERVIEW

One of the most far-reaching environmental recommendations of Vice President Gore's National Performance Review was to develop "a proactive approach to ensuring a sustainable economy and a sustainable environment through ecosystem management." The link between a healthy economy and a healthy environment has highlighted the need to actively maintain our natural infrastructure before problems arise, as we do with our highways and bridges. The report recommended the President issue a directive on ecosystem management and begin phased-in implementation with ecosystem management projects.

The goal of ecosystem management is to restore and maintain the health, sustainability, and biological diversity of ecosystems while supporting sustainable economies and communities.¹ Many factors, such as interagency conflicts, incompatible data bases, a lack of research on ecosystem functioning, inconsistent planning and budgeting cycles, and differing agency organizational structures, have hampered development of a coordinated approach to actively maintaining or restoring the health of ecosystems that are the cornerstones of sustainable economies.

The Interagency Ecosystem Management Task Force.

The *Interagency Ecosystem Management Task Force* was established to implement an ecosystem approach to environmental management. The Task Force, chaired by Katie McGinty, the Director of the White House Office on Environmental Policy, is made up of Assistant Secretaries from 12 departments and agencies, as well as representatives from the Office of Management and Budget and the White House Office of Science and Technology Policy. The Task Force is in a unique position to advance a consistent approach to environmental management by establishing overarching goals for all agencies, removing barriers that frustrate more effective, efficient interagency cooperation, and learning from large scale ecosystem-based management efforts. The Task Force has formed an interagency work group to assist in its work. One of the work group's most important tasks will be to examine major issue areas that influence the effectiveness of ecosystem management such as, the budget process, legal authorities, and information management and make recommendations for improvements.

Because ecosystems do not follow administrative boundaries, such as the borders of National Parks or Forests, working to maintain or restore ecosystem sustainability involves a perspective that crosses those artificial boundaries. This entails a shift from the Federal government's traditional focus on individual agency jurisdiction to considering the actions of multiple agencies within larger ecological boundaries. Just as interagency collaboration is important, finding ways to increase voluntary cooperation with state, tribal, and local

¹ An ecosystem is an interconnected community of living things, including humans, and the physical environment with which they interact.

Enclosure 1-1

DRAFT

governments, as well as nongovernmental organizations and the public, is key to effective ecosystem management.

Several ecosystems will be selected by the Task Force based on nine criteria: (1) ongoing interagency and intergovernmental management activities; (2) a mix of resource management and infrastructure agency involvement; (3) a mix of geographic scales and efforts in various stages of development; (4) availability and accessibility of data on the ecosystem; (5) environmental importance of the area; (6) a variety of environmental, economic, and social issues; (7) public and private support of, and interest in, the ecosystem; (8) agency support for the selection; and (9) geographic distribution.

There are many other large scale, integrated management projects around the country that may also meet the criteria above. The Task Force has chosen to focus the learning process on several areas which should serve as case studies or laboratories for ecosystem management by building on existing efforts, in addition to providing opportunities for achieving significant environmental and socioeconomic benefits. Limiting the focus of this learning process to the selected ecosystems does not mean that these ecosystems are the only areas in which the Federal government will, or should, pursue ecosystem management. The Task Force can gain significant insight from other ongoing ecosystem-based approaches, both Federal and non-Federal, and will develop a mechanism to receive input from and support these other efforts.

Ecosystem management case studies and laboratories.

The ecosystems are divided into two categories: (1) "Survey and Assist" case studies--ecosystems where mature interagency ecosystem-based activities are ongoing, but may need some assistance and (2) "New Initiatives" laboratories--locations where the interagency, ecosystem-based activities are not as well developed, but where the development of new, integrated approaches hold great promise. Each ecosystem will have a Federal agency that serves as the lead for Federal efforts in the ecosystem and will be held responsible for any information, reports, or other deliverables requested by the Task Force.

Survey and Assist Case Studies

The Task Force will conduct a survey and assessment of the ecosystem-based activities of these case study ecosystems to elicit lessons learned from local representatives about their ecosystem-based management efforts to date and to identify opportunities to assist these efforts, either through the elimination of existing impediments or the encouragement of successful approaches and techniques. The Task Force will seek answers to two basic questions:

- As the initiative proceeds, what can we learn from the experiences of these ecosystem management efforts, and

Enclosure 1-2

DRAFT

- What can the Task Force do to support efforts in the field and facilitate more effective ecosystem management in the future?

New Initiatives Laboratories

In the laboratories, the Task Force will ask Ecosystem Management Teams, comprised of local representatives from the relevant Federal agencies, to work with State, tribal, and local governments and the public through a collaborative process to:

- Characterize the historical ecosystem (i.e., its composition, structure, function, and natural range of variability, and human settlement patterns) and the present economic, environmental, and social trends for the ecosystem.
- Develop a vision of the ecosystem's desired future condition, as well as alternative means to achieve the vision. The vision should be consistent with the overarching goal of the initiative to maintain the health, sustainability, and biological diversity of the ecosystem while supporting communities and their economies and alternative means of achieving this vision.
- Analyze how current Federal and non-Federal activities in the ecosystem will address the problems and how they will capitalize on opportunities in furthering the goals and objectives of ecosystem management, including factors that may limit or inhibit full participation of non-Federal parties.

In addition, the teams will be asked to develop and implement an ecosystem management implementation strategy for Federal lands and Federally-managed programs and to develop and submit to the Task Force an integrated, interagency budget submission for the ecosystem for fiscal year 1996.

Enclosure 1-3

**Appendix I
Comments From the Department of the
Interior**

Comments of the Bureau of Land Management

We appreciated the opportunity to review the subject General Accounting Office (GAO) report. We are pleased to see the GAO address this timely topic, which is of high interest to the Bureau of Land Management, as well as the other Federal land managing agencies. We find the report to be well researched and well prepared. As you know, the Bureau of Land Management, under the guidance of the Secretary of the Interior, Bruce Babbitt, has stepped out vigorously to apply ecosystem management concepts to the Public Lands. The draft report reveals a sound understanding of ecology and its relationship to ecosystem management. The discussion of the relationship of biological diversity to ecosystem health and stability is a good example and illustrates that writers of the report are aware of the current thinking of ecologists on this issue.

See comment 2.

The Bureau of Land Management concurs with the recommendations stated in the subject report. In fact, we have already been working together with other Federal agencies on several actions which will, we believe, contribute to implementing each of the proposed recommendations.

See comment 3.

We bring to your attention one potential barrier to effective ecosystem management. The Bureau of Land Management experience indicates that the provisions of the Federal Advisory Committee Act (FACA) may actually deter effective ecosystem management. The FACA prescribes elaborate and costly procedural requirements whenever an agency acts to include nongovernmental access to Federal decision officials. Yet, the effectiveness of ecosystem management depends upon establishing open and collaborative relationships with key stakeholders. This issue deserves greater attention to determine whether FACA should be amended so it does not unwittingly frustrate productive ecosystem management partnerships.

See comment 4.

The report should also identify the need to develop staffing and skill mixes necessary to administer ecosystem management. The Bureau of Land Management believes that, in some areas and agencies, there is a lack of specific skills, such as hydrologists and ecologists, needed to properly implement ecosystem management. Interagency teams may help to solve this problem.

Enclosure 2-1

Appendix I
Comments From the Department of the
Interior

Comments of the National Park Service

The draft report nicely brings together the current situation regarding ecosystem management, some of the problems being experienced now with implementing it, and some options of what to do to overcome those problems. The following specific comments are offered to strengthen the report:

Page 17, para. 2: Minerals and land allocated under the 1872 Mining Law are transferred permanently by claim and patent, rather than temporarily by lease.

Page 21, para. 2: The National Park Service also is required to prepare and periodically revise general management plans for parks (National Parks and Recreation Act of 1978).

Page 30, para. 2: Even where the alteration is not irreversible, humans may want to maintain ecosystems in the altered condition for long periods of time, as is done with agricultural areas or planted forests. Ecosystem management requires maintaining ecosystems to meet both sustainable biodiversity and sustainable economic goals, not what is stated here.

Page 36, para. 3: The National Park Service now has an ecosystem management working group, and several of the National Park Service regional offices have established either designated persons or offices for ecosystem management. The 21 parks mentioned probably are in the Colorado Plateau ecoregion (Utah, Colorado, Arizona), not in the southwest. Even though the management of these parks will be coordinated along ecosystem management principles, the parks still are supervised administratively by the three parent regions. The key change is the ecosystem-based coordination among all of the affected park managers and their parent regional offices. Other possible examples include South Florida, Mammoth Cave Area Biosphere Reserve, or the Sierra cooperative program.

Page 37, para. 1: The Interagency Ecosystem Management Coordinating Group has been meeting at least since 1992, and perhaps slightly earlier. It also is engaging in sharing ideas and information in other areas of common interest, such as training, ecoregion assessment, and interpretation.

Page 37, para. 2: Some of the Federal coordination has been conducted in response to self-generated agency concerns, not to external pressure. The Greater Yellowstone Area coordination began in the mid-1970's, not 1986, and pre-dated the congressional concerns of the mid-1980's.

Page 38, para. 1: The National Park Service also participates in aspects of the Sierra project. The Southern Appalachian Man and the Biosphere Program is a U.S., not a U.N., program that involves biosphere reserves that, in response to formal U.S. nomination, have been designated by UNESCO as part of the international network of biosphere reserves. The Mammoth Cave Area Biosphere Reserve is another good example, where subsurface water-quality and flow--is the key resource that links the partners.

Enclosure 3-1

Now on p. 14.
See comment 5.

Now on p. 17.
See comment 6.
Now on p. 25.
See comment 7.

Now on p. 30.
See comment 8.

Now on p. 30.
See comment 9.

Now on p. 30.
See comment 10.

Now on p. 34.
See comment 11.

**Appendix I
Comments From the Department of the
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Now on p. 34.
See comment 12.

Now on pp. 34-35.
See comment 13.

Now on p. 51.
See comment 2.

Now on p. 52.
See comment 14.

Now on p. 57.
See comment 15.

Now on p. 57.
See comment 16.

Now on p. 60.
See comment 2.

Now on p. 60.
See comment 2.

Now on p. 61.
See comment 17.

Page 38, Footnote: The U.S. now has 47 biosphere reserves out of a world total of 323. Twelve Federal bureaus (includes the Smithsonian) participate in the national committee, more participate in biosphere reserve programs.

Page 39, para. 1: All four of these agencies participate at the regional office level—an important principle for ecosystem management that the cooperation occurs at the appropriate scale in relation to the system being coordinated.

Page 54, para. 2: There may be a number of areas where ecosystem management principles already are being applied and where the potential could be examined, including the Mammoth Cave Area Biosphere Reserve, the Pinelands National Reserve, the Champlain-Adirondack Biosphere Reserve, the Southern Appalachian Man and the Biosphere Cooperative, individual actions under the California Biodiversity Agreement, the developing Colorado Front Range partnership, interorganizational management programs for the Delaware - Upper Delaware National Rivers, the International Joint Commission for the Great Lakes, or perhaps the Chesapeake Bay program. Most of these areas are less "intractable" than the pilot project areas.

Page 56, footnote: The Gap Analysis project, which began in the Fish and Wildlife Service, has been transferred to the new National Biological Survey.

Page 60, para. 2: The human population element of the ecosystem should be recognized explicitly as part of the ecosystem management equation.

Page 61, para. 1: The National Park Service, Fish and Wildlife Service, and U.S. Forest Service are Federal land managing agencies that also have financial and technical assistance programs that are separate from their land management responsibilities.

Page 65, para. 1: The status report on South Florida needs to be updated, given the recent passage by the State Legislature of a measure to implement some of the State's duties under the agreement.

Page 65, para. 2: The Mammoth Cave Area Biosphere Reserve also seems to meet the criterion.

Page 67, para. 1: A voluntary decision to participate often brings a stronger personal commitment than does a forced decision to participate.

Enclosure 3-2

**Appendix I
Comments From the Department of the
Interior**

Comments of the U.S. Fish and Wildlife Service

Now on p. 14.
See comment 18.

The U.S. Fish and Wildlife Service welcomes an opportunity to comment on the subject General Accounting Office report. The report provides a well-written and comprehensive analysis of the issues. The report introduction provides a broad overview of pertinent history and policies. It is important to note, however, that there are important differences between agency missions. The implication of the report (except as noted on page 58) is that all Federal land units function to sustain long-term commodity production and uses and to protect natural resources. Both the National Park System and the National Wildlife Refuge System are primarily oriented to resource protection, not to commodity production. It is noteworthy that lands "set aside" to "protect their natural conditions" represents over 180 million acres of land (27 percent of the four agencies detailed in the report).

Now on p. 37.
See comment 19.

Page 41, para. 3: The report states there is no governmentwide legal mandate to maintain or restore healthy ecosystems. Actually the Endangered Species Act does direct Federal agencies to use their authorities to promote the recovery of listed species and specifically encourages the conservation of ecosystems upon which they depend (for example, in section 2(b)): "The purposes of this Act are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved...".

See comment 20.

Chapter 4 provides a thoughtful analysis of "barriers to implementing ecosystem management." While the "disparate missions" of different agencies make ecosystem management more difficult, we should not equate sharing of ideas and collaboration with homogenization of agencies. Our objective should be to advance common approaches, where appropriate, while encouraging and fostering different, but complementary, roles when it promotes effective ecosystem management across the landscape. Even disparate planning requirements need not be an insuperable barrier to ecosystem management, if agencies and other partners collaborate to establish ecosystem-wide resource objectives within which individual agency land unit plans may be developed.

Now on p. 51.
See comment 2.

Page 54, para 2: The Fish and Wildlife Service has found many areas of the country where intractable resource problems are not the norm. For example, private landowners seek out the Service to join in voluntary cost-share projects which restore wetlands, grasslands, and riparian areas in the Blackfoot River Valley of Montana, the Sandhills and Rainwater Basin in Nebraska, the Upper Mississippi River Basin and Lower Mississippi Valley, the Sacramento River Valley of California, and the Connecticut River Valley.

See comment 2.

The Service's Coastal Program has brought together partners in pursuit of an ecosystem approach in nine of the most biologically important estuaries including: Chesapeake Bay, Delaware Bay, Gulf of Maine, Galveston Bay, and Puget Sound. The Fish and Wildlife Service is a partner in many successful ecosystem management projects including the Greater Yellowstone, the ACE Basin and other coastal watershed projects in South Carolina, the Upper Colorado River Fish Recovery Program, the Lower Rio Grande Valley project, and other watershed projects associated with national wildlife refuges.

Enclosure 4-1

The following are GAO's comments on the Department of the Interior's letter dated June 7, 1994.

GAO's Comments

1. While Interior's preference would meet the executive branch's need for a collective assessment of federal agencies' progress in implementing an ecosystem management strategy through pilot projects and other initiatives, it would not make these agencies as accountable to the Congress as our recommendation. In our view, the greater flexibility in at least some of the agencies' budget structures that ecosystem management requires needs to be balanced or offset by greater accountability to the Congress for the agencies' ecosystem management expenditures. We believe that this accountability can best be ensured by assessing and reporting progress toward achieving measurable performance objectives as part of the yearly budget and appropriations process. These objectives should focus on end results and improvement in resource conditions, rather than on near-term commodity output levels (outcomes rather than outputs). BLM agrees, stating in its comments that fiscal accountability mechanisms and on-the-ground performance measures must be critical components of the new BLM budget structure.

2. We have revised the report to include the recent achievements of the Interagency Ecosystem Management Task Force, including its most recent draft of the "Ecosystem Management Initiative Overview." In addition, we have revised the section in our draft report and the corresponding conclusion and recommendation dealing with the need for testing the approach in other geographic areas. We believe that the criteria being used by the task force to select additional pilot projects, together with the specific examples cited in the observations and comments by the four primary federal land management agencies, are sufficiently diverse to permit adequate testing.

3. We agree that the effectiveness of ecosystem management depends on establishing open and collaborative relationships with key stakeholders in an ecosystem and that the elaborate and costly procedural requirements of the Federal Advisory Committee Act (FACA) may actually deter effective ecosystem management. This concern was clearly stated in chapter 4 of our draft report and is addressed in our recommendation on the need to identify statutory barriers to governmentwide implementation of ecosystem management.

4. We understand the importance of developing the staffing and skill mixes needed to implement ecosystem management and recognize that some agencies may not have the specific skills needed to properly implement the approach. We also note that CRS' April 1994 report on federal agencies' ecosystem management activities identified staffing and skill mixes as limits to the implementation of ecosystem management by other federal agencies. While this limitation could well prove to be a significant barrier to implementing ecosystem management governmentwide, we did not gather enough information to discuss it in any detail in this report. We have, however, revised the report to make it clear that other barriers, in addition to those we identified in our report, must be addressed.

5. We have revised the report to delete any reference to the type of system under which lands are used for mineral development.

6. We have revised the report to state that the National Park Service is required to develop general management plans under the National Parks and Recreation Act of 1978.

7. We have revised the report to state that ecosystem management recognizes that (1) managing natural resources to meet the needs of humans and other species will require both natural and altered areas and (2) both kinds of land uses can continue while ecosystems are being maintained or restored.

8. We have revised the report to (1) recognize the working group established by the National Park Service to develop its ecosystem management policies and strategy and (2) cite the efforts of the more than 20 national parks located within the Colorado Plateau to share information, develop cooperative programs based on the ecology of the area, and seek partnerships with interested organizations as examples of the Service's efforts to develop regional partnerships.

9. We have revised the report to state that the Interagency Ecosystem Management Coordination Group has been meeting since 1992 and that it has been exchanging information and ideas on areas of interest, including training and the delineation of ecosystem boundaries across the nation.

10. We have revised the report to recognize that (1) the efforts of some federal agencies to coordinate their activities across unit boundaries have occurred in response to the agencies' concerns and (2) efforts by the National Park Service and the Forest Service to better coordinate

management goals and standards and activities in the greater Yellowstone began in the early 1960s.

11. We have revised the report to (1) add the National Park Service as a participant in the Sierra Nevada cooperative program, (2) make clear that the Southern Appalachian Man and the Biosphere program is a U.S. program that has been designated by the United Nations as part of the international network of biosphere reserves, and (3) add the Mammoth Cave National Park area as another example of a biosphere reserve.

12. We have revised the report to state that (1) in the United States, 47 areas have been designated as part of an international network of 323 biosphere reserves and (2) 12 federal departments and agencies participate in the U.S. national committee and more participate in the biosphere reserve programs.

13. We have revised the report to avoid suggesting that federal participation in the coordinated strategy to address the diversity, ranges, and numbers of native plant and animal species in California is limited to the local level.

14. We have revised the report to recognize that the "Gap Analysis" project has been transferred to NBS.

15. We agree that humans are a biological component of ecosystems. We believe that this issue is adequately addressed in chapter 1 of the report.

16. We agree that the four primary federal land management agencies also have financial and technical assistance programs and have qualified our statement by adding that these agencies are "often" unable to control or affect the larger national land and natural resource use framework.

17. We agree that voluntary cooperation among landowners in ecosystems helps to avoid ecological and economic conflicts and have revised the report to make clear that such cooperation is desirable.

18. We make clear in chapter 1 that the approximately 77 million acres managed by the National Park Service and the approximately 89 million acres managed by FWS are primarily for the conservation and protection of natural resources and that legislation creating incentives to produce specific levels of certain natural resource commodities and uses are confined to Forest Service and BLM lands. However, previous GAO reports

have made clear that both parks and wildlife refuges are "multiple-use" lands. For example, in our report entitled National Wildlife Refuges: Continuing Problems With Incompatible Uses Call for Bold Action (GAO/RCED-89-196, Sept. 8, 1989), we state that virtually all refuges host many nonwildlife-related uses, including public recreation, mining, and livestock grazing.

19. We have revised the report to recognize that a stated purpose of the Endangered Species Act is to provide a means for conserving the ecosystems upon which endangered and threatened species depend. We have also noted that the National Environmental Policy Act speaks to concerns closely related to ecosystems. However, we note that neither act defines or delineates ecosystems or requires any agency to take specific actions for maintaining or restoring ecosystems as such.

20. The degree to which the disparate missions and planning requirements statutorily rooted in the federal land management framework will hamper interagency coordination of federal actions across ecosystems is still unknown. As we state in our report, we believe that the four pilot projects proposed in the administration's fiscal year 1995 budget, as well as other mature and new initiatives to implement ecosystem management, provide opportunities to identify this barrier and specific statutory, regulatory, institutional, and procedural options for resolving it.

Comments From the Forest Service



United States
Department of
Agriculture

Forest
Service

Washington
Office

14th & Independence SW
P.O. Box 96090
Washington, DC 20090-6090

Reply To: 1420/1330-1

Date: JUN 30 1994

Mr. James Duffus III
Director, Natural Resources Management Issues
General Accounting Office
441 G Street, N.W.
Washington, DC 20548

Dear Mr. Duffus:

This reply pertains to your request for comments on the U.S. General Accounting Office (GAO) Draft Report RCSD-94-111, Ecosystem Management: Additional Actions Needed to Adequately Test a Promising Approach. The Forest Service was assigned the lead to coordinate responses to the draft report. We did not receive comments from other agencies, hence our response reflects information that pertains to the Forest Service only.

We find the report to be in line with the Agency's history and thinking of ecosystem management philosophy and subsequent implementation policy. We recommend that you consider the following comments in issuing the final report.

The report implies that Federal agencies only recently began to work together in coordinated and cooperative efforts and only when directed to do so by the courts. However, the Forest Service has a long history of cooperation with other Federal, State, private, and Native American organizations. A shared adoption of an ecosystem management policy will continue to enhance these cooperative efforts.

The "scientific understanding of ecosystems" is an area that is well on its way to development. The Office of Science and Technology Policy's Committee on Environment and Natural Resources is currently formulating the Research and Development agenda for Biodiversity and Ecosystem Dynamics and for Resources Use and Management. Fourteen agencies have formed the Ecosystem Management Task Force to implement an ecosystem approach to environmental management as recommended in the National Performance Review. The charge to the Task Force's Science and Information Issue Area Subgroup is to focus on (1) lessons to be learned from "Survey and Assist" cases, (2) the development of ecoregional assessments, and (3) the development of an ecosystem management research agenda. Ecoregional assessment protocols that will consider the biological, physical, and human dimensions of ecosystem management will be available for use by October 1994.

See comment 1.

See comment 2.

See comment 3.



Caring for the Land and Serving People

FS-6200-28b(3/92)

Appendix II
Comments From the Forest Service



Mr. James Duffus III

2

See comment 4.

See comment 2.

See comment 5.

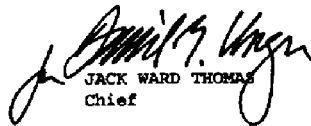
See comment 6.

The question of ecological classification systems is being addressed by the Interagency Ecosystem Management Coordination Group. The subject of conducting a non-biased review of the current systems, their strengths and weaknesses, and how best to use the various systems in combination at various scales has been discussed with the National Academy of Sciences. The Academy expressed an interest in conducting this assessment. There is general agreement that one size does not fit all systems. The process should not be one of selecting between a watershed approach over an ecoregion approach, but how best to use these tools to assess the conditions of the Nation's ecosystems.

The role of non-Federal forest lands in helping to protect and sustain ecosystem values is a critical element for the future. Our influence on these lands, however, will continue to be more indirect, providing knowledge and assistance, while recognizing landowner needs and their specific objectives as paramount. Existing mechanisms for assisting non-Federal landowners should be reassessed in light of the goal of forest sustainability. Additionally, new approaches for encouraging greater cooperation and coordination should be identified and evaluated while continuing to respect private property rights. It will be through cooperation and collaboration that we jointly accomplish a shared desired end.

We concur that the recommendations for implementing a Government-wide approach to ecosystem management do need to be addressed if we are to be successful in fulfilling ecosystem management potential. For the Forest Service, that potential calls for promoting the long-term sustainability of ecosystems by ensuring they are healthy, diverse, and productive. This report reflects that posture.

Sincerely,


JACK WARD THOMAS
Chief



Caring for the Land and Serving People

FS-6200-28b(3/92)

The following are GAO's comments on the Forest Service's letter dated June 30, 1994.

GAO's Comments

1. We have revised the report to recognize that (1) the efforts of some federal agencies to coordinate their activities across unit boundaries have been in response to the agencies' concerns and (2) efforts by the National Park Service and the Forest Service to better coordinate management goals and standards and activities in the greater Yellowstone area began in the early 1960s.
2. As CRS' April 1994 report on federal agencies' ecosystem management activities shows, ecosystem management initiatives are being undertaken throughout the federal government. As we stated in discussing our report's objectives, scope, and methodology, we limited our work primarily to relevant activities of the four primary federal land management agencies. The roles of the Office of Science and Technology Policy, the National Academy of Sciences, and other organizations and agencies were, therefore, beyond the scope of our review.
3. As we state in chapter 3, understanding an ecosystem's ecology is one of four practical steps that need to be taken to implement the principles of ecosystem management being considered by the administration. We have revised chapter 4 of the report to recognize the establishment of the Science and Information Issue Area Subgroup, its focus, and reporting milestone.
4. We have revised the report to recognize that the issue of ecological classification systems is currently being addressed by the Interagency Ecosystem Management Coordination Group.
5. We are aware that there is general agreement that various ecological classification systems should be used in combination at various scales. We are also aware, however, that there is growing consensus that a governmentwide approach to ecosystem management may ultimately require agreement on delineating ecosystem boundaries across the national landscape.
6. We agree that the role of nonfederal lands in helping to maintain and restore the health of ecosystems is a critical element for the future. Our report emphasizes that ecosystem management will generally fall short of its goal if it is limited to activities on federal lands and that efforts to

Appendix II
Comments From the Forest Service

establish effective collaboration and achieve consensus with nonfederal parties in support of ecosystem objectives will necessarily require an approach largely based on voluntary cooperation and incentives.

Comments From the White House Office on Environmental Policy

THE WHITE HOUSE
WASHINGTON

June 10, 1994

Dear Mr. Duffus:

I want to thank you for the opportunity to comment on the draft report entitled Ecosystems Management: Additional Actions Needed to Adequately Test a Promising Approach (GAO/RCED-94-111).


In general, the draft report is a well-framed and lucid presentation of the basic facets of ecosystem management. I believe the recommendations to be consistent and compatible with the core components of the Administration's ecosystem management initiative.

I would offer several observations. First, I must emphasize the value of the many on-going creative approaches to natural resource management. These "on-the-ground" efforts are vital to the success of the ecosystem initiative nationwide because they provide viable alternatives to managing natural resources and improving environmental quality. As such, they should, and will serve as important guides in the development of an overall national framework that will be well-grounded in practical field experience.

Second, I would also emphasize the importance of intergovernmental and public-private aspects of ecosystem management. Developing new and better management strategies is not exclusively a Federal issue, nor is it entirely a state and local issue. Major improvements in resource management must involve better integration of governmental activities at all levels, as well as enhanced coordination among public and private endeavors. This exemplifies the significance of addressing institutional complexities in natural resource management.

Once again, I want to thank you for the opportunity to review the draft, and I look forward to its publication.

Sincerely,



Kathleen A. McGinty
Director, White House Office on
Environmental Policy

KAM/mmg

See comment 1.

See comment 2.

The following are GAO's comments on the White House Office on
Environmental Policy's June 10, 1994, letter.

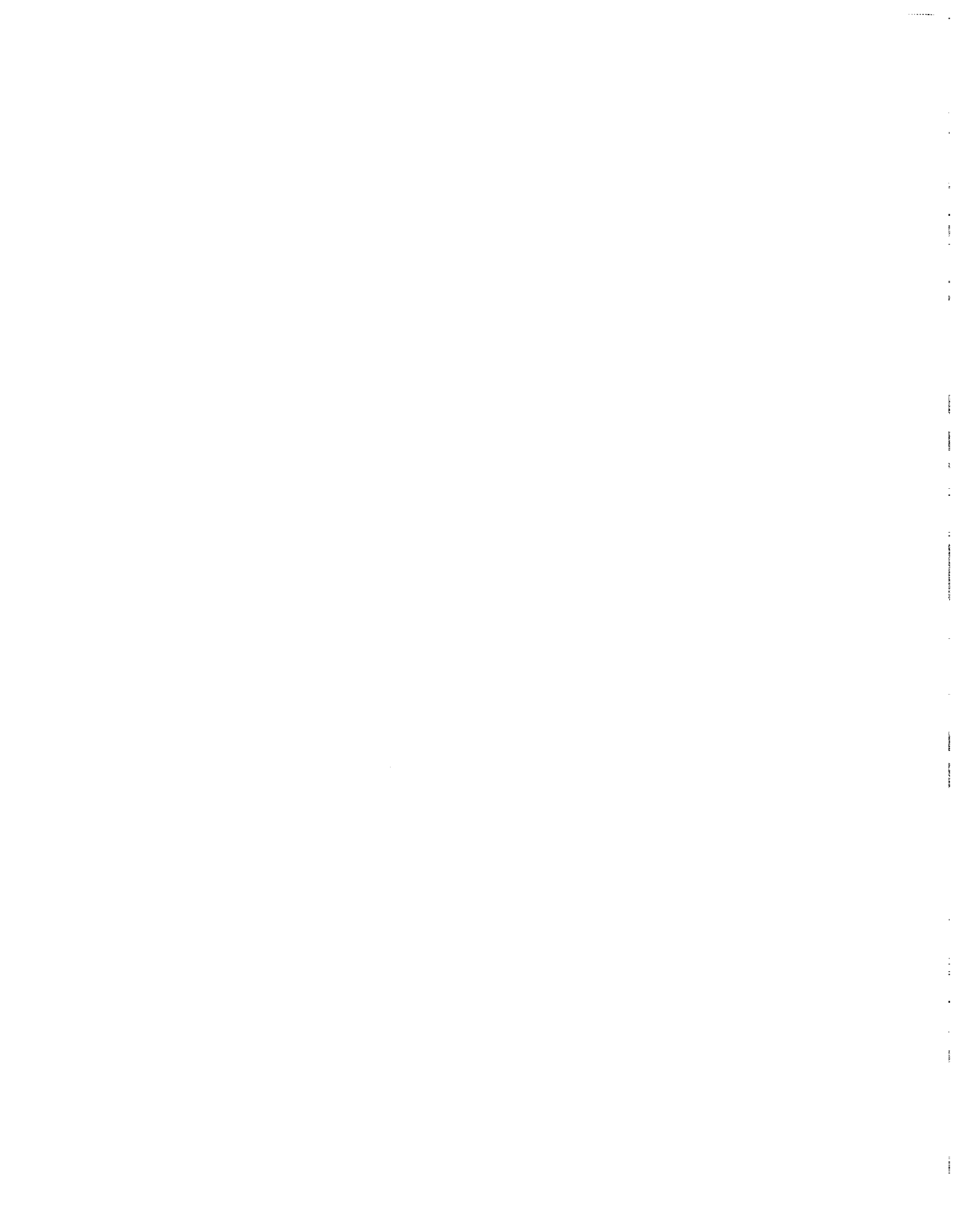
GAO's Comments

1. We agree that ongoing and new initiatives to implement ecosystem management will serve as important guides in the development of an overall national framework that is well grounded in practical field experience. As we state in our report, we believe that the four pilot projects proposed in the administration's fiscal year 1995 budget, as well as other initiatives to implement ecosystem management, provide opportunities to address barriers and identify statutory, regulatory, institutional, and procedural options for resolving them.
2. We agree that major improvements in natural resource management must involve better integration of government activities at all levels, as well as enhanced coordination among public and private endeavors. The importance of interagency coordination and federal and nonfederal collaboration and consensus-building are emphasized throughout our report.

Major Contributors to This Report

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