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Agency Capacity for Recreation Science and Management: The Case of the U.S. Forest Service

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Abstract

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This report examines the capacity of natural resource agencies to generate scientific knowledge and information for use by resource managers in planning and decision-making. This exploratory study focused on recreation in the U.S. Department of Agriculture, Forest Service. A semistructured, open-ended interview guide elicited insights from 58 managers and 28 researchers about recreation issues, information exchange, and research-management interactions. Data were coded and analyzed using Atlas.ti[®], a qualitative analysis software program. Results indicate that recreation managers seek information to address user conflicts and manage diverse activities across sites and landscapes. Managers do not always turn to the research community when looking for scientific information and are uncertain about the proper channels for communication. Managers consult a variety of information sources and aggregate various types of scientific information for use in planning and management. Managers desire greater and more diverse interactions with researchers to promote knowledge exchange useful for addressing recreation problems. Barriers to interaction include organizational differences between management and research, researcher responsiveness, relevance of information to manager needs, and the lack of formal interaction opportunities. Several structural processes were suggested to facilitate opportunities for greater interaction and information exchange.

Keywords: Organizational capacity, natural resources, recreation, science integration.

Summary

An important aspect of the U.S. Department of Agriculture Forest Service (U.S. Forest Service) mission is to manage public forests and grasslands based on scientific knowledge of natural processes and human interactions. U.S. Forest Service Research and Development (R&D) is charged with the production of basic and applied scientific research related to forest processes. Forest Service managers use models, tools, and information generated by scientists in making resource decisions. Changes to the external and internal operating environment of the U.S. Forest Service at the end of the 20th century have affected production and use of scientific information. Environmental regulation, public engagement in natural resource governance, and legislation that emphasizes planning and environmental analysis all have affected the decisionmaking environment, with implications for the role of science. The question arises as to whether the Forest Service has evolved from an agency of forestry experts to an agency of decision-process managers with the capacity to incorporate a much broader array of scientific information into management decisions.

The overarching goal of this study is to understand the capacity of the U.S. Forest Service, both research and management branches, to respond to current and future resource management challenges by incorporating scientific information from Forest Service R&D and other sources into its management decision processes. Specifically, the study focused on gaining a better understanding of the agency's capacity to identify, frame, and address resource management issues through the use of scientific information. To narrow our scope, we focused on one area of forest management—outdoor recreation. We asked recreation managers to identify recreation issues and information needs. We explored how managers incorporate scientific knowledge in addressing recreation problems and making decisions. We also sought information about what types of interactions managers and researchers valued and what institutional factors promote or inhibit these interactions.

Telephone and in-person interviews were conducted with a sample of 49 managers at various levels of the Forest Service as well as 8 social scientists in the National Forest System. In addition, 20 recreation researchers in Forest Service R&D and 8 university researchers were interviewed to discuss science exchange and interaction. Data were analyzed and coded by using Atlas.ti[®] software.¹ A selection of key findings is summarized below.

¹The use of trade or firm names in this publication is for reader information and does not imply endorsement by the U.S. Department of Agriculture of any product or service.

Recreation Issues and Information Needs

Recreation managers in the Forest Service were asked, “What have emerged as the most significant recreation management issues that you have faced over the course of your career?” Responses were grouped into five prominent themes:

- Motorized recreation
- Recreation alignment and facilities planning
- Biophysical effects of outdoor recreation
- Resource conflict and noncompatible use
- Meeting visitor demand; resource pressure

Agency capacity to identify issues and frame problems was affected by (a) time and budget constraints of managers, (b) fewer numbers of formally trained recreation professionals, (c) reduced opportunities for recreation planning, and (d) perceived declines in collaboration with researchers.

The types of scientific information managers thought would be useful to address everyday management challenges were grouped into several thematic areas:

- Understanding recreation visitors (demographics, motivations, preferences, behaviors) in a particular region or national forest
- Understanding motorized recreation use (motivations, preferences, use patterns)
- Spatial tools for recreation planning—how recreation use changes over a landscape
- Measuring wilderness carrying capacity—how much human use a region will support
- Measuring biophysical change related to recreation use

Barriers to conveying information needs included

- A lack of time to identify information needs and translate them into researchable problems
- A lack of understanding of the process of conveying information needs both within the Forest Service and to the scientific community
- Difficulty conveying information needs in a scientific framework.

Sources of Scientific Information

Recreation managers appeared to be highly resourceful when it came to identifying and accessing various sources of information needed to address recreation problems and issues. For basic scientific research, literature reviews, conceptual frameworks, and decision tools, they used Forest Service R&D or universities. For applied research, particularly administrative studies that catered to a specific

geographic area, they relied on university partners, enterprise teams, or consulting firms. For data used in planning and environmental analysis, they used state or county sources, consulting firms, nongovernmental organizations, and Forest Service databases such as the National Visitor Use Monitoring program. For case-based knowledge of emerging practices, they often accessed internal professional networks for experiential knowledge from enduring recreation professionals. Managers relied on different sources at various times in the planning and decisionmaking process and pieced together information in an iterative fashion.

Communication of Scientific Information for Recreation Management

Managers identified preferred mechanisms for communicating scientific information including:

- Web-based or Internet sources
- Brief technical bulletins and report summaries
- Workshops, meetings, conferences, and symposia
- Targeted training (onsite)
- Scientific journals
- Knowledge syntheses

Several challenges or constraints made the application of scientific findings difficult, including:

- Lack of formal training in recreation
- Information (“sensory”) overload (too much available information)
- Lack of relevant information related to a particular problem or issue
- Inability to generalize from cases and apply to local setting
- Lack of specificity of information
- Short “shelf-life” of recreation research
- Absence of resources to use or apply scientific information.

Interactions Between Managers and Researchers

Managers and researchers in the Forest Service were asked to characterize their ideal type of interaction. Although many similarities between managers and researchers were evident, other important differences emerged from this analysis. Features of “ideal interactions” included:

- Engagement in mutual problem framing and collaborative research
- Direct communication of information needs from managers to researchers
- Research briefings, presentations, and information sharing sessions

- Field trips and other opportunities for on-the-ground understanding
- Personal ties characterized by long-term dialogue, trust and mutual consultation
- Formal relations between research stations (or labs) and management units.

There was general agreement about the most prominent barriers to achieving these interactions. Analysis points to the need for awareness of differences between research and management, acknowledgement of roles, and creating opportunities for interaction and exchange. The following barriers rose to the surface for research and management:

- Organizational differences between research and management (researchers and managers occupy different worlds)
- Time and workload constraints
- Absence of networking opportunities
- Relevance of recreation research
- Inability to fund recreation research
- Lack of awareness of existing research expertise
- Undeveloped appreciation for science among recreation professionals.

Strategies for Building and Sustaining Capacity for Recreation Research

The exchange of scientific information and the interaction between managers and scientists would both lead to stronger professional networks in recreation, allowing recreation professionals to develop a common language, identity, and sense of purpose about the importance of recreation. Several structures and processes were identified that promote information exchange and create a “community of practice” among recreation scientists and managers. These structures attempt to organize existing research and legitimize the use of professional knowledge and case studies as sources of information.

- Recreation information clearinghouse and research directory
- Recreation extension agents and boundary spanners to translate research findings
- Case studies to demonstrate best recreation practices and strategies
- Recreation synthesis project to summarize existing state of recreation knowledge
- Renewed support for national recreation meetings to enhance networks
- Forest field trips and sabbaticals to bring researchers into the realm of the recreation manager.

Faced with growing responsibilities and diminished human capacity, recreation managers in the Forest Service face constraints in their ability to proactively address recreation challenges using scientific information. The Forest Service may consider evaluating its existing capacity to generate basic knowledge and to conduct recreation research that is timely, relevant, and responsive to manager's needs. Forest Service R&D maintains its multifaceted role as a provider of both fundamental (theory-driven) and applied research, and as a producer of innovative tools, models, and applications for land managers. Yet, facing its own budgetary and personnel constraints, Forest Service R&D may not be equipped to respond to ongoing agency needs for applied science and data in the changing context of planning and decisionmaking.

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Introduction

The U.S. Department of Agriculture, Forest Service (hereafter U.S. Forest Service or Forest Service) has long emphasized the role of scientific knowledge in informing resource management policies and decisions. Since its early roots in Progressive-era conservation, the agency has championed the paradigm of technical rationality and empirical science as a basis for sound forest management practices that benefit all Americans (Kaufman 1960, Wellman 1987). Agency recognition of the role of science was embodied in the creation of the Forest Service Research and Development (R&D) division, one of three separately funded branches that make up the Forest Service. Research stations support basic scientific research and develop tools and applications in forestry sciences, which ultimately feed into management decisions (Duncan 2000). Natural resource managers in the Forest Service consult with researchers in Forest Service R&D as well as other sources to acquire the scientific information they need to make management decisions. The administrative structure that features an autonomous research division within a natural resource institution is rather unique among federal agencies in the United States.

Changes in the external and internal operating environment of the U.S. Forest Service at the end of the 20th century have affected the way scientific information is produced and used. Regulations and public involvement processes stemming from key legislation in the 1960s and 1970s added greater complexity to the agency's ability to make and implement resource management decisions (Mills and Clark 2001). The Forest Service faced legal challenges from advocacy organizations and industry groups seeking to influence management decisions (Andrews and Edwards 2004, Jones and Taylor 1995). Sources of scientific information spread beyond the borders of the agency to include universities, nongovernmental organizations (NGOs), private industry, and "blue ribbon" panels (Lach et al. 2003). Moreover, the agency's emphasis on forest planning and environmental analysis altered the daily practice of resource managers and fundamentally affected the nature, type, and form of scientific information being sought. At the same time, the agency adopted an ecosystem management approach, which encouraged land managers and scientists to conceptualize problems on multiple temporal and spatial scales and across jurisdictional boundaries (Yaffee 1999). Managers were prompted to integrate biophysical and socioeconomic information to address issues. The role of science in natural resource decisionmaking, while becoming more critical, also was becoming more complex (Mills and Clark 2001).

As a result of these changes in the everyday operating environment, and the structure and conduct of scientific research, the question arises as to whether the Forest Service has evolved from an agency of forestry experts to an agency of

Changes in the external and internal operating environment of the U.S. Forest Service at the end of the 20th century have affected the way scientific information is produced and used.

decision-process managers with the capacity to incorporate a much broader array of scientific information into management decisions. How has the interaction between scientists and managers changed in response to changes in the operating environment?

Research Objectives

Given the dramatic changes in administrative and operational context for the Forest Service over the last 30 years, it is likely that the roles and relationships of agency scientists and managers have changed as well. The overarching goal of this study is to understand the capacity of the Forest Service, both research and management branches, to respond to current and future resource management challenges by incorporating scientific information from Forest Service R&D and other sources into its management decision processes. Specifically, the study focused on gaining a better understanding of the agency's capacity to identify, frame, and address resource management issues through the use of scientific information. To narrow our scope, we focused on outdoor recreation.

Recreation is a relatively new emphasis area for the Forest Service, and its development can be traced through oral history accounts. The Forest Service began to build capacity in recreation after passing of the Multiple Use-Sustained Yield Act in 1960. Growing environmental awareness and interest in outdoor activity filled the forests with hikers, anglers, and boaters. In the 1970s, public land managers worked with universities to train a future generation of recreation specialists and scientists. National and regional recreation conferences brought managers and researchers together to find ways science could be used to address management challenges. Close interactions between recreation managers and researchers in the 1970s and 1980s led to the development of science-based applications, such as the Recreation Opportunity Spectrum (ROS), that responded to management needs (Manning 1999). Professional networks of scientists and managers in recreation developed over time as a result of common educational training and shared commitment to effective recreation management.

Since the 1990s, multiple factors have contributed to the erosion of long-enduring recreation networks important for scientific exchange. Agency personnel from both research and management were drawn into comprehensive planning processes and efforts to improve the quality of public involvement. Both National Forest System (NFS) and Forest Service R&D adopted a "human dimensions" approach, which included recreation alongside other public uses and values. As recreation professionals advanced or retired in the organization, recreation positions were left unfilled or were combined with other parallel duties, increasing work-

loads. In many parts of the country, agency personnel working in timber, range, or other programs were reassigned to recreation. Meanwhile, budget constraints limited the frequency of national and regional recreation conferences after the 1990s. These factors, along with natural attrition, resulted in a recreation workforce with weakened professional networks and gaps in formal recreation training.

These observations formed the impetus for this study to understand the ways recreation information is currently produced and used by the agency and the nature of science/management interactions. Our implicit assumption is that reduced opportunities for interaction between managers and researchers after the 1990s led to a decline in collegiality, which has inhibited research collaboration. Specifically, we focused on how managers define recreation issues, determine their needs for scientific information, and communicate information needs to the research community. We explored how managers incorporate scientific knowledge in addressing recreation problems and making decisions. We also sought information about what types of interactions managers and researchers value and what institutional factors promote or inhibit these interactions. The exploratory nature of this study allowed us to delve into many facets of this interface between recreation management and research to understand important connections and influences that shape institutional behavior.

What Is Organizational Capacity?

Organizational capacity is a conceptual framework useful for examining science-management interactions, particularly, how agencies develop structures, processes, and institutions for the creation and distribution of knowledge. Organizational capacity refers to the internal ability of an institution to define and realize goals in an effective and sustainable manner (Horton et al. 2003). An organization's capacity includes resources (human, financial, technological), knowledge, and processes used to achieve its mission. All of these systems are designed and orchestrated to achieve the agency's goals. When an agency embarks upon a new initiative, such as when the U.S. Forest Service embraced recreation as one of its multiple forest uses in the 1960s, the organization's structure, personnel systems, and budgetary processes must be developed to meet this new need.

Organizational capacity is understood as a dynamic process requiring continual adjustment to new conditions. An organization also must be responsive to factors in the external and internal environment that may affect its ability to achieve its goals (Horton et al. 2003). Changes in the external environment, such as political climate, economic stability, technology advances, or shifts in public values, require the agency to adjust its processes and structures. Changes in the organization's internal

Organizational capacity refers to the internal ability of an institution to define and realize goals in an effective and sustainable manner.

An important aspect of the Forest Service mission is to manage public forests and grasslands based on scientific knowledge of natural processes and human interactions.

environment also can affect its ability to achieve its purpose, such as leadership, use of incentives, management style, communication processes, professional networks, work ethic, morale, and embedded organizational values. An organization with adequate organizational structure, human resources, and financial resources may still fail to achieve its goals because of problems with the internal operating environment.

An important aspect of the Forest Service mission is to manage public forests and grasslands based on scientific knowledge of natural processes and human interactions. Structures, processes, and rules designed to promote effective science-management interactions were based on progressive-era philosophies of rational decisionmaking and scientific forestry (Clarke and McCool 1996). In the Forest Service, this reverence for science has been institutionalized in the development of the R&D division. How has the agency adjusted to new conditions by shifting organizational capacity to generate and incorporate scientific information to address everyday problems and decisions?

Communication of Scientific Knowledge and Information

Managers in natural resource agencies are charged with making decisions informed by science. Recent papers have explored the importance of understanding factors that influence effective communication between researchers and land managers and the adoption of scientific knowledge (Wright 2007). In this report, we define the term “scientific information” to mean the gathering, processing, and organizing of scientific data to describe a particular condition, object, or situation. We define “scientific knowledge” as the application and interpretation of scientific information, based on judgments, experience, or experimentation over time. Scientific knowledge may be understood as exposure to innovative tools, concepts, or cases and an understanding of how to apply them to existing management conditions. Our operating assumption was that when making decisions, recreation managers rely on scientific knowledge and information, as well as models and tools that have been developed based on scientific research.

Managers obtain scientific information through communication with researchers, technology transfer specialists, and other resource professionals (Wright 2007). Research may be presented to managers at professional conferences, workshops, training sessions, or through individual consultancies. In addition, managers and researchers may work together collaboratively to identify information needs and establish a research plan. Barriers in communication between researchers and managers can inhibit the application of scientific knowledge and information used to address resource management problems (Wright 2006, 2007). Studies have

identified several barriers in the communication and adoption of scientific research by managers, such as (a) lack of knowledge of information sources, (b) lack of access to information or technology, (c) cultural differences between research and management professionals, and (d) lack of capacity (resources, personnel, time, and funds) to access research (Blahna and Kruger 2007, USDA Forest Service 1995, Warrington 2007, Wright 2007).

Some research has shown that effective communication occurs when individuals share common background, training, institutional setting, and purpose (Rogers 1995). In other words, a longer history of communicating together in the same operating environment contributes to greater understanding, utilization, and implementation of science in decisionmaking (Wright 2007). A cultural barrier between research and management in natural resource agencies has been described previously, that reflects the differences in worldview, language systems, incentives, and responsibilities (USDA Forest Service 1995, Warrington 2007). These barriers may inhibit the development of trust leading to the free-flow of information between scientists and managers. The term “community of practice” is used to describe collegial learning communities devoted to information exchange and learning to achieve a common purpose (Wenger 1999). The development of a professional network or “community of practice” between research and management may lead to the production of scientific information that is relevant, problem-focused, and applicable to managers, while meeting criteria of scientists.

The term “community of practice” is used to describe collegial learning communities devoted to information exchange and learning to achieve a common purpose.

The Structure of Science in the U.S. Forest Service

The U.S. Forest Service was created in 1905 within the U.S. Department of Agriculture as the administrative agency to manage forest reserves for the public good (Steen 2004). In 2007, the Forest Service supported a budget of \$5 billion and employed 33,000 workers (USDA Forest Service 2007b). The U.S. Forest Service consists of three parallel organizations. National Forest Systems oversees 193 million acres of forests and grasslands. The NFS administrative headquarters is located in Washington, DC. Nine regional offices oversee activities in 155 national forests and 20 national grasslands (fig. 1). These units are further divided into more than 600 ranger districts. The NFS develops policy and makes decisions affecting the daily management of forests and grasslands. The Forest Service R&D division consists of five experimental research stations, along with the Forest Products Laboratory and the International Institute for Tropical Forestry. The R&D division is responsible for conducting basic and applied science related to forest resources. The State and Private Forestry division (S&PF) works with nonfederal landowners to provide the transfer of technical knowledge in forest health. Early years of forest

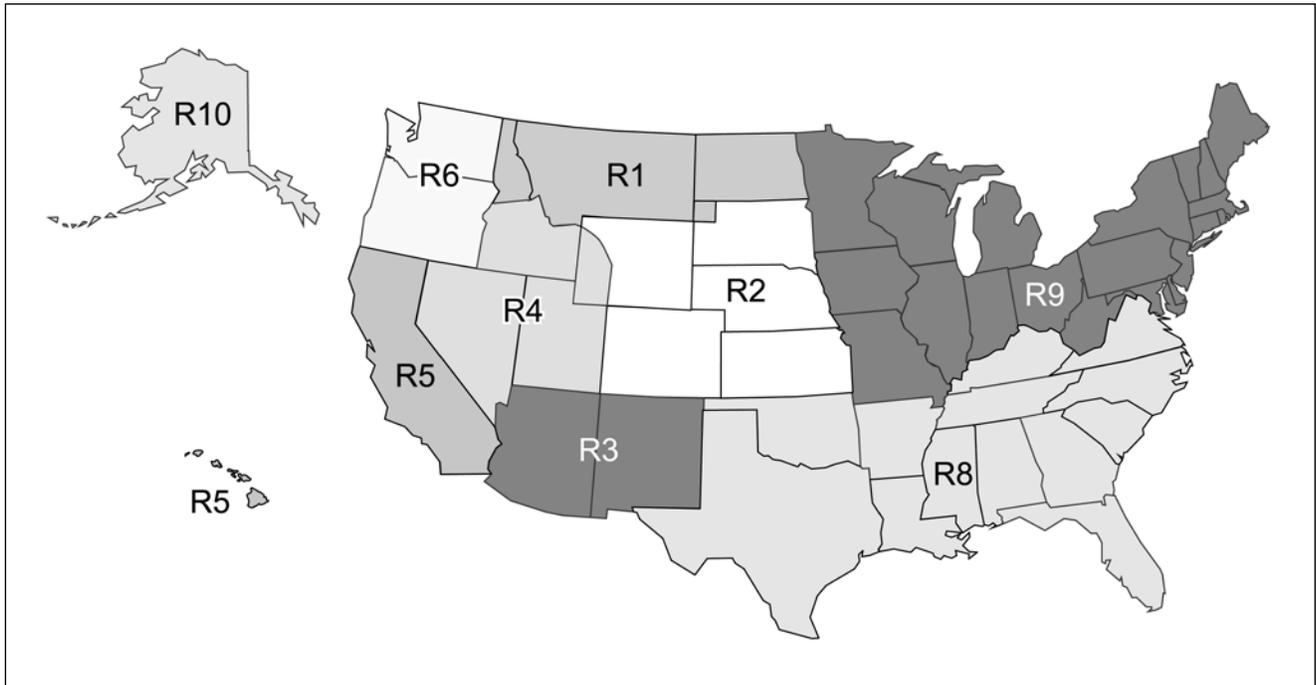


Figure 1—Forest Service regions.

management emphasized consumptive goods, especially timber, minerals, and grazing, as well as fire management. The Multiple Use Act Sustained Yield Act of 1960 expanded the agency's mission to serve diverse public uses of national forest resources, including recreation.

A belief in scientific forestry was an important tenet of forest management that has become embedded in Forest Service culture. Foresters and natural resource managers were expected to incorporate state-of-the-art scientific knowledge and rational decisionmaking to manage public lands (Lachapelle et al. 2003). This emphasis on science-based decisionmaking has remained a salient feature of natural resource management and was institutionalized in the creation of the R&D division. With the adoption of ecosystem management in the 1990s, the need for integrated science at different biophysical scales was great (Grumbine 1994, Kennedy and Quigley 1998). Yet, in recent years, the role of science has been challenged and it has become recognized that science is one of many factors at work in the process of public lands decisionmaking.

Scientific research related to forest resources has long been an important part of the U.S. Forest Service organization. In 1901, the first Bureau of Forestry Chief, Gifford Pinchot, established the office of Special Investigations to conduct forest research. One year later, research was established as a distinct division in the Bureau of Forestry with 55 employees (Steen 1998). The agency developed its first

experimental station in 1908 near Flagstaff, Arizona, and 2 years later established the Forest Products Laboratory in Madison, Wisconsin. By 1921, eight experimental stations were located throughout the country. During the early years, research units were developed under the authority of district offices, with research tied to regional and local needs. In 1915, the research division was established as a distinct branch of the U.S. Forest Service under direct authority of the Washington office (Steen 1998). National leaders embraced the idea of a separate and distinct research entity that would maintain credibility and objectivity through the independence to publish scientific findings. Meanwhile, applied research and site-specific studies would be conducted through “administrative studies” initiated by NFS managers. The relation of the research division to the NFS was not explicitly defined from the beginning, and many foresters urged leaders to tie research more directly to management needs (Mowrer 2005). The role and relation between Forest Service R&D and the NFS would be perpetually negotiated throughout the decades to follow.

Forest Service R&D gained prominence throughout the 20th century. In 1928, the McSweeney-McNary Act allocated an annual budget for R&D and land was withdrawn from the forest reserves to establish experimental forests. The Forest and Rangeland Renewable Resources Research Act (1978) expanded the research division into areas of renewable resource management, environment, protection, utilization, and recreation. Research areas of responsibility are determined with input from a variety of stakeholders, policymakers, and clients including the NFS.

The U.S. Forest Service remains one of the only federal agencies without an explicit division or program for technology transfer to natural resource managers (Mowrer 2005). Technology transfer refers to the process of sharing knowledge and technical tools developed by research units with practitioners and the public. Technology transfer specialists do exist in research stations under a variety of titles and are sometimes housed in explicit research units or programs, but much variability exists among research stations and programs. One program that emphasizes science information transfer is the Focused Science Delivery (FSD) Program in the Pacific Northwest Research Station. The FSD staff work with scientists to synthesize research results and communicate findings to resource professionals. The program’s recreation and tourism initiative sponsored several studies and products in the period from 2004 to 2007. The extent to which individual scientists or research units are responsible for technology transfer remains unclear. At present, scientist commitment to technology transfer is highly variable and depends more on personal commitment than a formal reward system.

Forest Service R&D makes up a small portion of the total budget for the U.S. Forest Service. In 2007, R&D represented 6.5 percent of the total Forest Service

Forest Service R&D is responsible for “carrying out basic and applied research to study biological, physical, and social sciences related to very diverse forests and rangelands.”

budget, compared to 34 percent for NFS and 43 percent for wildland fire management. Funding for Forest Service R&D has increased steadily and modestly since 1985, growing an average of 6 percent annually from \$140 million to \$280 million in 2007. Meanwhile, employment in Forest Service R&D declined from 2,494 full-time equivalent positions in 2002 to an estimated 2,109 positions in 2008 (USDA Forest Service 2007b). Similarly, there has been a sharp decline in the number of permanent scientists from 985 in 1985 to 547 in 2007. An estimated 33 percent of existing scientists will be eligible for retirement by 2010. This shift in overall research capacity has implications for the agency's ability to conduct research internally.

Research scientists have compensated for employment declines by hiring temporary scientists and postdoctoral researchers and by working with university collaborators. Moreover, in response to budget declines, there is greater emphasis on seeking soft money sources from foundations such as the National Science Foundation to augment base level funding. This trend presents a unique challenge for recreation scientists, who may not have as many sources to draw from compared to counterparts in fire or biophysical sciences.

Forest Service managers also seek out scientific information from external sources, including university researchers, private consultants, and nonprofit agencies. Universities across the country, particularly those with schools of forestry or natural resources, provide a supply of scholars and students to conduct research and collect data related to natural resource problems. The McIntire-Stennis Act of 1962 authorized forestry research at the land-grant colleges, which played a role in fostering recreation science. University researchers may work directly for a national forest or in collaboration with a station scientist to engage in studies relevant to land managers. Projects may be short-term data collection efforts or long-term research studies. Managers also may contract with private or nonprofit agencies to collect data or provide information useful in planning and decisionmaking, such as demographic, economic, or market data.

A more recent source of knowledge and information may be found in the enterprise teams, which are autonomous units within the Forest Service with expertise in data collection and analysis. The Enterprise program began in 1997 in response to the National Performance Review. Enterprise teams mirror private business models and draw from a wide range of Forest Service employees who provide expertise in particular fields. Services are marketed both within U.S. Forest Service and other federal agencies as well as state and local governments, nonprofit agencies and the private sector. Enterprise teams compete with the private sector and offer an internal choice for engaging in research and data collection. The program emphasizes

timely deliverables, high-quality products, and competitive pricing. In 2007, there were 16 enterprise teams based in three Forest Service regions. One enterprise team, Recreation Solutions, focuses on helping forest service staff to work with recreation partners to implement recreation programs.

Study Design and Approach

This exploratory study used multiple methods including indepth interviews, analysis of secondary literature, and archival data (Creswell 1998). A grounded theory approach was used, emphasizing a systematic, inductive discovery of concepts that emerged from analysis of the data (Strauss and Corbin 1998). This study leads to the development of propositions and hypotheses that will be tested in future research.

Research phases—

Research was conducted in three successive phases in 2005 and 2006 that built on knowledge gained in the previous phase.

Phase 1—

The initial project phase included a pilot study of nine key informants in the winter of 2005. These respondents were selected because of their long history of working in some aspect of Forest Service recreation. Key informants shared their observations about changes in agency function and structure over time and provided insights about the study context that were helpful in the final design of the interview guide. Key informant interviews were completed by telephone or in person and were 90 minutes to 2 hours in length. Most, but not all, key informant interviews took place in the Pacific Northwest region. These interviews led to the development of an interview guide used in phase 2 of the research. These interviews were combined with subsequent data sets in the analytical phase.

Phase 2—

The primary phase of data collection occurred in spring and summer 2005, when 60 interviews were conducted with recreation managers and researchers in the U.S. Forest Service. Most interviews were conducted by telephone and a few were inperson interviews. Interviews were conducted with 40 managers in the NFS in every region of the country. In addition, 20 researchers in Forest Service R&D representing all five research stations were interviewed.

Phase 3—

The final phase of data collection involved telephone interviews with two additional sample groups in summer 2006. The first group consisted of eight university-based

researchers who had conducted recreation research with the Forest Service throughout the country. The second group was made up of nine social scientists in the NFS, who were involved in linking research and management. Most of the social scientists worked at the regional office level.

Sample features—The sample of managers was designed to maximize regional diversity and ensure that recreation managers at multiple levels in the NFS were included (fig. 2). At the regional office level, 13 managers in each of the nine regions were interviewed. Each recommended one national forest in their region to be studied based on the criteria that the forest had an active recreation program.¹ For each national forest, one forest supervisor and two recreation managers were identified and interviewed (n = 23). Recreation managers at the national forest level then recommended one ranger district with an active recreation program for inclusion in the study and interviews were conducted with recreation staff on the district level (n = 13). In addition, social scientists working for NFS at the regional level were interviewed (n = 9). For the researchers in the sample, scientists in each of the six major research stations in Forest Service R&D were interviewed based on their work on recreation problems² (n = 20). In addition, university researchers with a history of research collaboration with the Forest Service were selected based on manager interviews (n = 8).

Data Collection and Analysis

Semistructured interview guides were used in each phase of data collection. Semistructured interviews are based on an interview guide, which is a predetermined list of questions or topics the researcher wishes to cover (Kvale 1996, Rubin and Rubin 1995). Conventional interview methodology suggests that the researcher should adhere to an interview guide if reliable, comparable qualitative data are desired (Bernard 1995). Managers and researchers responded to different versions of the interview guide that were adapted to meet their role in the agency.

Respondents were asked about their background, expertise, and experience, and to comment on the nature of their current work. The interviewer then prompted

¹ By “active” recreation program we meant a forest or district where recreation activity was significant and there was a sizeable staff of recreation professionals, relative to other forests or districts in the region. Although this stipulation might serve to bias the sample in favor of more healthy recreation programs, the criteria was selected to eliminate problems of nonresponse or irrelevance associated with a random sample approach.

² At the time of data collection, there were six research stations, including Northeast Research Station, North Central Research Station, Rocky Mountain Research Station, Southern Research Station, Pacific Southwest Research Station, and Pacific Northwest Research Station. In 2006, Northeast and North Central Station merged into the Northern Research Station.

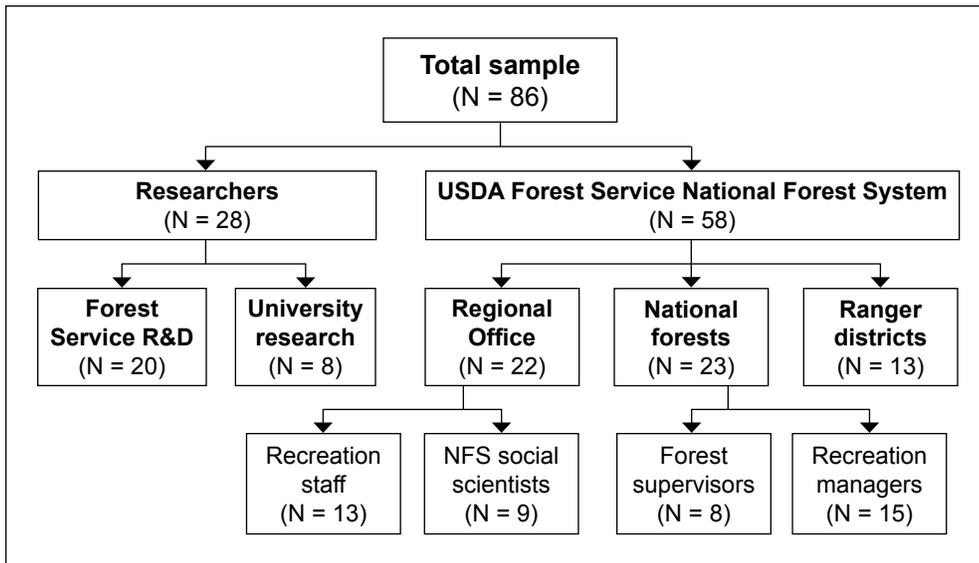


Figure 2—Distribution of interviewees.

respondents to describe prominent issues in recreation that they had addressed through their role as researchers or managers. They were asked specifically about the information or knowledge they sought (or produced) to address these issues and the usefulness of this information; and they reflected on interactions between managers and scientists. Finally, respondents were prompted to comment on broader changes observed in the recreation management and research within the agency as well as the role of Forest Service R&D. Interviews generally took 1 hour to complete (see appendix.)

All interviews were recorded by hand and transcribed by a graduate student. The research team reviewed transcripts and identified key themes and content areas for subsequent analysis. The team mutually developed a coding schema that was used to code the entire data set. Qualitative data analysis software was used to assign codes to the interview data and assisted in the sorting and organizing of codes into thematic areas (Rubin and Rubin 1995). Using the software’s sorting functions we discerned similarities and differences among managers and researchers in the sample.

The research team relied on several types of quantitative data to explore indicators of organizational capacity, including Forest Service budgetary data for recreation, Forest Service budgetary data for research, personnel data for Forest Service recreation and research, data related to academic and training programs in recreation, and institutional data, such as organizational charts, memoranda, and internal documents.

Forest Service Capacity for Recreation Management

In this section, we look at how recreation has been approached and implemented by the U.S. Forest Service both in the management and research branches. Using historical and oral history data, we trace Forest Service treatment of recreation as a core function. Qualitative data from interviews with recreation researchers and managers help to illuminate current perceptions of recreation within the agency. Agency commitment to recreation appears to have peaked in the 1980s. Through most of the 1990s, recreation became subsumed under the broader framework of human dimensions, which was concurrent with relative declines in funding and personnel. Currently, agency commitment to recreation appears to be gaining momentum, yet existing recreation professionals find themselves pulled in multiple directions.

Recreation as a Core Program Area

Recreation has been an important aspect of forest management since the early part of the century. The proliferation of the automobile allowed people to visit national forests for leisure and outdoor adventure, resulting in the appearance of forest resorts, lodges, and facilities on public lands. Although the Forest Service was oriented to the consumptive use of forest lands for timber, grazing, and mining, a few visionary foresters, including Arthur Carhart, recognized the potential role of recreation (Forest History Society 2007). In the 1930s, the Civilian Conservation Corp. built much of the initial recreation infrastructure, including cabins, shelters, trails, docks, and lodges. These facilities catered to the proliferation in outdoor recreation activity in the post-war years, when Americans began spending leisure time in national forests and parks (Tweed 1978). Forest Service brochures distributed during this era touted the allure of “National Forest Vacations” to draw visitors onto public lands.

Institutional support for recreation management began to take shape in 1957, when the Forest Service introduced the program, Operation Outdoors, which gave recreation its own line item in the budget and allowed the agency to establish a political justification for recreation in Congress (Clarke and McCool 1996, Douglass 1999). The Outdoor Recreation Resources Review Commission (ORRRC) was formed in 1958 to inventory recreation facilities and to assess infrastructure needs (Steen 2004). In 1962, the ORRRC released the report *Outdoor Recreation for America*, which led to a federal commitment to increase recreation opportunities on public lands. This came shortly after the passage of the Multiple Use Sustained Yield Act of 1960, which recognized recreation as one of the many forest uses. The Outdoor Recreation Act of 1963 defined outdoor recreation as a public good and

called for the provision of adequate recreation resources. The act also provided the authorization to create the Bureau of Outdoor Recreation, an interagency organization that coordinated federal recreation programs and embarked on the creation of a national outdoor recreation plan (Douglass 1999).

A series of legislative acts in the 1960s bolstered recreation participation, including the Land and Water Conservation Fund (1965), which funded the acquisition of public lands for recreation purposes, the Wilderness Act (1964), the National Trails System Act (1968), and the Wild and Scenic Rivers Act (1968). The 1970s also saw the development of national outdoor recreation plans by the Bureau of Outdoor Recreation. Recreation facilities were improved and developed by a cadre of workers in the Youth Conservation Corps and Youth-Adult Conservation Corps, which were formed in the mid-1970s. The Bureau of Outdoor Recreation was renamed the Heritage Conservation and Recreation Service in 1978 and shortly thereafter was dissolved, yet support for recreation resumed in the Reagan administration with the President's Commission on American Outdoors (Douglass 1999). This commission produced the report *Americans Outdoors* (1987) that urged citizens to act to protect greenways and work with volunteer organizations (President's Commission 1987). The National Recreation Strategy (1988) advocated a customer service focus and use of marketing strategies for recreation facilities (USDA 1992). In 1996, recreation funding received a boost with the Recreation Fee Demonstration Program, a revenue leveraging action, which allowed user fees to be charged at high-use sites to support facilities maintenance (Moore and Driver 2005).

The buildup in capacity for recreation research was concurrent with the expanded focus on recreation in the NFS. Recreation research units were established throughout the country to address 14 priority problem areas (Cordell 2003). Recreation scientists were hired to explore aspects of recreation demand and site characteristics (Manning 1999). The publication of *Outdoor Recreation for America* prompted the development of degree programs in recreation at universities and the building of recreation research capacity (Camp 1983). These programs, many housed in colleges of forestry and natural resources, trained a generation of recreation professionals. Several universities, including Clemson and Utah State, began offering "short courses" to train agency professionals in recreation. These courses were staffed by Forest Service researchers and managers as well as university professors and promoted direct contact between managers and researchers. Throughout the 1970s and 1980s, recreation scientists in Forest Service R&D were widely recognized as national leaders in the generation of scientific knowledge and recreation scholarship (Burdge et al. 1981).

To promote exchange in recreation knowledge, the agency initiated and sponsored regional and national conferences and workshops with university partners and recreation professionals. In 1963, the first national recreation research conference was held at the University of Michigan. In 1971, the Northeast Forest Experiment Station sponsored a recreation research conference in Syracuse, New York. In 1973, a recreation applications workshop involving 80 scientists and managers was held in Marquette, Michigan, co-sponsored by the Northcentral Experiment Station and the University of Minnesota. In 1978, the Southeastern Forest Experiment Station sponsored a similar gathering of researchers and managers in Asheville, North Carolina. In 1989, Forest Service researchers began the Northwest Recreation Research Symposium. The Pacific Southwest Research Station began sponsoring the Symposium on Social Aspects and Recreation Research in the 1990s.³ These organizations continue to provide a venue for managers and researchers to convene to discuss recreation topics.

In the 1990s, the operating environment of the Forest Service underwent changes that affected the agency's pursuit of recreation research. Many national forests began investing in forest planning and ecosystem planning processes, which required employees to synthesize and integrate biophysical and social science information. These planning processes drew in many recreation professionals and researchers who were trained to consider human dimensions and social science applications more broadly. Existing research capacity in recreation shifted to broader social science topics. Recreation researchers in the R&D division also began to pursue other topics such as fire, community studies, public involvement, and science-policy interactions in response to funding incentives and research gaps. Many recreation researchers in R&D began to redefine themselves as social scientists and consider issues across broader spatial and temporal scales. Accordingly, the frequency of national-level recreation meetings dwindled during the 1990s and 2000s and recreation researchers began attending more general social science conferences. In 2005, a national workshop on recreation research and management was held in Portland, Oregon, sponsored by the Pacific Northwest Research Station (Kruger et al. 2007). This represented the most recent effort to gather recreation professionals and scholars.

³The northeast recreation research symposium (NERR) began in 1989 and meets annually in upstate New York. The meeting is supported by the Northern Research Station and several regional universities. The southeastern recreation research conference (SERR) has met annually since 1978. The 30th SERR meeting was held in Savannah in 2008. In 1992, the first symposium on social aspects and recreation research was held in Ontario, California sponsored by the Pacific Southwest Research Station. Three additional symposia have been held since then, the most recent in 2004.

Meanwhile, recreation visits to national forests were increasing steadily and recreation use was changing rapidly, driven in part by improvements in technology and shifting consumer preferences for outdoor leisure (Moore and Driver 2005). Recreation visits to national forests increased from 560 million in 1980 to 860 million in 1996 (USDA Forest Service 1998). Although traditional forest activities such as hiking, skiing, fishing, and camping remained popular, the marketing of off-road vehicles and improvements in recreation gear, such as mountain bikes and global positioning systems, have led to rapid diversification of recreation activity. Changing population dynamics in the United States also meant that forest visitors were ethnically diverse and increasingly urban, suggesting new patterns of recreation use preferences (Manning 1999). Recreation managers found themselves dealing with management challenges among visitors whose activities or values were in conflict. Social science needs for understanding forest values among various recreation segments were significant. New recreational uses also result in biophysical effects that require analysis. Although these emerging recreation problems suggest the need for recreation-focused research, many recreation scientists in R&D had already moved on to broader human dimensions questions.

As the Forest Service has shifted away from an emphasis on commodities production and toward ecosystem management and provision of environmental services, recreation remains an important agency function. In 2001, Forest Service Chief Dale Bosworth outlined four major threats that faced the national forest lands. One of these threats dealt with “unmanaged recreation” and the growing concerns about the biophysical and social implications of off-highway vehicles (OHV) and other dispersed recreation activity. In 2007, Chief Gail Kimbell also announced an agency commitment to fostering connections between people and forests, with particular emphasis on youth. These policy statements suggest that recreation remains important to agency leadership in the 21st century.

The Forest Service increasingly relies on industry groups, such as the American Recreation Coalition, a group of recreation industry providers, to gain insights about recreation services. Moreover, the agency depends on partners from the private and nonprofit sectors to manage recreation services. As public use grows and existing recreation capacity is constrained, private sector partners, such as campground concessionaires, and volunteer organizations, such as local trail maintenance groups and hiking clubs, have taken on much of the responsibility for recreation services in many regions (Moore and Driver 2005).

Capacity Trends in Forest Service Recreation

The agency’s historical approach to recreation management can also be understood when examining traditional capacity measures such as funding and personnel.

Budgetary capacity—

Funding for the USDA Forest has been in gradual decline since 2005. Throughout most of the 1980s, the budget for the Forest Service hovered around \$3 billion, with half (\$1.5 billion) going to the NFS (Farnham 1995). By 2007, the total budget for the USDA Forest Service had increased to \$4.8 billion, with \$1.4 billion (28 percent) allocated to NFS. The increased emphasis on fire management has been the most significant change in the Forest Service budget. In 1991, the wildland fire program composed 13 percent of the total Forest Service budget; this proportion had increased to 45 percent by 2008 (USDA Forest Service 2007b). Thus, while the overall budget for the agency has increased steadily, the portion awarded to NFS land managers has declined, with immediate implications for recreation programs.

Funding for Recreation, Wilderness and Heritage has fluctuated between \$225 million and \$310 million since the 1980s, peaking in 1993 (fig. 3). In 2007, the Recreation, Wilderness and Heritage program received \$260 million, which comprised 18 percent of the budget for NFS and 5 percent of the total U.S. Forest Service budget. Since 1993, the recreation budget in constant dollars has declined

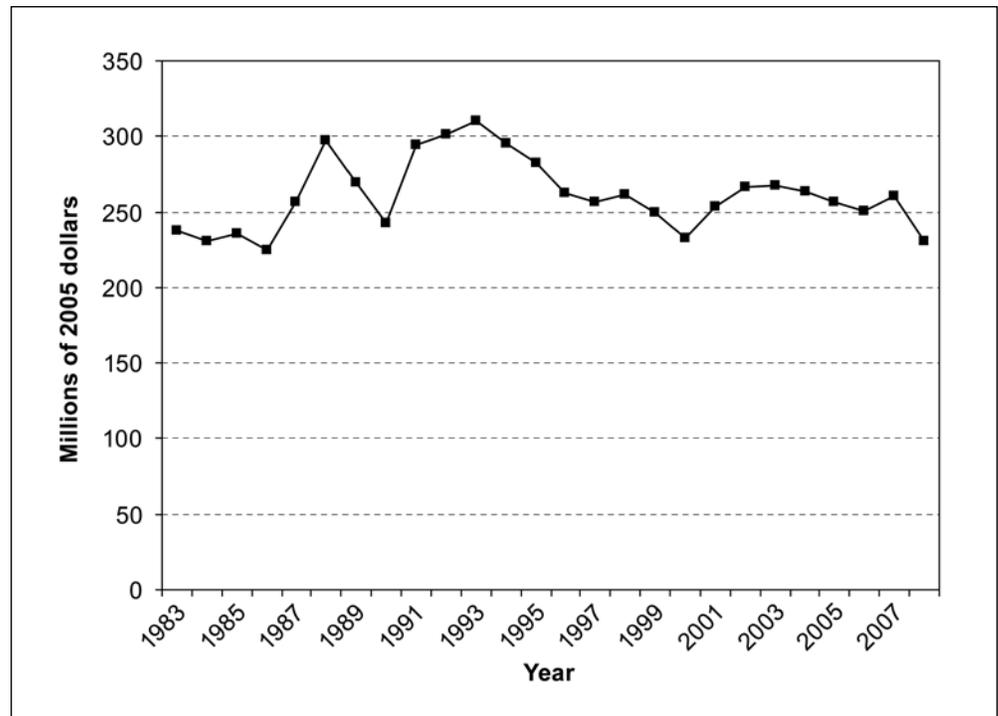


Figure 3—Recreation budget for the National Forest System, 1983–2008.

an average of 2 percent annually. Actual spending on recreation programs is difficult to assess accurately, as timber revenues subsidized recreation programs in many parts of the country. In addition, roads and facilities maintained by timber programs also are used by recreation visitors. With the decline in funding of timber management programs, a greater burden was placed on the agency to fund recreation projects and programs. The agency has responded by reaching out to partners and concessionaires to assume control of high-use sites. Reliance on the Recreation Fee Demonstration Program has provided \$30 million in annual revenues for high-use sites and addressed maintenance backlogs.

Human capacity—

The number of personnel in the Forest Service has declined fairly steadily since the 1990s. In 1992, the agency employed 43,427 full-time equivalent employees (FTEs), which fell to 36,000 FTEs by the late 1990s. By 2008, the total workforce was expected to be closer to 31,000—representing a loss of about 12,000 jobs in 16 years (USDA Forest Service 2007b). In contrast, fire management gained a net of more than 3,000 jobs between 2002 and 2007. The number of recreation personnel in NFS increased from 2,400 in 1981 to a peak of 3,153 in 2002 before dropping back to 2,498 in 2007 (20 percent of NFS employees) (fig. 4). By 2008, another 300 additional jobs in recreation were expected to disappear, reflecting the loss of 955 jobs since 2002 (USDA Forest Service 2007b).

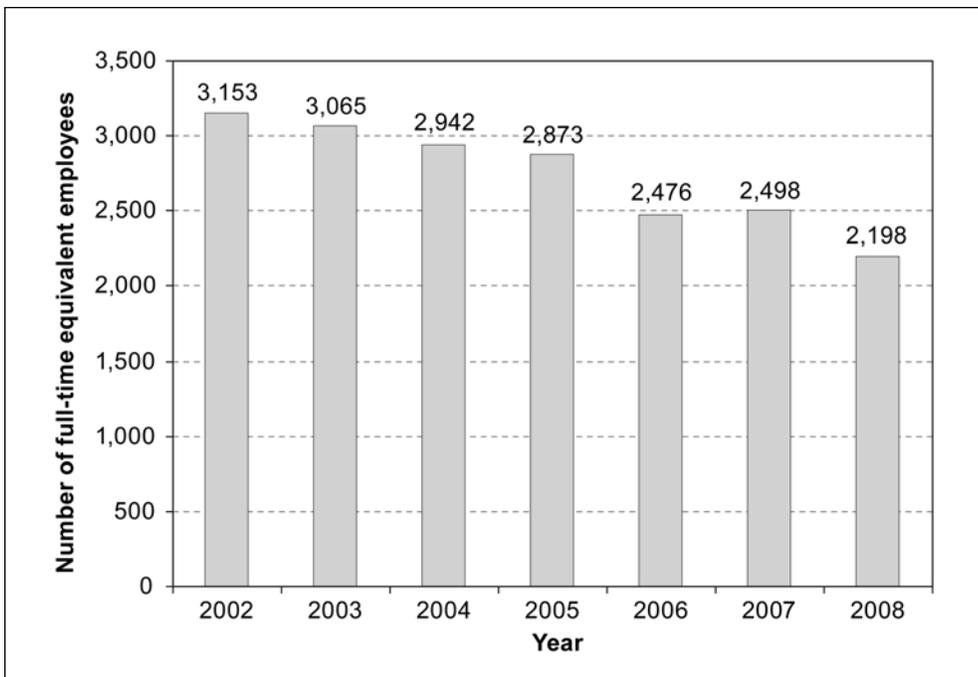


Figure 4—Recreation employment in the Forest Service.

Human capacity for recreation science is more difficult to assess on a national scale, because employment classifications for scientists differ. Some recreation researchers are identified as social scientists, whereas others, particularly in the earlier generation, are classified as foresters. Although the number of research social scientists, economists, and geographers employed in Forest Service R&D has been fairly steady since 1985, averaging about 28, the number of scientists classified as research foresters declined from 350 to 150 over the 27-year period.

Manager Perceptions of Forest Service Recreation

Recreation managers and researchers interviewed for this study described the everyday reality of working in an agency facing budget constraints and a maturing workforce. Several trends were noted: Recreation managers perceived an increase in responsibilities over time as a result of downsizing and the resulting reconfiguration of positions. Managers and station researchers described a lack of institutional support for the recreation profession and for recreation science. Recreation managers were hopeful that support for recreation would increase in future years.

Common background, common language—

A look at the educational background and training of recreation professionals revealed several important trends among recreation managers and between scientists and managers (table 1). The majority of recreation managers in the sample possessed formal education in general forestry or natural resource management (68 percent), with over half of those holding formal degrees in recreation. In contrast, Forest Service researchers most commonly held advanced degrees in social sciences (68 percent), with a minority majoring in resource management (27 percent). Just 11 percent of scientists in Forest Service R&D interviewed had achieved degrees in recreation. In contrast, all university researchers in the sample had formal background in natural resources management, including recreation.

Table 1—Educational background of study respondents

Academic discipline or degree	Forest Service managers (n = 58)	Station researchers (n = 20)	University researchers (n = 8)
	----- Percent -----		
Forestry or natural resources (no recreation)	30	16	43
Forestry or natural resources (with recreation)	38	11	57
Social sciences/economics	2	68	0
Biophysical sciences	14	0	0
Public administration, planning	12	5	0
Other	4	0	0

Review of disciplinary background suggests that recreation managers have much in common with university researchers in terms of education, exposure to concepts and models, and a broad natural resource focus. Shared academic roots suggest an ability to communicate information and a sense of familiarity, collegiality, or comfort among these groups. Station scientists in the sample were trained in a variety of social science disciplines, (e.g., geography, social psychology), and many obtained degrees outside natural resource colleges. The different educational trajectories could suggest barriers in the communication of knowledge related to recreation management.

Changing workforce dynamics—

Many respondents in the study were approaching eligibility for retirement, suggesting a significant turnover in workforce in the near future and a potential loss of institutional knowledge and professional networks. The NFS employees in the study sample had worked for nearly 24 years in the agency, whereas researchers had worked an average of 20 years. Assuming that an employee is eligible for retirement after 30 years of service, 64 percent of recreation managers and 36 percent of station researchers in the study could retire by 2010. Recreation specialists trained in the 1970s and 1980s were retiring by 2005, and some positions were not being replaced. As one manager stressed, “Now the difficulty is a recreation employee drain. Expertise will be leaving in large numbers and the agency doesn’t have a strategy to replace those experts.”

The declining workforce has meant added responsibility for the workers who remain. In some cases, this has affected employee morale. As one manager explained,

There is no new blood in the personnel. Attrition is how we are dealing with the budget crisis. We may lay off people next. We have 13 recreation positions that are not filled. Our ability to retain is bad, morale is low, and people go to the private sector.

The loss of recreation specialists with years of agency experience and formal recreation training represents a loss in institutional capacity. The question remains about how the agency will seek to build recreation capacity amidst these transitions. Short courses have been useful in retraining agency personnel, and the Forest Service is exploring new training models to upgrade skills in the recreation workforce.

Recreation managers also reported that their responsibilities had expanded laterally. With downsizing and retirement of staff in core functions, remaining staff took on additional responsibilities and job titles. One researcher called these “comma jobs,” referring to the list of functions attached to one’s official title or job description. Put simply, “People are wearing more hats.” Another manager explained,

The loss of recreation specialists with years of agency experience and formal recreation training represents a loss in institutional capacity. The question remains about how the agency will seek to build recreation capacity amidst these transitions.

In the 1980s, the person in [my] position would have focused almost exclusively on recreation. In the 1990s, downsizing combined positions of engineering, lands, and recreation in 14 forests in Region [X]. Five out of six forests have the same arrangement.

At the ranger district level, recreation specialists typically had responsibility for an array of functions, including dispersed recreation, developed recreation, wilderness, trails, special use permits, and interpretation. They supervised temporary maintenance staff and trail crews and managed concessionaires and partnership contracts. Recreation staff at the district level also might serve as a community liaison and were periodically asked to lead Interdisciplinary (ID) teams as part of National Environmental Protection Act (NEPA) or forest planning processes. One subject described herself as the “ORA,” or the “Other Resource Assistant” who handled “resources that nobody else wanted.” Meanwhile, at the forest supervisor’s office, recreation staff had responsibility for many disparate areas, including public services, wilderness, heritage, lands, minerals, engineering, tribal relations, and interpretation. A recreation manager at the forest level explained,

I came here to this office in an air quality specialist position, but it was immediately downsized and I moved here to this [recreation] position. This position has gotten broader and broader as other people leave and downsizing occurs. When I first started here, we had two people just doing wilderness. This reduction has occurred across the forests. We’re just in custodial/janitorial modes right now, because we don’t have active programs on the ground.

As job descriptions expanded to encompass more functional areas, many managers felt they were losing touch with “on the ground” issues. One manager at the supervisor’s office explained that as budgets declined, they sought to preserve staff at the district level to encourage public contact; the staff at the supervisor’s office was “bare bones.” As one manager explained, “Budget and personnel are on the decrease relative to the workload. We rely on volunteers and collaborators.” Recreation partners have become an essential way of doing business for many Forest Service programs.

Perceptions of recreation as the “second fiddle”—

Recreation managers frequently indicated their belief that recreation had never been a high priority for the Forest Service. Managers often used words like “second fiddle,” “ugly stepchild,” and “side program” when describing the viewpoints of

agency administrators toward recreation. As one respondent explained, “Recreation has always been the same. I’ve been optimistic that it would be the number one white hat. We have come close a few times. We get no respect.” The notion that recreation was something that agency leadership tolerated, but did not encourage was echoed throughout the study. “Recreation is viewed as a necessary evil. We recognize it and say it is important, but there is not funding. It does not rise to a high level of priority.” Another manager reiterated,

I hate to say this, but [recreation] has not changed at all. When I first came to the Forest Service, my supervisor said when I was hired that “we’re getting serious about recreation.” Here I am at the end of my career and we’re wrestling with the same issues. We’ve never been serious about it.... Recreation has been accepted, tolerated, but not aggressively or proactively managed.

Accordingly, there was a shared perception that recreation personnel were not highly valued. In the words of one manager, “Internally, [recreation] is not thought of highly; people think “all the duds are in recreation.” Managers who had studied recreation in college often had been told by professors to combine recreation with forestry or other disciplines if they wanted to get a job, “you couldn’t get anywhere unless you were a forester or an engineer.” The lack of a professional series in recreation until 2006 limited the career paths for recreation staff. Many recreation professionals moved into other functional areas as a means to advance.

Reasons offered to explain agency attitudes toward recreation were numerous and varied. Some detected a natural resource bias in the agency, causing land managers to disregard recreation. As one manager explained, “Recreation is viewed as a problem. [People say] ‘If it wasn’t for those recreationists, we would be able to cut trees and not worry about wilderness.’” Some referred to the inherent philosophy of the Forest Service. “The Forest Service institutionally is utilitarian. Recreation is hard for foresters, given the traditional mindset of the Forest Service of using wood, water, and fiber. Resource extraction is the mindset.” Others suggested that the lack of support was linked to the absence of lobbyists and big business advocates for recreation. The notion that recreation is a low priority for the Forest Service has implications for the agency’s commitment to building recreation expertise and knowledge. The widespread perception of institutional ambivalence toward recreation may reflect a broader confusion about the agency’s core mission.

Four threats boost the status of recreation—

Meanwhile another group of respondents contested this perception that recreation suffers from declining support, by pointing to the agency's "Four Threats" and the accompanying attention to OHV use on public lands. Moreover, media focus on issues and challenges resulting from growing recreation use on public lands and the eruption of resource conflicts have kept recreation on the radar screen. Recreation remains salient for the general public, and the agency is being forced to deal with challenges they can no longer ignore.

The administration's focus on unmanaged recreation as one of the "Four Threats" facing national forest lands has encouraged a current focus on travel management planning. As one manager exclaimed, "Funding is up and recreation has stature. ... We are at the table now." Another stated, "It has changed. [Recreation has gone] from a second child to one of the leading emphasis programs." Another manager noted an increase in leadership focused on recreation,

Fairly recently, recreation is getting more attention in the region. They recognized the demand potential from the standpoint of healthy recreation and tourism industry. But we have not been able to put resources and funding organizationally to bear on moving programs.

Although managers were encouraged by the emphasis in recreation, they were still hoping for an increase in funding to match the focus of Forest Service leadership. As a manager explained, "There is increasing rhetoric about the importance of recreation for the focus of the Forest Service, but this is not backed up by the budget." Another stated, "We are not walking the talk. The Four Threats are not reflected in the budget." Finally, in reference to promises of support for recreation at his region, one recreation manager said simply, "Words come cheap. The funding and the words don't match."

Despite mixed responses about the overall perception of support for recreation in the agency, respondents widely agreed about the growing significance of recreation and its role in making a connection with the American public. As one manager explained, "Recreation is our major connection with the public. Recreation is the portal that they view the agency from. If the Forest Service wants advocates [in the public] they will come through recreation." The agency's support of programs to improve human connections with the natural world, such as Chief Gail Kimbell's "Kids in the Woods" program, will likely be approached to some extent through recreation programs.

Recreation Issues and Challenges

Types of recreation issues—

Recreation managers in the Forest Service and other public agencies face a wide variety of issues and problems that they must address (Nelson 2006). Managers were asked, “What have emerged as the most significant recreation management issues that you have faced over the course of your career?” (fig. 5). Some issues raised in the interviews reflect concerns identified by recreation visitors and stakeholders. Others, such as motorized vehicle use and recreation realignment, reflect national agency priorities. Results show that recreation managers face greater pressure to understand trends among recreation visitors to improve planning processes. The top seven most common themes are discussed below. Many of these issues overlap.

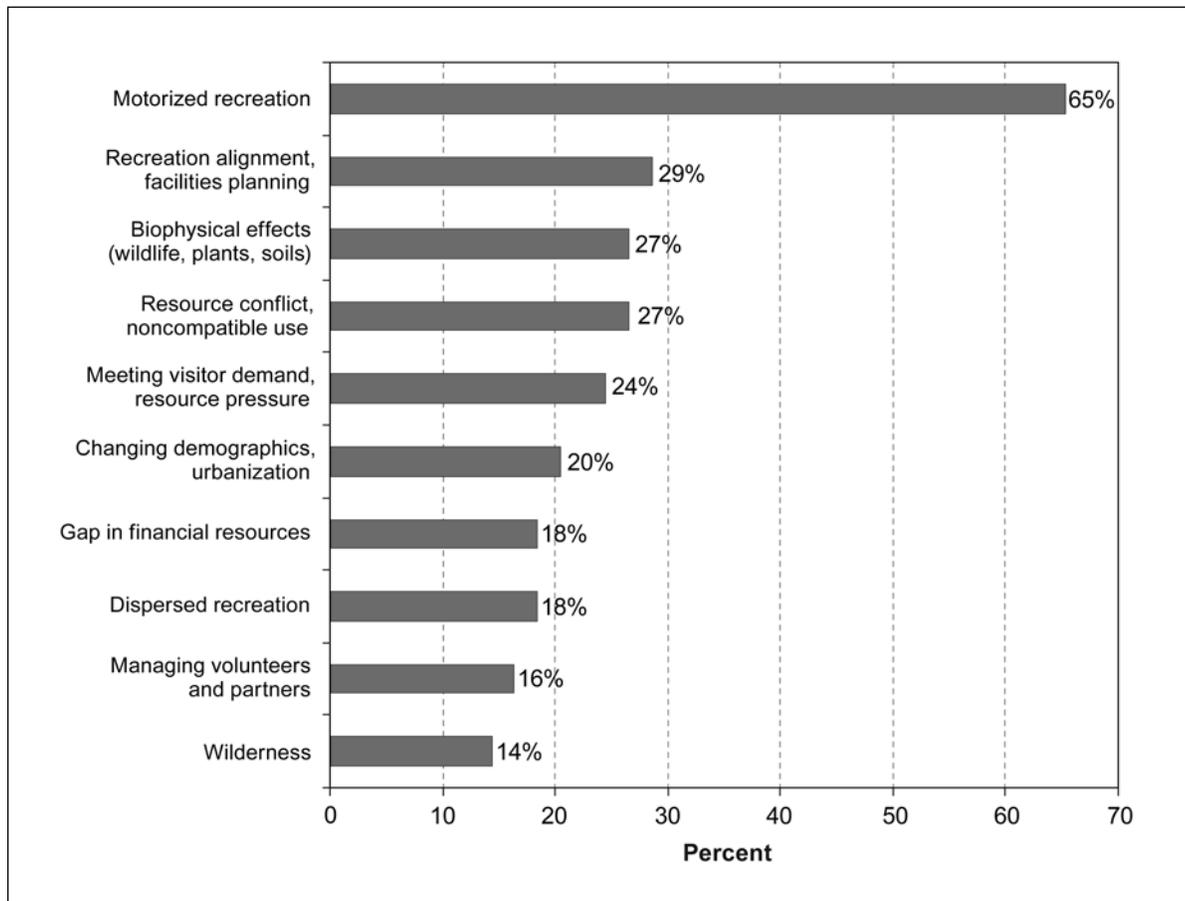


Figure 5—Recreation management issue types—percentage of total responses (n = 49).

Motorized recreation—The issue on the surface of nearly two-thirds of recreation managers in the sample dealt with the need to manage motorized recreation and OHV use. As one manager explained, “The off-highway vehicle issue is emerging. In the past 5 to 7 years, it has exploded.” Expansion of motorized vehicle use on public lands as well as the associated planning efforts to regulate that use has created challenges for recreation managers. Off-highway vehicles and other forms of motorized recreation were identified as a primary threat to the national forests by former Forest Service Chief Bosworth. The 2005 Travel Management Rule requested that all management units engage in travel and access management planning, including comprehensive environmental analysis. Many managers were in the process of drafting motorized vehicle plans, which require significant information needs related to recreation use.

Aligning recreation services with demand—The Forest Service is urging forest units to review recreation assets to prioritize and determine services to offer their publics, in an effort called the Recreation Facilities Review.⁴ This task requires understanding the changes in use dynamics among stakeholders and users and identifying primary uses that match with existing settings. Managers are assessing supply of existing facilities and services and matching with changing client needs.

(We are) currently practicing this idea of niche management. It’s a new philosophy, where each forest tries to identify its niche. The idea is that not every forest can be everything to everybody. (This forest) is being noted for its [geologic features], rivers, waterfalls, lakes, and horse riding. We are trying to develop facilities to accommodate that. The idea is that you focus on a niche and don’t target others.

Biophysical effects of outdoor recreation—Managers expressed rising concern about the effects of various forms of recreation, particularly motorized use, on native habitat, forest ecosystems, and endangered species. As one manager asked, “How many people can we provide quality recreation experiences without degrading the resource in a variety of settings?” A special concern was raised related to wildlife effects of recreation use and effects on rare plants and alpine ecosystems.

Resource conflicts and noncompatible use—The diversity of recreation uses and changes in recreation technology have led to an increasing frequency and intensity of conflicts between various types of visitors, such as various types of motorized

⁴ This process was previously named the Recreation Site Facility Master Planning process. The name was changed in 2007.

users (e.g., motorcycles, four-wheel drive vehicles), equestrian groups, nonmotorized forms of use, mountain bike groups, climbers, and others. Managers seek ways of managing use conflicts at various scales of analysis.

Meeting visitor demand—In some forests, particularly those adjacent to urban metropolitan areas, recreation use has increased, putting pressure on existing facilities and resources. Changing patterns of recreation use reflect shifts in values, consumer trends, and patterns of work and leisure. Changing recreation technologies and marketing from the outdoor recreation industry have helped to fuel increased visitor demand for public lands. Managers must respond quickly to these changing patterns to mitigate potential conflicts.

Changing demographics and urbanization—Managers often talked about the growing diversity of recreation visitors and the resulting shift in predominant uses, particularly in forests close to urban areas. As demographics change, new visitors are appearing in national forests seeking different experiences and desiring new types of services and settings.

Funding for recreation programs—Recreation managers frequently mentioned that their greatest challenge was the lack of available funds to maintain existing facilities and programs. Budget cuts had diminished capacity to plan and manage recreation. Many core functions, such as campground management, were outsourced to the private sector. Recreation managers increasingly were responsible for managing contracts, developing partnerships with volunteer organizations, and managing special use (outfitter-guide) permits as part of their duties. Recreation Fee Demonstration Programs were helping to offset management costs in high-use sites, which had helped to alleviate backlog in maintenance. Little funding was available for recreation management in dispersed sites, which is where much off-road use takes place.

Agency capacity to identify recreation issues—

Nearly one-fourth of managers in the study indicated that they had adequate capacity to identify issues. Managers and researchers pointed to several factors affecting managers' ability to identify recreation issues.

Time and budget constraints—Recreation managers faced challenges in their ability to define issues, owing to time constraints. One scientist noted that in years past, managers would contact researchers to discuss problems and get to the heart of a particular issue. "Now, they don't have time to pick up the phone." Several managers commented issues came to their attention based on input

from stakeholders, user groups, permit holders, and volunteers, because current recreation staff was not able to visit the forest themselves. As one researcher commented,

Scientists agree that the barrier is the crunch that managers face. They don't have time to fully look into and define an issue or ask the right questions. We don't have time to properly do research to answer the question.

Reduction in formally-trained personnel—Both managers and researchers noted that downsizing and reassignment had reduced the skill base of remaining recreation staff. Recreation professionals with formal training had retired or moved into other positions. With so many forest service personnel being retrained from other areas, today's recreation manager may be less prepared for intensive community interactions that are required during the process of issue identification.

Skill bases are so low that even if you throw money (at a problem) for a short time, there are no people to do the work. We have reached 'below critical mass.' We are almost at critical mass of even having the infrastructure to work with volunteers.

In addition, staff members recently reassigned to recreation may hold different expectations related to the role of science in decisionmaking.

It's not just money; there's no staff with the right skills. They do not have people with social science backgrounds and they don't have a culture that really turns to data and research as the first tool of choice to make decisions. Culturally, they just made decisions through anecdotal experience....

Reduced opportunities for planning—Recreation planning helps to allocate resources among various types of recreation use and encourages managers to think proactively about a particular landscape or site. The decline in funds allocated toward recreation planning and the dearth of formally trained recreation personnel has encouraged more reactive decisionmaking.

Decline in collaboration—Researchers perceived that opportunities for interaction with managers in issue identification and problem framing have declined in recent years. Many suggested that these declines reflected administrative pressures and budget constraints. Yet, with the decline in opportunity to mutually define issues, the gap between researchers and managers has widened.

Future Questions

1. Recreation managers at all levels of the agency appear to be assuming many responsibilities in addition to recreation planning and management. Consequently, more recreation functions are being handled by volunteers, paid concessionaires, and contracting partners. What are the implications of sharing the workload with external organizations?
2. Do perceptions of recreation as a lower priority function of the agency persist in the workforce? What is needed to improve the perceived status of recreation among all employees and external partners?
3. Many employees have been assigned to recreation positions without extensive formal training in recreation. University short courses have provided the workforce with skills and tools in recreation management. What ongoing training needs do these recreation managers have? Is the agency prepared to provide continuing education to develop the skill set needed to address contentious recreation issues?
4. Changing recreation trends have altered patterns of use and resulted in user conflicts among diverse groups. Capacity constraints have impacted the ability of some recreation managers to identify and frame recreation issues. How might the agency tap into existing capacity, such as recreation partners and researchers, in the process of issue identification?

Agency Capacity for Science Exchange and Interaction

Natural resource managers in the Forest Service often seek scientific information to aid them in planning and decisionmaking. The agency has both internal sources for science production in the R&D division as well as external professional networks in the research community. In this section, we explore the process of identifying and communicating information needs as well as the application of information to management decisions. We also describe expectations, opportunities, and barriers for interactions between managers and researchers, and how these have been affected by overall changes in organizational capacity.

Exchanging Science Information for Recreation Management

The objectives of federal research programs can only be truly achieved if scientific knowledge and applications are transferred to managers (Wright 2007). Knowledge, information, and tools are developed by scientists to address resource management

problems. Managers require access to sources of knowledge and the capability to interpret and apply relevant findings to their situation. Several barriers to information have been identified in previous studies, including lack of awareness of available information, lack of access to knowledge sources, cultural differences between research and management, limited incentives to incorporate science and technology, and lack of time or resources to engage in information exchange (Hollstedt and Swift 2000, Wright 2007). This section explores how managers identify information needs and sources and their ability to access and apply scientific information to address everyday recreation problems.

Information needs of recreation managers—

Managers mentioned several areas where access to information or research was desired to address a particular set of recreation management challenges or issues. Specific needs for scientific information are noted (fig. 6). Not surprisingly, information needs correlated with recreation issues. Four information needs were especially germane to managers in the study.

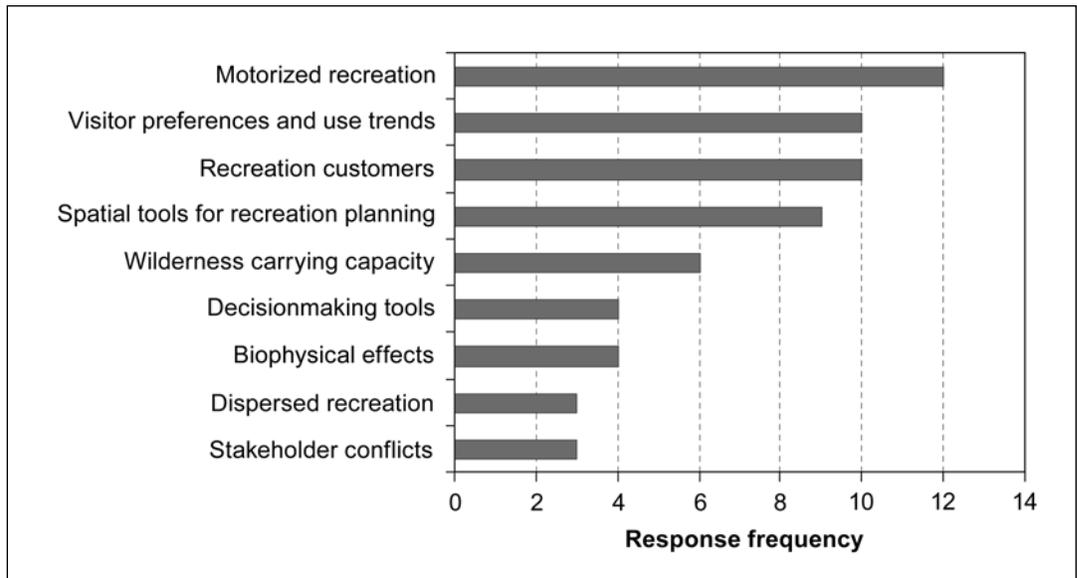


Figure 6—Information needs of recreation managers (n = 36). Note: There were 49 recreation managers in the sample.

Motorized recreation—Managers desired more specific information about dispersed recreation, including OHV use, including characteristics, behaviors, numbers, and site preferences among dispersed recreation visitors. Recreation managers sought information on the biophysical, social, and economic effects of OHV use and other forms of dispersed recreation. Specifically, they requested tools to help manage OHV use in concert with other forest activities.

Visitor preferences and use trends—Recreation managers desired tools that would help them understand values, preferences, and behaviors of user groups visiting public lands. Managers wanted to understand what settings certain user groups prefer, what they seek to do when they arrive in national forests, and what shapes their actions and decisions once they come. They also sought strategies and tools to assist in modifying or altering visitor behavior to mitigate biophysical impacts, improve visitor flow, or ease tension from conflicting visitor uses.

Recreation customers—Managers expressed an immediate need for information related to demographics and visitor use trends so that they could better understand who the forest visitors are and what they are doing when they visit national forests. Managers especially sought information that was specific to their national forest or region. Several mentioned using data from the National Visitor Use Monitoring (NVUM) program to understand visitor demographics.

Spatial tools for recreation planning—Managers required information about how visitors interact with particular sites. Previous tools developed by Forest Service scientists to plan recreation opportunities across a planning area need to be modified and updated to address changing conditions. By understanding recreation values and activities among user groups, managers hoped to predict social impacts of forest management policies and decisions.

Other information needs mentioned include tools for establishing wilderness carrying capacity, a greater understanding of the interaction between recreation and the biophysical environment, tools and models for decisionmaking and managing stakeholder conflict, and research related to managing dispersed recreation use. There was widespread consensus about the need for site-specific data and analytical tools that would help recreation managers make on-the-ground decisions. Several mentioned the need for data that would assist in forest planning, as well as more targeted recreation planning efforts.

Managers identified three specific barriers related to identifying information needs.

- **Lack of time to define information needs.** Recreation managers perceived a shortage of time and resources to adequately identify and convey their information needs or to learn about potential information sources. They indicated that they often were too busy or overwhelmed to contact scientists.

- **Process for conveying information needs.** Managers often were unaware of how to convey information needs within NFS or to Forest Service R&D. As one manager explained, “Occasionally information needs come up. We don’t necessarily know what level decisions are made on information. We are not asked what our information gaps are. [We] can forward things up, but where does that go?” Managers also commented on the need for a direct channel between NFS and Forest Service R&D; many were unaware of formal channels that linked their management unit to a research station.
- **Conveying information needs in a scientific framework.** Managers and researchers both noted that recreation managers without formal recreation training face difficulties articulating needs in a scientific framework. Researchers note that issues identified by managers often do not translate into research problems. As one researcher explained, “Managers frame questions in ways that are generally not researchable . . . Too often managers are confronted by controversy and are seeking the silver bullet.”

Information sources—

Managers were asked where they sought out information or what agency/individual they consulted when in search of information useful for resolving recreation problems. Most managers who responded sought information from a variety of sources at different phases of a given project (fig. 7). They also indicated a preference for information sources that could provide data that were iterative and responsive to particular questions important for planning and NEPA analysis. In some cases, empirical research was not needed, but rather synthesized information, databases, and cases were most useful in actual management settings. Depending on the nature of the problem being addressed, managers may seek either applied or basic science resources in search of scientific information.

Managers seek information from multiple sources and for different reasons—

Managers in the sample generally appeared resourceful, relying on a variety of information sources to address aspects of recreation problems: One manager explained his/her approach.

[We’II] look into a number of places. Internally, [we’II] look for stuff that is specific to an area or a specific district or forest. A problem one place may be similar to one in another area. [We] look for local examples, history, and patterns. [We] also ask other folks around the forest . . . documented historical records; oral history is a big piece. Retired [Forest Service] folks can help; we call them to get history. Outside the Forest Service, we talk to conservation organizations, other landowners, state parks, people that work

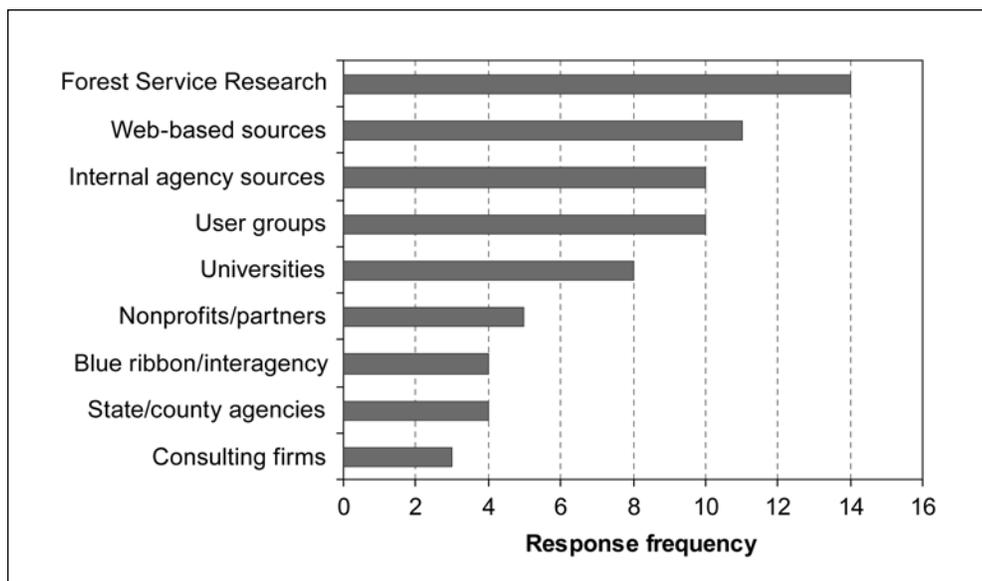


Figure 7—Information sources consulted (n = 36). Note: There were 49 recreation managers in the sample.

for cooperators. [We'll ask them,] 'Have you seen similar things? What works and what doesn't.' Local (information) is the first choice. From there, we can go to the Internet and search wilderness.net ... or leavenotrace.org. We'll see what kind of research has been done and what things people are employing in similar or dissimilar environments. The other thing, is publications from the agency or independent sources.

Forest Service R&D was mentioned as a common source of knowledge and information related to long-term studies or decisionmaking tools and applications, such as the ROS or place-based planning. Others mentioned research stations as a source of information about biophysical effects of recreation use. Station scientists were mentioned as a source for empirical research, long-term studies, and conceptual frameworks.

Universities also were mentioned as a source of empirical research, including both basic and applied studies. Managers often commented that university researchers offered professional objectivity and expertise that lends credibility to study results. Many also noted that university researchers were flexible and responsive to manager needs and time constraints.

Stakeholders and user groups were sought as sources of local knowledge, particularly when addressing issues in a nearby forest or district. Managers appeared to rely heavily on input from local groups with extensive knowledge about a particular issue or a particular place. This local knowledge was incorporated both in the problem identification phase and in the process of weighing alternatives.

Managers turned to nongovernmental organizations and task forces, such as blue ribbon panels (panels of experts appointed by government officials), and inter-agency working groups, particularly when they needed information about a new issue which had not been deeply studied by researchers. Several managers mentioned needing information about OHV management as part of travel management planning. Rather than fund empirical studies on OHV use, they were more likely to rely on information supplied by panels of experts to respond to immediate needs.

Internal sources in the NFS often were consulted as a source of experiential knowledge or “anecdotal” information. As one manager explained, “You call individuals and say: ‘Have you dealt with this one?’ Colleagues have seen it and done it; (solutions) are tried and tested.” Other types of information and sources are shown below:

Type of information	Sources
Decisionmaking models, recreation planning tools, applications	Forest Service Research and Development (R&D) and universities
Basic science, literature, conceptual frameworks	Forest Service R&D and universities
Applied research (issue or site-specific)	Universities, consultants, private firms, nongovernmental organizations (NGOs), and enterprise teams,
Information about emerging issues	Blue-ribbon panels, tasks forces, and NGOs
Site-specific information, maps, use patterns, local knowledge	Stakeholder and user groups, NGOs, universities, and internal National Forest System (NFS) sources
Experiential cases	NFS (internal) sources, blue ribbon panels, and Internet sources
Demographic, socioeconomic data	Forest Service databases, states, counties, and private consulting firms

Several managers mentioned the need for site-specific demographic, socioeconomic information for planning processes, such as “recreation niche” planning. They typically sought demographic and socioeconomic information from state and county sources or private consulting firms, such as market researchers, consumer research firms, real estate research entities, and others engaged in collection or management of socioeconomic databases.

Managers also required information about visitor backgrounds, values, and preferences to assess their recreation niche and for other planning purposes. They most often hired private consulting firms, university researchers, or enterprise

teams to assess local patterns of visitor motivations, expectations, and activities at specific sites and regions. The NVUM program (Washington office) and the National Survey on Recreation and the Environment (NSRE) surveys (Southern Research Station) were mentioned by many managers as sources of visitor information; however, several commented that these data were not helpful in addressing problems at finer scales.

Managers need information in an iterative fashion—Several managers explained that they required different types of information at different stages of the project. The standard process of problem identification, environmental analysis, and decisionmaking appeared to be compatible with iterative search for information. Empirical research, which often requires greater lead time, may not easily fit into the decisionmaking cycle.

I'm not necessarily seeking research information, not statistically valid research. Sometimes we do, but (that is) not our first source. If you take the Recreation Fee issue, I was in the Northwest at the time. It was a matter of learning the legislation ... a new concept. There was internal discussion and brainstorming. We talked with interest groups and constituents and launched into an experimental program. We got anecdotal public reaction.... After a year or two, we revamped the program and made some tweaks. We did telephone survey research of the general population.... We met with focus groups and did on-site interviews. The first attempt had the ... research station involved. Then we went on to do more research.

Managers also indicated a need for information that was timely and relevant. As one manager explained, "That's why we went to universities, we wanted applied research that met our needs. One of the problems with internal Station folks; they could not produce in a timely fashion. [Once, I] waited five or six years and never got a report."

Capacity constraints shape decisions about information sources—Choices about where to go for information also were influenced by funding and time constraints. Several managers mentioned that they did not have time to work with the research station scientists, nor did they have time to wait for results. As one manager explained, "We do have a need for information, but we don't have time to research the problem. We don't have time to read stuff." A few mentioned that they had no resources to employ station scientists or university researchers to conduct a study. The availability and responsiveness of information sources also affected

decisions about where to seek information. As these managers explained, the lack of awareness of formal links between their management unit and the research station shaped their decisions.

Generally, we do not go to the [named] station. We go to the academy before we would go to a research station. Usually there is some interest or not in the research station, but I have not had success in getting them to respond to a request, even for basic information like what studies have been done in an area. There is simply no relationship between the [named] station and the regional office.

[I] get information from user communities, from science, and from internal land managers that may have experience on similar issues... [I] began sending out emails and making phone calls, trying to pick up information through [discussions with others on] monitoring and comments. We don't have clear channels to research.

For some managers, research did not come into the equation at all when addressing recreation issues or problems. Instead, they used information at hand, consulted internal sources and local groups, and made professional judgments based on collective wisdom or agency precedents in similar cases. As one manager explained, "In the end, decisions are made on perceptions rather than fact. Our limitations to making good decisions are not due to a lack of good scientific data."

Communicating Scientific Knowledge and Information

Recreation managers and researchers were asked to discuss effective ways of communicating recreation knowledge and information that would be most helpful to them. Two interview questions attempted to address this question about the mechanisms used to convey scientific information: What is the best way for you to access information? What is the best way to communicate findings to managers? A total of 26 managers and 18 researchers responded, and they identified a variety of mechanisms for information conveyance (fig. 8). Most respondents noted more than one strategy for sharing information often was necessary.

Web or Internet sources—

Nearly every respondent mentioned the use of the Web as an effective way to convey information. Many mentioned the use of search engines, issue-specific information sources, databases, and online indexes. Researchers interviewed also felt that managers appreciated information that was accessible online, including data summary tables, statistical tables, and presentations. Recreation managers often

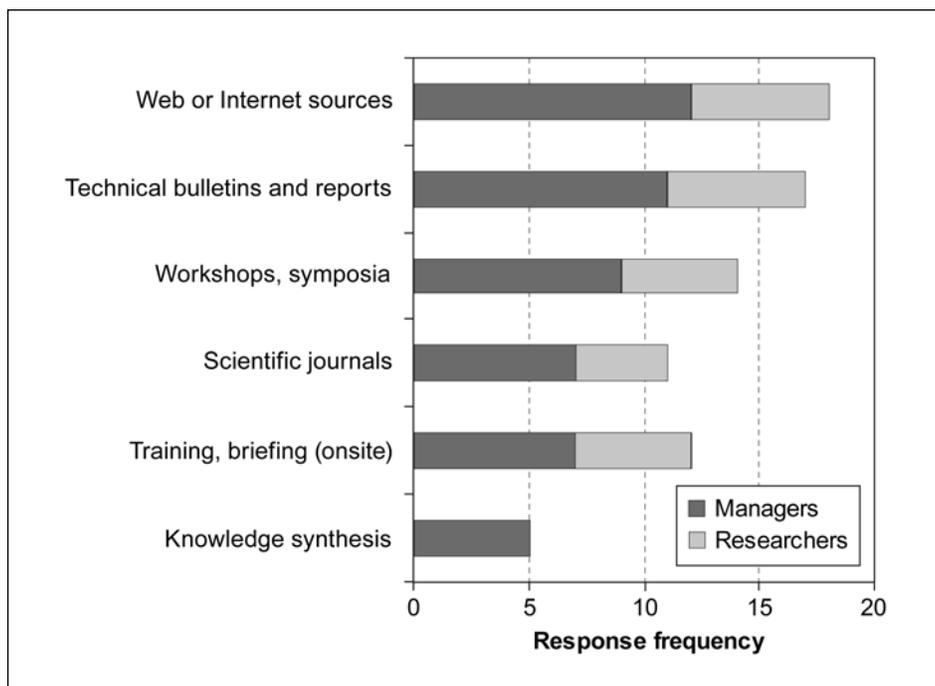


Figure 8— Preferred means of information conveyance (n = 26 managers, 18 researchers).
 Note: There were 49 recreation managers in the sample.

felt frustrated about not knowing what scientists were working on or how to find them. Several suggested developing a Web-link to existing research where topics are organized and synthesized, with links to individual scientists. They sought a central clearinghouse of recreation information indexed by subject and scientist. This type of system would ease the burden of information-seeking considerably for managers. “You need a simple, easy-to-navigate place that has a nice index of stuff. Why not a permanent link to research? One-stop shop. Researchers need to do a stronger marketing of what is available.”

Some web-based resources have been recently developed, such as the Human Dimensions Web site (<http://www.hd.gov>), which is a clearinghouse for natural resource managers to access information relevant to human dimensions. Launched in 2007, this site provides access to issues, tools, cases, publications and policies relevant to a variety of topics dealing with human/natural resource interactions. Recreation researchers may need to find ways to better link their work through this site.

Technical bulletins and reports—Managers enjoyed reading newsletters and brief summaries with links to more detailed reports or studies. One manager commented, “Anything quick and easy is good.” Researchers shared the perception that managers prefer short technical reports with research highlights. Although

these formats are widely recognized as being useful, several station scientists noted that administrative pressures, publishing expectations, and the Office of Management and Budget survey requirements made it difficult to find the time to engage in technology transfer. They do not receive credit in their promotions for producing short research summaries that communicate with lay audiences.

Workshops and symposia—Managers enjoyed the opportunity to interact personally with researchers and learn about new approaches in context of workshops, conferences, and issue-specific symposia. Several noted that capacity constraints (e.g., budgets) had inhibited these interactions.

Training, briefing (onsite)—Managers also appreciated direct information transfer opportunities, such as trainings, short courses, and brown-bag presentations that occur onsite. Researchers also agreed that one-on-one interaction was an effective means of information exchange.

Scientific journals—Managers felt that scientific journals represented an important means of communicating scientific information, but many mentioned their lack of time to read journal articles. Refereed journals and general technical reports remained the primary means researchers used to communicate scientific findings. Researchers also acknowledged that few managers had time to read the articles they published.

Knowledge synthesis—Several managers indicated their preference for products that synthesize information from a variety of sources related to a particular topic or issue. Some mentioned previous research units that provided library searches, conducted literature reviews, or assembled reading lists. Capacity constraints had reduced the agency's ability to provide these services through the research stations, although they were appreciated by managers.

The lack of time and capacity to access research and scientific information was noted by many managers. Several urged researchers to reconsider the best ways to share relevant findings, urging use of a variety of strategies.

We should encourage innovative ways [for Research] to disseminate information to on-the-ground managers in timely and constructive ways. A lot of information is not getting used. There should be some vehicle that would put findings in the right hands, so it gets used. People lack the time and ability to put their hands on information.

Integrating science in resource management—

Managers were asked whether they could identify any specific recreation studies, tools, or models they found particularly useful in planning and decisionmaking. Although the question was open-ended, respondents tended to focus on products associated with Forest Service R&D, possibly because other questions specifically probed about interactions with the research stations. These findings should be considered tentative and exploratory owing to the low response rate (fig. 9).

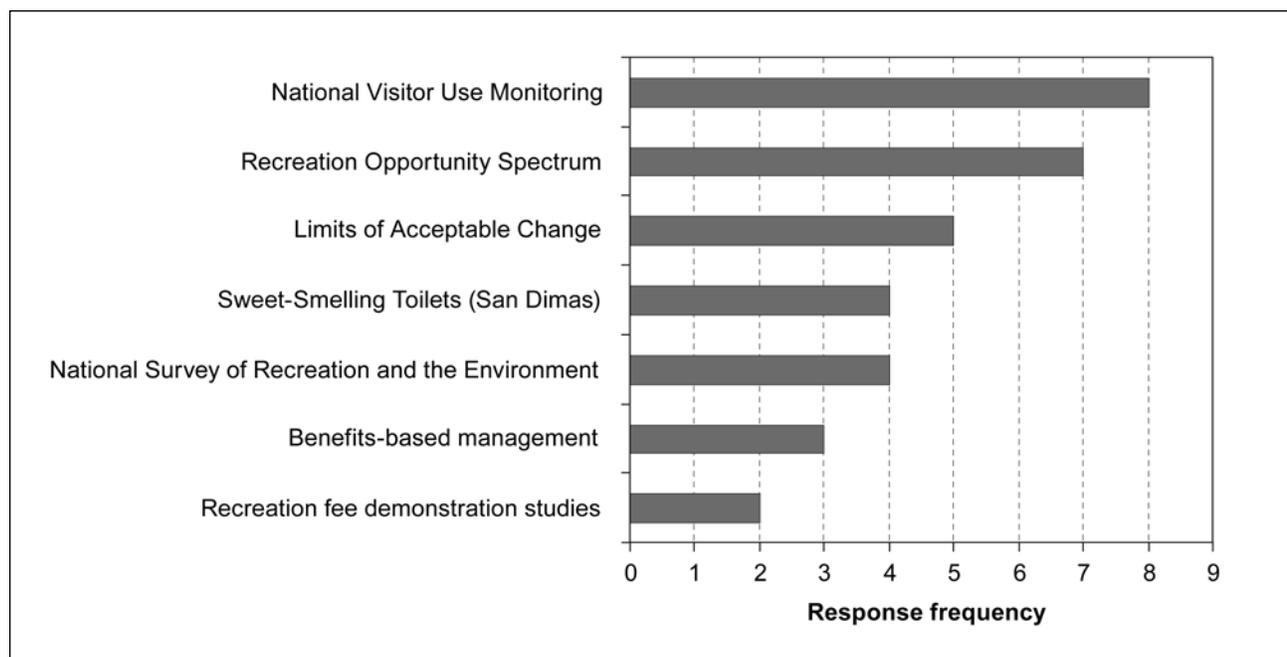


Figure 9— Research products used by managers (n = 20). Note: There were 49 recreation managers and 20 researchers in the sample.

Interestingly, very few specific studies or reports were identified in response to this query, although several were mentioned as being noteworthy or useful in other segments of the interview. In addition to survey data sources, such as NVUM and NSRE, managers gravitated to management tools, planning models, and other applications produced by researchers when noting what had been most useful. In addition, many of the tools mentioned were developed in the 1970s and 1980s, including ROS and Limits of Acceptable Change (LAC). Several managers suggested that these applications were still relevant, but required updating to match current conditions. Although some of these tools, such as LAC, have been updated, managers may not be aware of efforts among researchers to make them relevant for current recreation problems (see McCool and Cole 1997, McCool et al. 2007). One manager’s response echoed the sentiments of others.

We need something that says, “do this first, and then do that.” [Forest Service] research is not developed enough at the field level to give us that tool that we need. We have what was developed in the 1980s and that’s it. The stuff in the 1960s and 1970s was impressive, but recreation management has stalled out. The skills to do an area wide analysis and implement a plan have deteriorated. The money is gone. There was a push in the early 1990s, but we are still implementing plans from 1991, we are just getting the money to do those. Recreation doesn’t have good analytical processes for managing the resource.

These exploratory findings suggest that managers perceive the need for new applications to manage complex recreation challenges. Existing applications have proven useful but may require updating to adapt to changes in the operating environment. Although research studies may inform managers, research applications, technologies, and models for planning and decisionmaking are most desired. Additional research is needed to further substantiate these findings.

We also were interested in understanding the role of recreation research in everyday management situations. Specifically, they were asked, “How important or relevant is research information to recreation management decisions?” The 35 managers who responded to this query described a variety of ways in which research and scientific information may be used in everyday management situations. These include:

- The incorporation of quantitative data into planning models.
- The creation of tools for recreation planning and inventory.
- Synthesis of related studies to address a management problem.
- Empirical research within a particular management unit.

Scientific information also was viewed as important for defending against public challenges, such as lawsuits or appeals.

Although 74 percent of managers interviewed indicated that scientific research held some value for managers, 40 percent suggested that research and scientific information played a role in management decisions on a daily basis. Managers believed that decisions based in science were preferred, but, as one manager explained, “Research is one of many things that go into decisionmaking.” Other factors include professional judgments, hunches or “gut” reactions, political factors, stakeholder or citizen values, input from partners and Forest Service colleagues, and budgetary considerations.

Research as a foundation for understanding—Rather than being something directly incorporated into recreation planning and decisionmaking, research is viewed by many managers as a foundation for knowledge and understanding. As one manager explained, “On a day-to-day basis, when we are working on immediate issues, we don’t have research. In the longer term it becomes important. Research provides a basis of knowledge to work with. It helps you learn as a manager and make better decisions.”

Although some managers felt that all decisions should have a basis in scientific knowledge, others indicated that scientific information was most relevant as background—helping managers to understand or appreciate a facet of the recreation experience. For example, one manager indicated that research related to user preferences of OHV riders helped him to understand the context for developing a travel management plan.

Validity and availability of social science data—Managers explained that they thought scientific information should be relied on more strongly as the basis for decisions, but in the case of recreation, this simply was not commonplace. There were several reasons for this. Some managers said that social science findings were difficult to quantify and defend. One manager explained that scientific information plays a far greater role in biological and physical sciences.

Our specialists are using research to address resource issues, like fish and wildlife issues. We have to use the best science. Detractors try to dig up other science. But, this is not occurring in the social sciences. Recreation managers struggle to find the same quality of science to help them.

Others said that lack of research in a particular area hampered their decision-making. Another barrier mentioned was that recreation researchers were unwilling to publish studies based on data that were not statistically sound or was otherwise unreliable. Yet, managers argued that having some data, however flawed, was better than no data at all. As one manager stated, “Numbers that are statistically valid on the Forest level may not be statistically valid at the watershed level. It’s not good enough for researchers.” Still, these data were the only ones available for this particular manager, so they were incorporated.

Substantiating professional judgments—Research was also valued for its ability to lend support to the gut feelings of managers who most often relied on professional judgment to make everyday decisions. As one manager explained,

On the social end, decisions are not made based on research. [We are dealing with] conflicts and users and people's perceptions of how we manage the system. We go mostly by anecdotal [information] and personal experience or one-on-one contact. When making social choices, [you rely on] intuitive balancing, not on research.

Capacity constraints—Several managers explained that they simply lacked the time and the financial resources to adequately incorporate existing scientific information into the decisionmaking process. They knew the research was out there, but had no time to integrate it to the decisionmaking process. As a result, managers relied more on judgments, experiential knowledge, and professional anecdotes shared by agency colleagues rather than the synthesis or integration of existing research. As one manager explained,

Managers use professional judgment to make decisions about the data they are looking at. It's harder for researchers to build a model based on professional judgment. Managers make assumptions; they think about rough proportions of use and they make some judgment calls.

These exploratory findings suggest the need for additional empirical research using quantitative methods to explore the various factors that managers weigh in decisionmaking, and how scientific research relates to these other factors.

Capacity constraints in science integration—

Once they have obtained information relevant to their recreation problem or issue, managers must figure out how to interpret and apply that information to their decisionmaking process. Recreation managers in the study talked about several challenges or constraints that made the application of scientific findings difficult.

Lack of formal training in recreation—Managers and researchers observed that some recreation specialists lacked indepth knowledge of the recreation field. Some have been retrained from other functional areas, such as timber or engineering. Although they may have basic knowledge of recreation principles, they have spent less time exposed to recreation theories, tools, methodologies, concepts, and frameworks. Because of this gap, it is difficult for managers to know how to make sense of research findings, particularly when study findings conflict or when studies were conducted in settings with different physical or social conditions.

Information overload—The abundance of information from multiple sources available on the Internet and other avenues is resulting in information overload. It appears to be difficult for recreation managers to determine the credibility of

various studies, particularly if they lack formal training in recreation disciplines. Recreation managers also stated that they have difficulty keeping up with the latest journals. As one researcher pointed out, “There is so much out there that it becomes a question of how to provide information in a way so that it doesn’t become noise.”

Relevance of information—Many recreation managers commented that they preferred applied research that addressed on-the-ground issues and offered solutions, rather than theoretical information. As one manager explained, “I need answers to the problems that are on my desk.” Another researcher pointed out that managers need data and information to apply to models or plans. Meanwhile, researchers produce findings and implications that require interpretation. In his words, “Managers need information . . . data. Researchers publish findings.”

Specificity of information—Managers and researchers recognized the problem of data specificity. Managers typically seek site-specific information that is collected at the same time and spatial scale as their geographic unit. They found it more difficult to find information or apply research findings conducted on a larger scale. For example, data from the NVUM was considered valuable; however, it often was not collected on the scale most needed by managers (site, watershed).

Generalizing from cases—Managers expressed difficulty applying findings from existing studies to suit their particular situation. They need researchers to translate, interpret, or synthesize findings so that it is immediately applicable to them. One researcher explained, “What do managers like? . . . Managers have a harder time consuming general research. [A paradox] is that the ideal in research is to generalize, but managers want [research] to particularize.”

Shelf-life of recreation research—Recreation issues evolve rapidly as values, demographics, and technology shifts. Information needs of managers are immediate. Yet, research studies often have a longer time horizon. By the time the study is published, new problems have emerged. As one manager noted, “Recreation research is like a dairy product, it has a short shelf life.”

Resources to utilize information—The recreation manager may have found a solution or idea that stemmed from a scientific finding, but owing to budgetary constraints, they may not have the funds to actually implement the idea. “People [in management] don’t have the ability, time, interest, or support [to apply information.]” Several managers indicated that they simply did not have enough resources to do anything with the knowledge they had. Instead, projects were shelved awaiting funding or a shift in priorities that would allow the project to be implemented.

Downsizing, budget cuts, and combining of jobs in the Forest Service have challenged the abilities of recreation managers to identify, communicate, interpret, and use scientific information to address issues. Some recreation specialists may need additional training to fill gaps in knowledge of recreation concepts and principals. Study results also suggest that researchers may consider new ways to communicate scientific findings to maximize managers' ability to access, integrate, and implement findings in their daily decisionmaking and planning.

Future Questions

1. Managers report difficulty understanding how to communicate information needs to the research community. What processes and structures are already in place for communicating information needs? How might these structures be clarified or streamlined to assist managers at various levels of the agency?
2. Managers rely on a variety of sources for scientific information. How might systems be developed to help managers navigate various sources of scientific information and their possible applications? What kind of clearinghouse or database would help managers to understand where to go for their recreation information needs?
3. Managers appear to value tools and applications to help with everyday recreation decisionmaking. What processes are in place to update these management tools to suit changing conditions? They also rely on the stories and experiences of professional colleagues and retirees to evaluate what solutions were successful under specific conditions. How might these experiential cases be systematized and packaged as a viable source of professional knowledge?
4. Involvement in large-scale planning processes and environmental analyses creates the needs for certain types of social science and recreation data. Often information needs are iterative and adaptive. Data are needed at different spatial and longitudinal scales. How are these data needs being met and by whom? What is the role of Forest Service R&D in producing fine-scale data?

Research-Management Interactions

Scientific exchange can be effective when it involves direct interaction between managers and researchers. Frequent interaction between managers and researchers can result in enduring relations that build trust, which some science transfer specialists deem is the most important factor in affecting whether scientific knowledge actually gets used or applied (Alderman et al. 2007, Wright 2007). There are a variety of ways researchers and managers work together that result in relevant science, including issue identification, problem-framing, collaborative studies, planning and prioritization, monitoring, and evaluation. This section explores the types of interactions currently taking place between managers and researchers, the ideal types of interactions envisioned, and barriers to achieving these ideals. Institutional structures and processes that facilitate and inhibit interactions are noted.

Types of interaction—

Forest Service managers and researchers were asked to characterize their current interactions and to discuss institutional processes in place that promote interaction. Based on responses of 34 managers and 20 researchers, the most common forms of interaction are listed in figure 10. Managers and researchers in the Forest Service both recognized the broad array of opportunities for working together; however, many differences were observed in the frequency of responses in various categories.

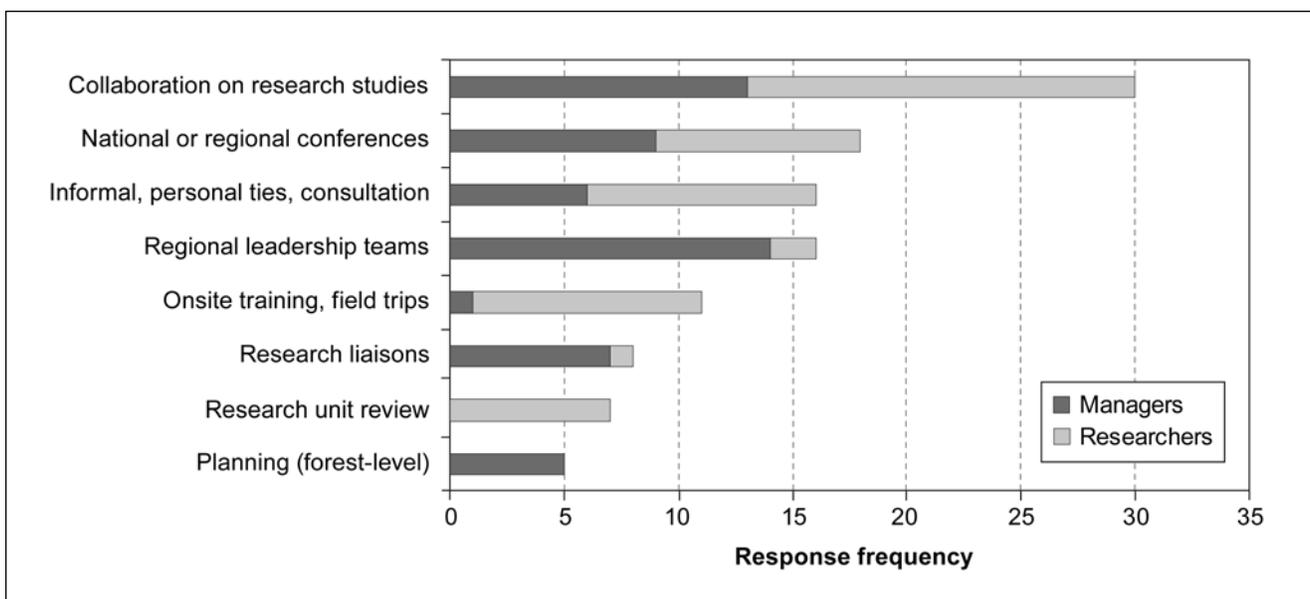


Figure 10—Existing types of interaction between managers and researchers. Note: There were 49 recreation managers and 20 researchers in the sample.

Collaboration on research studies—Overall, the most common form of interaction noted was the engagement of researchers on studies related to forest management. Often these studies were collaborative in nature, although in some cases a standard “contract model” was employed, where a researcher was hired to produce a specific product, with little involvement from managers. Both managers and researchers extolled the value of collaborative research, which was linked to the development of applications and tools managers used. However, according to respondents, opportunities for long-term collaboration had diminished in recent years.

As one researcher explained,

Early on it was both research and management driving the need for research. . . . A bunch of us had base funding and worked closely with managers. We understood their concerns and were able to translate. We performed a joint function; managers would come to us with money to give and help with the work. It was a collaborative approach. We were certainly independent from managers, but there was constant dialogue. [I] dealt with Chiefs, supervisors, rangers. . . . [Later] Now that cooperation is completely gone. The agencies have lost their way. Timber harvest is gone, resources gone, money, expertise—gone. Recreation could be a key driver, but how do you do that? We’ve lost management staff, have different kinds of people. Lost expertise.

Although some described the gradual decline in collaboration between managers and researchers over time, others had seen a recent surge in interaction.

Over the last 3 years, there has been increasing interaction with Forest Service social scientists. They are showing more willingness to meet the decision demands of the day. I can’t speculate on why this has changed. We all learn together on what needs to be done. But, management does not always know what to ask and how to ask it.

Several managers mentioned that the new performance and accountability standards issued by the Office of Management and Budget (OMB) may be encouraging researchers to reach out to the NFS to ensure that their research products are based in management needs. These standards evaluate the work of scientists based on quality and relevance. Input from research clients about the utility and relevance of scientific work is sought in evaluating research units.

National and regional conferences—Participation in national or regional conferences related to recreation also was mentioned, although many respondents indicated that the frequency of conferences had declined in recent years. Several

respondents heralded the national recreation workshop held in Portland in 2005, which convened managers and researchers to discuss recreation issues on a national scale.

This Portland conference was the first conference that I heard of since I was with the agency, where researchers and managers were getting together. It was fairly well-publicized, but still, it was mostly regional folks, though the researchers were more representative of the entire nation. . . . I heard at the conference that the Washington office thinks that researchers and managers interact fairly often. I'm not sure why they think that.

Informal relations and onsite interactions—Researchers, on the other hand, were more apt to note the prevalence of onsite technology transfer activities, issue-based workshops, joint field trips, short courses, and other means of disseminating information to managers. Notably, few managers acknowledged these types of interactions. And, researchers were more likely to mention the importance of personal ties and informal relations with managers. Some managers indicated that they had a circle of scientists they called upon to discuss problems or brainstorm information sources. These exploratory findings suggest that managers are more apt to acknowledge formal processes for interaction, whereas researchers may recognize the role of informal ties and personal relations. Further research may be needed to explore perceptions and practices of formal and informal interaction styles.

Leadership teams and research liaisons—Managers were more likely to note that interactions with Forest Service R&D took place at the regional level through station leadership teams. Several managers noted that representatives from the stations participated to varying degrees in regional planning efforts. Station directors, unit or program managers and scientists participated in these planning processes. In a few cases, respondents were aware of research station liaisons that had been identified and were charged with linking research and management priorities. Although liaisons may be established in other regions, they were not mentioned. One manager explained, “The region has a Science and Leadership Council. Station leaders and Supervisors come together quarterly to talk about issues and science and to identify the most frequently litigated issues. They try to hone in on those issues.” Other managers mentioned the New England Leadership group as an example of a regional leadership team consisting of managers and researchers, which links issues in Washington, DC, with regional priorities. Interestingly, very few researchers in the sample mentioned these higher-level, more formal means of interaction.

Planning and assessment processes—Managers readily noted researcher participation in forest or local planning processes, although this was seldom acknowledged as a form of interaction by researchers, who perhaps did not perceive this interaction as constituting “research” or were not rewarded for these activities. Meanwhile, researchers pointed to manager involvement in the development of station or unit strategic planning processes and technical assessments. Managers did not mention this type of involvement with Forest Service R&D. Either the managers interviewed had not participated in these technical assessments with the research units, or they were not readily cognizant of these opportunities for input into the research agenda.

Ideal interactions—

Managers and researchers in the Forest Service were asked to characterize their ideal type of interaction. A total of 43 managers and 19 researchers responded. One researcher noted that the nature of interaction differed depending on the problem or issue, the personalities involved, and the goal at hand. Still, managers and researchers readily enumerated various factors or qualities that they would consider ideal (fig. 11). Although many similarities between managers and researchers were evident, other important differences emerged from this analysis.

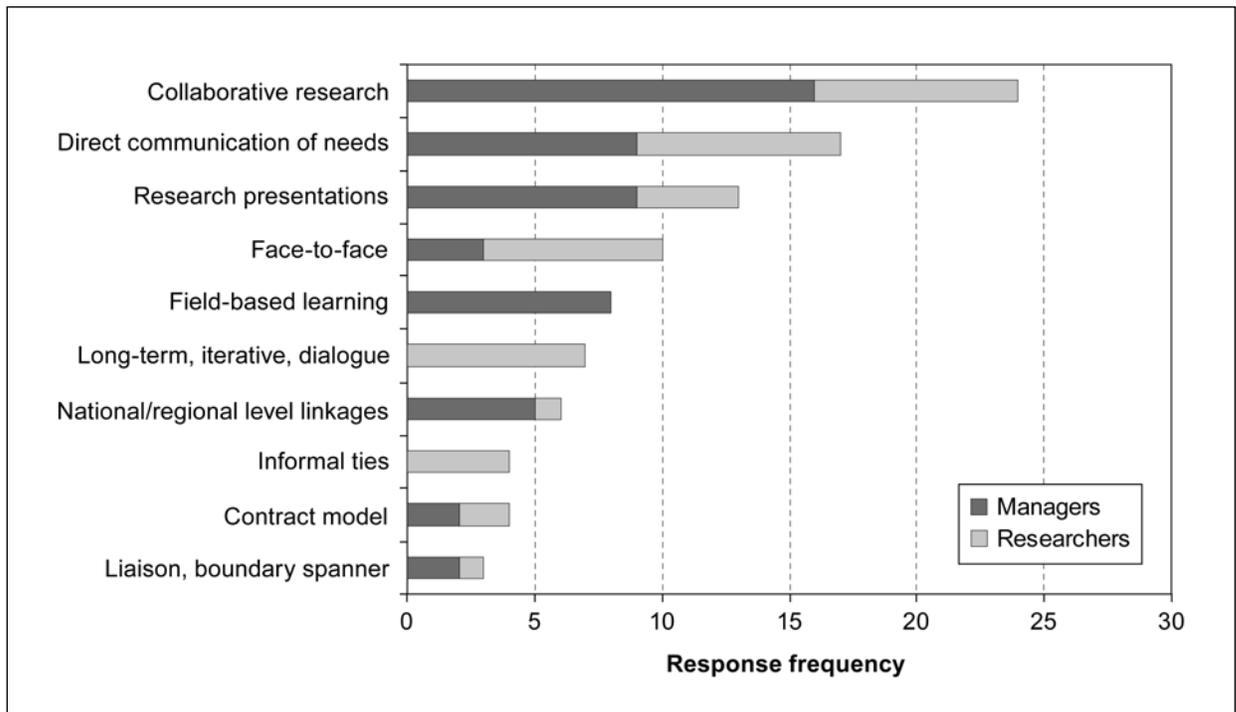


Figure 11—Types of ideal interactions. Note: There were 49 recreation managers and 20 researchers in the sample.

Collaborative research—Both managers and researchers lauded the benefits of collaborative research, which allows researchers and managers to work together to identify issues in recreation management, establish information needs, frame research questions, and cooperate in data collection, analysis and interpretation, as well as monitoring. As one manager explained,

Ideally, it would begin with the needs of land managers. We could say, “I have a need.” The interaction would cause a conversation to occur, and dialogue. Hopefully, we could draw on the expertise of research to examine the problem. The challenge is to take research and apply it. [Another challenge] is to agree on what kind of research needs to be conducted. Ideally, we would follow through with a followup dialogue, “How did it go? How could we monitor?”

Another manager echoed this approach, “Ideally, you would present problems, issues, or thoughts about the data you thought you were lacking, or that you needed, to researchers. Researchers would help you design a study to get information that you were lacking.”

The collaborative approach was preferred by managers because of the blending of expertise, including on-the-ground knowledge of managers with conceptual frameworks of researchers. The collaborative model often was contrasted with more top-down approaches, where researchers arrived with pre-developed questions and prepared research agendas. Several studies have indicated that collaboration and direct contact between researchers and managers are often more effective and preferred means of sharing information (Graham and Kruger 2002, White 2004, Youngblood et al. 2007).

Direct communication of needs—In addition to collaborative research, both managers and researchers sought vehicles or venues for the open and direct transmission of information needs. Managers sought ways to communicate these needs within the NFS and to the research community. As one manager explained, “We should be asking managers at the lower level what their needs are. There should be direct communication to identify priority research needs. I don’t know where this is occurring and am not sure if the information is getting down to our level.”

Researchers sought better ways to gain insight about information and research that could benefit managers. In developing mechanisms for the sharing of information needs, researchers may need to be clear and realistic about the nature of their role and approach. A recreation manager described this problem well,

The problem managers have is that they go to researchers and say, “I have this problem, solve it.” What is preferred is that the manager says, “I have this problem,” and the researcher says, “Have you thought of a, b, and c.”

Researchers are not always able to solve problems immediately, but may help managers to frame the question in a way that appropriate information could be sought.

Research presentations—Managers in the sample particularly valued the opportunity to learn about existing research efforts from recreation scientists. Presentations at workshops, conferences, or onsite trainings were often noted by managers as being valuable to them. Several mentioned regional recreation research groups that gathered for occasional “show and tell” by researchers and the sharing of case studies and successful models by managers. As one manager explained,

From a district perspective, it would be great to have a week during the winter where we identified the significant issues on the district. For a week, staff [could] learn all they could from scientific background, trends, and relationships between resource issues. And, then, briefings, presentations, and workshops on how to use that information as decisions are made throughout the year.

The California Recreation Roundtable, initiated by state officials, was acknowledged as a positive example of technology transfer, as well as the annual Northeast Recreation Research Conference. In an ideal world, particularly from the management standpoint, there would be more opportunities for information exchange.

Researchers in the field—Managers were more likely to mention the idea of embedding researchers into ranger districts and field sites to help them gain understanding of the daily realities of resource specialists and district rangers in the Forest Service. Some talked about the idea of researchers doing occasional details or sabbaticals in a field setting, similar to the “sabbatical in the parks” program sponsored by the National Park Service. Others noted the value of extended field trips where managers and researchers visit sites together and identify problems that could be addressed by recreation scientists. One model of field participation was noted by a manager,

There would be listening and field participation. Tech transfer does not seem to be rewarded in the research system; rewards are for publishing. The Station in [name of city] is the best example. Local scientists are very interactive with us; they go on field trips. They have developed tools and conduct tech transfer. There is almost constant interaction. We see them every month.

Managers felt strongly that researchers could benefit from a real-world understanding of the recreation setting and the complex operating environment. These remarks appear to reflect a shared perception that researchers have lost touch with the real world of recreation management. Interestingly, few researchers identified the need for field experience as a component of an ideal interaction.

Personal ties and long-term, iterative dialogue—Forest Service researchers were more likely to identify the need for long-term, iterative contacts that were based on professional interests and personal ties. Researchers were eager to develop close bonds with a few managers as a way to develop a long-term dialogue about issues of shared importance. As one researcher explained,

It is a continuous dialogue where people in each group know the other group and where they are headed and what their concerns are and might be. When a crisis or urgent information need comes up, then it is not so difficult to communicate and share information as it might be if there was less communication. . . . Given the rapidly changing context of recreation resource management, it is critical that we maintain a dialogue and look for trends and prospects.

In general, researchers sought informal contacts rather than structured relations and formal research contracts.

Formal relations and shared program of work—Managers were more likely to indicate a preference for formal ties at higher levels (regional and national) to identify common priorities and better link research agendas with management needs. They valued more contractual relations with researchers as well as the formal incorporation of liaisons or extension agents to disseminate and interpret research findings. Two managers' comments reflected the idea of formalized, shared strategies to focus on resource management problems.

The ideal would be if, early on, research and management communicated on which products would be the most beneficial. We should have a clear program of work and products that keep researchers on track. We should have a reward system consistent with that, to follow the program of work.

Products should have a pragmatic application and may not have a publication application.

It's about personalities ... people. [It's about] researchers, who understand that their role is to help manage as much as the district manager's role is to manage. There is too much separation between research and management. We need to help them to get focused on our problems.

This point of view was not widely shared by researchers in the sample, who preferred to have more autonomy about the nature of their research direction and who reiterated their role in addressing long-term research questions in addition to short-term needs. For many researchers in Forest Service R&D, the need for independence in setting their own agenda was essential, suggesting that autonomy may be an important theme in the division's organizational culture, that harkens back to the division's early history. These differences may suggest the need for a variety of innovative approaches in building opportunities for interactions between managers and researchers.

Barriers to ideal interactions—

Although there were demonstrated differences between managers and researchers as to what constituted "ideal interactions," there was general agreement about the most prominent barriers to achieving these interactions (fig. 12). Forty-seven managers and eleven researchers identified barriers. The list of barriers identified were varied and numerous, but analysis points to the need for awareness of differences between research and management, acknowledgement of roles, and creating opportunities for interaction and exchange. We discuss several of these barriers below.

Organizational differences between research and management—Managers and researchers largely recognized that although they inhabited the same agency, they operated in different professional worlds, with different goals, incentives, and measures of success. Some attributed the differences to the deliberate housing of research and management in separate divisions.

Some respondents observed that the structure of autonomous divisions resulted in a "wedge" or "chasm" between research and management. "There is an invisible wall between research and management that needs to be torn down. We need to get the researchers amongst us. They are too independent. You don't have the infusion unless you work amongst each other."

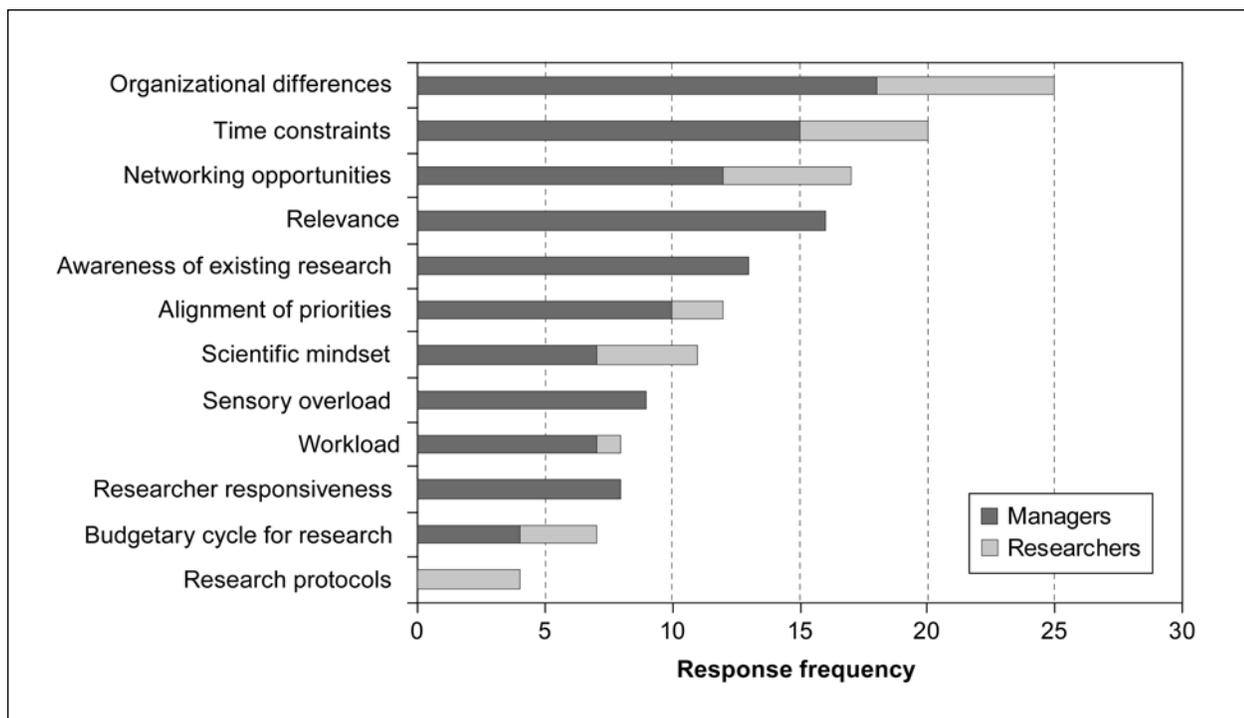


Figure 12—Barriers to achieving ideal interactions. Note: There were 49 recreation managers and 20 researchers in the sample.

Others recognized the importance of an independent research division, but urged that the agency find ways to bridge the gap so that research is more responsive or tuned in to management concerns. As one manager, exclaimed,

Researchers feel a need to maintain their professional independence. But we are not asking them to alter their findings to fit our needs. I find that hollow. It's more that researchers feel that rubbing shoulders with the real world will tarnish their lofty distance.

One aspect of this cultural barrier is the focus of Forest Service R&D on basic science and long-term studies. As one manager put succinctly, “There is a cultural barrier. There is separation between valuing research which is longer term, versus acquiring immediate answers.” Differences between managers and researchers have been described as a barrier to information and technology exchange in the context of other studies as well (Sydoriak 2007, Wright 2007).

A main focus of this different operating reality lies in the incentives that motivate researchers’ work. Scientists in the Forest Service are rewarded most highly for publication of their work in peer-reviewed journals. Both the number of publications produced and reputations of the journals used are evaluated. Direct technology and information transfer is perceived to be of secondary importance

for a scientist's promotion. Recreation managers in the sample indicated significant time constraints, limiting their opportunities to access and digest journal articles. The emphasis on publication of scientific articles often means that the researcher does not make time for disseminating results in a format that managers may readily access. This manager identified problems in the reward system for researchers.

The bottom line: at universities, in the Forest Service [Research], academia, is to keep the eye on the prize defined by publications, even when they have the best intentions on a project. Managers are more pragmatic and utilitarian. Research moves into the theoretical. There are initiation rites associated with the research reward system.

Another manager commented,

Research doesn't always focus on immediate management needs. They are focused on publications, while managers are focused on immediate problems. The reward system is different for researchers versus managers. It would be heaven on Earth to have a social scientist working with us on these issues.

Time constraints—

Managers and researchers alike often acknowledged that the needs of managers for immediate answers contrasted with the emphasis in Forest Service R&D on long-term studies, basic research, and the development of theoretical models and methodological approaches. One manager captured the sentiments of many, "Sometimes the timeliness of getting information [is a concern.] They [managers] come up with questions that they need immediate answers for, but have to wait a few years for the study. You have to predict what questions you want answered."

Managers continued to rely on Forest Service scientists in long-term collaborative studies, but for projects requiring a quick turnaround time, they often hired private consulting firms or turned to universities that had graduate students eager for research experience. Researchers acknowledged that their results took time to produce and often did not meet the timing needs of managers.

Absence of networking opportunities—Both managers and researchers lamented the dearth of opportunities for information-gathering and research exchange. One researcher compared present reality with the operating environment early in his career.

There has been a diminishment of formal structures. In any given year in the first decade [1970s] one could guarantee 4 to 10 major recreation

management meetings across the country on a regular basis. I would be invited to come. ... Managers were creating the venues in which interaction was taking place; we were debating and discussing policy issues. There were ready-made opportunities to say: Here is what we are doing, and listen to what we may be doing. That is virtually non-existent now.

One researcher explained that leadership was needed in Forest Service R&D. “The networks don’t exist for researchers. The social scientist linkages have been broken. The Washington office does not provide leadership or a home for social scientists.” The need for national direction to develop, fund, and sustain opportunities for interaction between managers and researchers dealing with recreation problems and issues was frequently mentioned.

Relevance—A prominent concern for recreation managers in the sample was the relevance of existing recreation research and the need for applied research grounded in real-world experiences found in the field. Although managers often acknowledged the value of long-term, basic studies, many were frustrated by the dearth of applied research, experiential case studies, and applications useful for managing in a complex environment. As one manager explained succinctly, “Managers are more focused on users and recreationists rather than looking at an issue in a scholarly fashion.” As one manager emphasized, managers need relevant information in a language that they understand. “We don’t need a dissertation; we need relevant information.” Another manager echoed these sentiments, “There is a cultural barrier. There is separation between valuing research which is longer term, versus acquiring immediate answers.”

Managers discussed ideas for exposing researchers to the realities of the field, through field trips, details, and sabbaticals. Although there were many examples noted of Forest Service researchers who had conducted applied research or who provided information of immediate use, one-third of sampled managers expressed this as a concern.

Ability to fund research—Managers also explained that they had little discretionary money to fund research related to recreation. Long-term basic studies were viewed as a luxury and were trumped by other priorities. Several managers said that they lacked funds to travel to recreation conferences or to sponsor recreation workshops in the local area. Meanwhile, they noted that researchers also were challenged by budget constraints and were moving away from recreation research in favor of topics with more substantial funding, such as fire. Researchers had lost much of their base funding to do studies, relying more on NFS sources to pay for research.

Awareness of existing research—In some cases, managers said they were simply unaware that Forest Service R&D had units or teams focused on social sciences or on recreation. Approximately 30 percent of the sample indicated that they were unaware of what recreation research was available, who in the Forest Service was engaged in recreation studies, or how to contact them for assistance.

Alignment of management and research priorities—Managers frequently suggested that a significant barrier to improved interactions is the lack of formal alignment between resource management goals and priorities and those of Forest Service R&D. Several managers described the need for mutual strategic leadership meetings for Forest Service R&D to more closely match their research programs with the problems managers face on the ground.

Researchers conceive of a project and come up and do the research, but [my] interests are not captured in the effort. Research is not coordinated. There is no fusion of research and management interests. . . . Research does research things and management does management things. The challenge is to work on mutually beneficial outcomes.

Scientific mindset—Managers and researchers also were in agreement that downsizing and a decline in funding for professional training of recreation personnel was responsible for the absence of a scientific mindset among recreation managers. Many noted that contemporary recreation specialists often did not possess formal training in recreation as in years past, and were less comfortable with social science. As a result, they may lack knowledge of core principals of recreation management, awareness of the history of recreation research, or understanding of the ways that research and science-based applications might assist in addressing everyday management problems. Networking opportunities to expose retrained managers to recreation concepts and scientists were often suggested.

Sensory overload—Several managers described the challenge of being overwhelmed with information, e-mails, and electronic “chatter,” noting that it was difficult to process and manage various inputs. E-mails bearing topics related to recreation research simply get deleted in an effort to manage the daily workload. As one manager expressed,

If the [station] is putting out recreation bulletins, why are we not seeing them? I’m dealing with 50 messages a day and you don’t absorb it all. They are overly depending on e-mail as the primary form of communication and assume that everyone is informed.

Several managers felt that researchers relied too heavily on e-mail and Internet communications, preferring a more diverse communications strategy that included face-to-face encounters.

Research responsiveness—Many examples of researchers being responsive to manager needs were described by respondents, yet recreation managers sometimes noted that they had contacted Forest Service researchers for assistance with various questions, problems, or information needs, but researchers either did not respond to these inquiries or were unable to help. In other cases, they were told that there were no researchers available to address a particular problem or need.

Workload—Managers often referred to challenges associated with the heavy workload resulting from increasing responsibilities and decreasing personnel. Under these conditions, interaction with researchers is very difficult. Managers referred to being in “crisis management mode” or “stuck in the trenches” and unable to take time to consider big-picture issues. As one manager explained,

For me, it takes discretionary time in a day, a week, and a year, on a regular basis to contemplate issues. Folks like me and higher are swept into a frenzy of crises. We get into a trench mentality. It’s hard to think creatively when you are swatting at rattlesnakes at your feet. There is not an intellectual zone for the contemplation of issues.

Funding and research protocols—Researchers in the study explained that one of the biggest barriers they faced in conducting research was the requirements of the OMB related to paperwork reduction and protection of human subjects (Office of Management and Budget 2007). The OMB stipulates that any social science research that involves more than nine human subjects must be approved by OMB officers, who evaluate the study based on methodological approach, reliability and validity, content, and burden on subjects. The amount of time it takes to prepare a study for OMB review, revise based on reviewer comments, and await approval can exceed a year. This schedule makes it difficult for researchers to be immediately responsive to management needs. Although not noted by recreation managers in this study, researchers are keenly aware of this constraint on their ability to adopt expedient timelines.

Another barrier raised by researchers dealt with funding for recreation research. Recreation researchers typically rely on base funding to conduct studies, which is to some extent at the discretion of station directors. According to researchers in the study, support for recreation research varies widely among station directors.

Researchers in Forest Service R&D seek foundation support and other “soft-money” sources for recreation research, but funding options are slim, compared to other high-stakes topics, such as wildland fire and climate change.

Capacity for research-management interactions—

As the agency’s recreation workforce undergoes changes and budgets have become constrained, the opportunities for recreation managers and researchers to interact have been impacted. Interaction is a critical element in successful exchange of technology and information (Wright 2005). Existing and emerging structures to promote interaction may be used in combination to create an environment where researchers and managers can build trust, shared experiences, common language, and collegiality that are important elements for effective knowledge exchange (Rogers 1995).

Managers and researchers in the Forest Service discussed a variety of ways in which they currently interact. Research collaboration, attending national and regional conferences, participation in regional leadership teams, and long-term informal relations were most commonly mentioned. Managers were more apt to note formal, structural relations between managers and researchers, particularly those occurring at higher levels. Meanwhile, researchers reflected on the informal and personal ties and consultancy relations they shared with managers. Many observed that opportunities for interaction had diminished significantly since the 1980s, noting the declining frequency of national or regional recreation conferences involving managers and researchers. Changes in personnel had severed long-term relations between managers and researchers, reducing opportunities for informal interactions. Structured means of interaction, such as involvement in regional leadership teams, local planning processes, and research unit reviews, seem to have replaced long-term collaborations common in previous years.

Managers and researchers shared similar views of what characterizes an ideal interaction. Both heralded the need for collaboration on recreation research, developing channels for communication of information needs on a regional and national level, and creating forums for sharing research results and new applications. Although managers valued the notion of researchers becoming embedded in the field, researchers sought opportunities to develop informal relations based on long-term dialogue about shared issues and problems. Both managers and researchers appreciated opportunities for research visits to the forest for training, technology transfer, and field trips.

Managers and researchers identified numerous barriers to achieving these ideal interactions. Some barriers were associated with the autonomous and independent nature of Forest Service R&D as a separate division. The emphasis of Forest

Service R&D on the production of basic scientific knowledge that advances theory and methodology does not always match with the managers' needs for concrete information for use in planning models or for experiential cases that provide lessons and insights on making recreation management decisions. Moreover, the publication schedule for research journals, which typically involves an extended peer review process, does not always match the manager's immediate need for information that addresses a real-time problem.

Future Questions

1. Collegiality among recreation managers and researchers in the Forest Service appears to be waning owing to the absence of shared professional networks. What processes may be instituted to promote face-to-face interaction and information exchange?
2. Collaborative research appears to be a highly valued form of interaction, but requires time and financial resources as well as long-term commitment from both researchers and managers. How might collaborative research be pursued using existing technologies and resources?
3. Managers reported the desire for onsite interactions that would encourage information exchange and provide field-based knowledge for recreation researchers. How might this be achieved through existing Forest Service mechanisms, such as details and temporary assignments? How do newly hired research scientists receive field orientation?
4. Managers appeared to prefer more structured or formal interactions with researchers, such as technical site visits, workshops, field trips, and co-participation on leadership teams. Researchers emphasized informal, situational, and personal interactions around particular issues. How might interactions be designed to accommodate these diverse preferences and needs?

Building and Sustaining Recreation Research Capacity

Recreation managers have a need for scientific information for planning, assessments, inventories, solving problems related to recreation use, and managing recreation across various landscapes. They acquire this information through a variety of sources depending on their needs. As stated earlier, Forest Service R&D

is designed to generate scientific knowledge that forms the basis for science-based decisionmaking. This section explores the role of Forest Service R&D as a source of information for managers.

Current Recreation Research in the Forest Service

The NFS is not the only client of Forest Service R&D. Forest Service researchers design studies on a broad range of topics to suit a variety of clients and to satisfy both long and short-term needs. In addition to NFS, Forest Service researchers conduct studies for other federal agencies, state and county governments, nongovernmental organizations, private industry, and international agencies. Some research conducted by recreation researchers in Forest Service R&D is highly theoretical. Other work has more direct application. Yet, the question remains to what extent recreation researchers in the R&D division are responding to manager needs.

With increased attention to recreation issues in the media and a renewed focus on managing recreation from the Forest Service Chief, a recreation research emphasis has been revitalized. In 2005, a Strategic Program Area (SPA) framework was adopted by Forest Service R&D, which assigns the work of research units to one or more strategic areas. One of these seven strategic areas was recreation. The SPA initiative brought together recreation researchers from all of the research stations in 2006 to discuss a shared research strategy. More than 20 R&D research scientists working in aspects of recreation and tourism met in Asheville to explore common areas of interest and future directions. As part of those meetings, researchers stated their current topic areas that related to recreation. These topic areas are grouped and summarized in figure 13. This list is not exhaustive, but examination demonstrates the range of issues and themes of importance. The list also reflects the engagement of researchers on broader social science issues in connection with recreation, such as governance, diversity, communities, equity, and communication.

Recreation researchers in the Forest Service appear to be responsive to manager needs, although gaps do exist. Studies examining aspects of recreation visitors and recreation use patterns top the list of recreation research study areas, which is consistent with the information needs identified by managers in this study. In addition, several studies are underway that examine the biophysical implications of recreation, which also was cited as a research need by managers. Yet, research related to recreation conflicts and OHVs, which were of high interest to managers, were relatively low on the list of researchers. In addition, researchers in Forest Service R&D addressed topics not mentioned by recreation managers, including natural resource decisionmaking, tourism, communities, and place. Managers are

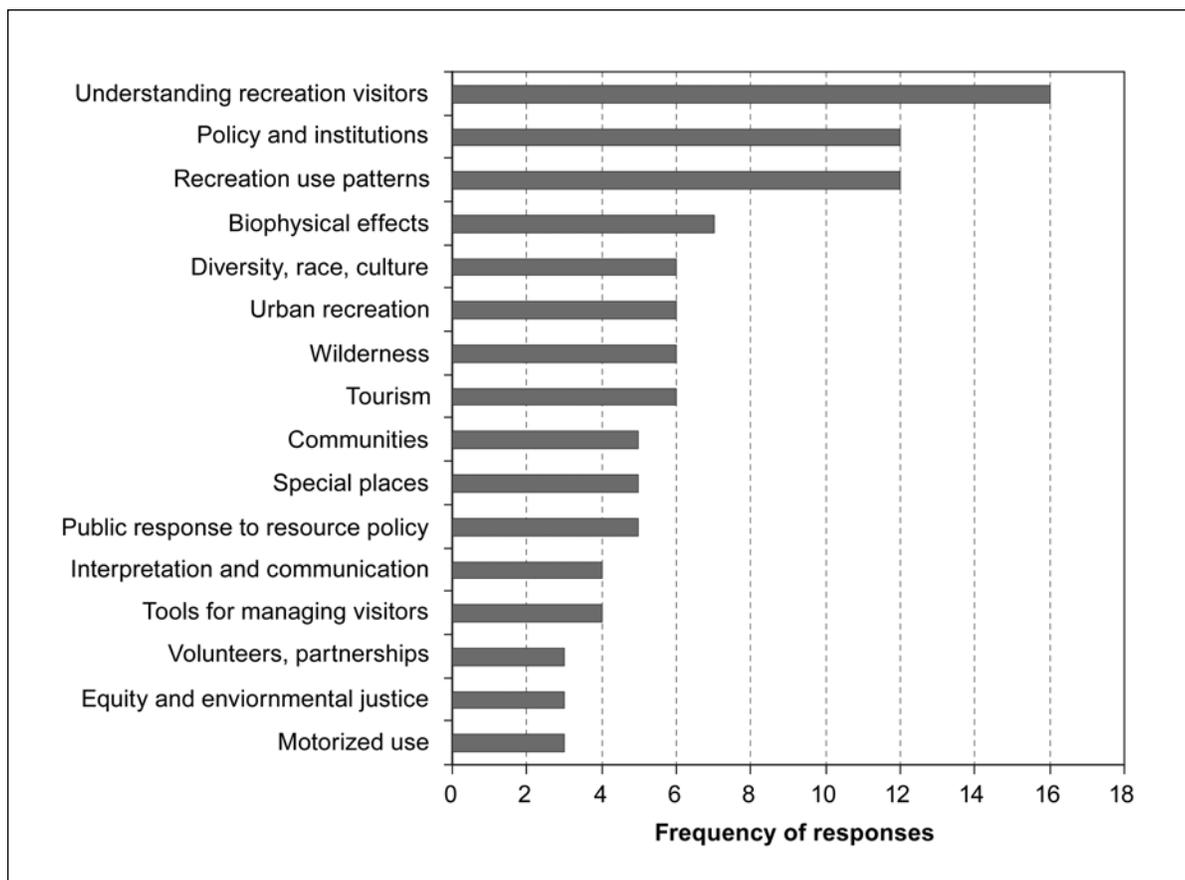


Figure 13—Recreation research areas for Forest Service Research and Development.

likely finding research on visitor conflicts and OHV use from other sources. Or, they are using experiential cases and existing networks of resource professionals’ to help them identify solutions.

Perceived Role of Forest Service Research and Development

Managers and researchers in the sample were asked to discuss their personal understanding of the role of Forest Service R&D within the agency. Questions elicited open-ended responses, and those interviewed discussed a variety of elements to this question, touching upon more than one thematic area. Two broad categories of responses emerged from this question. Some focused on the clients and audiences for whom Forest Service R&D should be catering their research. Other responses focused on the scope of research, whether the role is to promote basic scientific research, applied science, or to satisfy data and information needs. A summary of responses appears in table 2.

Table 2—Perceived role of Forest Service Research and Development

Role of Forest Service R&D		Managers (34)	Researchers (18)
		<i>Percent</i>	
Primary client	Align research issues and problems faced by natural resource managers	71	33
	Serve National Science Foundation mission directly	25	11
	Serve multiple clients	2	33
	Serve the American public	9	11
	Serve the research community	6	11
Research scope	Applied scientific research (science delivery, tools, development)	44	21
	Basic scientific research (long term, future-oriented)	35	33
	Data and information source	8	0

Note: There were 49 recreation managers and 20 researchers included in the sample.

Clients for Forest Service research—

Both researchers and managers recognized that Forest Service R&D catered its work to multiple clients and audiences. Forest Service R&D was viewed as an organization that assisted both NFS managers and served the needs of the wider community (e.g., other federal land management agencies, state and local agencies, private and nongovernmental organizations, and the general public). Researchers often felt that managers perceived their client-focus to be exclusively on the NFS and readily emphasized the multiclient perspective. Although a portion (25 percent) of managers stated that Forest Service R&D should maintain an exclusive NFS-focus, most (71 percent) had a softer view on this, urging R&D to develop their research agenda based on issues faced by resource managers, but not be tied exclusively to management concerns. A significant number of researchers also agreed with this premise. Other managers noted that R&D served other clients, researchers, and the American public.

Research scope—

The function of Forest Service R&D was a topic of emphatic discussion. Both managers and researchers recognized that Forest Service R&D occupied a dual role. On the one hand, Forest Service R&D was a source of basic scientific knowledge related to natural resource processes and principles, emphasizing long-term, dedicated studies that made advances in theory and methodology, as well as contributions in scientific understanding that more broadly inform management. On the other hand, they recognized the need for applied research that is problem-driven, as well as the development and applications for immediate use by managers engaged in planning and decisionmaking.

The need to preserve the role of basic scientific research was echoed by managers and researchers alike, although researchers tended to value this function more readily. Researchers talked about how their agendas were being driven by immediate management needs to a greater extent, resulting in more applied, problem-driven analysis and short-term studies. As one researcher stated, “We have lost attention to the real research. Now, we do more development applications and support of management. We’ve lost theory and conceptual frameworks. Now, people in management want their hand held.”

Researchers strongly emphasized the ongoing need to tackle future-oriented questions and develop an integrated, long-term research agenda that dealt with problems over a range of temporal and spatial scales—studies that may not directly address manager questions in real time, but provide a rich context for understanding the complexity of problems. Managers facing increasing pressures on their everyday work lives also saw value in preserving some element of a big-picture view. As one manager explained, “I think of research as our eye to the future as well as the people that have a chance to stop and think.” Sometimes there was a perception that researchers worked in isolation from real resource problems and focused on topics of personal interest rather than more broadly shared concerns related to recreation managers. As one manager urged, “A certain percentage of research should be dedicated to address problems that are biting us—pressing issues rather than researchers picking their own favorite things.” While most managers recognized the importance of basic science and appreciated its role, there was a tendency to emphasize applied research.

There should be a balance of theoretical and applied, for managers. Not so far as to say that research should be less thoughtful, but primarily it should be to serve an applied role. We don’t have the luxury as taxpayers to pay for theoretical research. People don’t know that the Forest Service has a research branch. Why should tax dollars be funding research that is not applied? ...Unless research has a direct application, it may not be worth the money.

I have always felt that research has two functions. They [researchers] should provide new information to resource management as a whole, and they should provide specific research that supports on-the-ground management. ... Secondly, they have to continue to distill tools for managers. This is job protection. If they are not helping managers solve public land management issues, maybe they will go under.

Managers appear to appreciate the role of Forest Service R&D as advancing the field of recreation knowledge and promoting general scientific understanding. Yet, their frustration appears to lie with the fact that they have little immediate need for basic science and tremendous need for applied research, syntheses, and case studies that they can use in their recreation decisionmaking. Moreover, in times of budget decline and downsizing, research is viewed by many as an unnecessary luxury. “What is the point of having research when we can’t keep the toilets clean?” is a commonly echoed sentiment. These observations suggest that the agency as a whole contemplates its role in a mix of basic and applied research related to natural resource management.

Strategies for Bridging Research and Management

In 1981, Yoesting (1981) published a paper describing the status of recreation research and its use in Forest Service decisionmaking. First, he argued that research needed to be timely if it is to be used in decisionmaking related to critical problems or issues. Managers most often need information within a 6- to 12-month framework, whereas research may require 3 or more years from funding to publication. For research to make a difference in decisionmaking, this gap needs to be tightened. Although the length of time it takes to publish results will be difficult to accelerate, there may be ways for researchers to share results and intermediate products with managers. Second, Yoesting identified a need for research findings that are relevant and applicable to the problem at hand. Under existing reward systems, he noted, applied research is not highly valued, which means that extra steps to develop manager applications may not be taken. Third, research results need to be disseminated in outlets available to managers, who may not have access to academic journals or time to read them. He urged the development of reward systems for researchers who reached out to managers in direct ways, such as use of cooperative extension programs. In the 25 years since publication of this article, much recreation research has been completed that is timely, applicable, and accessible. Yet, interviews with recreation managers and researchers in 2006 suggest that these three challenges are still salient.

While reports about diminished funding, reduced personnel, and increased workloads reverberated throughout interviews, we also unearthed many ideas for how to use existing capacity to improve access to research and researchers. Throughout the interviews, managers and researchers identified specific structural and institutional changes that they believed could potentially improve the ability of managers to access recreation research and build bridges with scholars engaged

in the study of recreation problems. This section summarizes or encapsulates ideas suggested throughout the interviews and mentioned in early sections of this paper.

Processes to improve recreation information exchange—

Several structures and processes were identified that promote information exchange. These structures attempt to organize existing research and legitimize the use of professional knowledge and case studies as sources of information.

Recreation information clearinghouse—Managers desire a Web site that includes a searchable database of all recreation studies organized by keywords, authors, and geographic regions. This would help managers to search for publications (station manuscripts and academic journals) relating to recreation. The Web site at <http://www.hd.gov/> combines information relating to a variety of human dimensions topics, including recreation, and serves as a model or a host for a recreation-specific data clearinghouse.

Extension agents—Several managers and researchers suggested that the cooperative extension model that is used in the USDA and in universities, particularly with an agriculture focus, could be adapted or applied to natural resources issues. Extension agents could help to develop publications that translate, synthesize or interpret research findings in recreation.

Case studies in recreation management—Managers often relied on internal networks that offered stories, experiential cases of solutions and strategies that have been tried by others. The institutionalization and acceptance of this form of professional knowledge in the form of natural resource cases may help others to develop their own solutions that meet local needs.

Recreation knowledge synthesis—Managers were eager to have access to short, accessible papers that synthesize the current state of knowledge on a particular topic or set of topics, such as recreation motivations, conflict, or biophysical effects. Ideally, managers hoped these synthetic pieces would be updated periodically with current findings.

Processes to encourage recreation manager-researcher interactions—

Managers and researchers noted several mechanisms that may be considered to facilitate greater contact between managers and the research community. Formal processes promoting interaction were sought, particularly by managers, given that opportunities for informal exchange had diminished because of staff turnover and time constraints.

Recreation research directory—Managers shared that they were not currently aware of who was engaged in recreation research, both in universities and in government agencies, and what their areas of expertise were. A directory of recreation scholars with links to publications may help managers to identify persons with whom to collaborate to address recreation challenges.

Boundary spanners—Many suggested that staff be assigned to the role of boundary spanner to help managers translate issues into researchable questions and to link managers with professional colleagues and scientists. Boundary spanners also could work with researchers to identify managers with research interests. Some social scientists interviewed who work in NFS indicated that this boundary-spanning role is part of their job description, but that it typically gets subsumed by other tasks.

National and regional recreation meetings—The model of regional and national recreation conferences held with predictable regularity was one most often mentioned by managers and researchers. Momentum gained in the 2005 recreation conference in Portland may be capitalized upon to solidify budding relations between recreation managers and researchers operating at multiple levels of government, universities, nonprofits, and the private sector. One venue that attracts recreation researchers is the annual meeting of the International Symposium on Society and Resource Management. An existing conference such as this may represent an appropriate setting to rekindle this exchange, although manager awareness of and participation in this meeting has been relatively modest.

Show and tell—Managers appreciated “show and tell” opportunities to learn about recreation research and applications. Science fairs, brown-bag presentations, training, and other ideas were mentioned. Budget constraints and increasing responsibilities inhibit travel to scientific meetings for many managers; onsite, direct, information sharing sessions are often preferred.

Forest field trips and sabbaticals—Both researchers and managers mentioned the success of field trips and “workshops in the woods” that brought researchers and policymakers onto public lands with managers to share information about current dilemmas and brainstorm solutions in an informal setting. In addition, several managers suggested offering details and sabbaticals for researchers to spend time in the national forests. The National Park Service “Sabbaticals in the Parks” program may be investigated as a programmatic model for encouraging scientists to spend time in the field.

The exchange of scientific information and the interaction between managers and scientists would both lead to stronger professional networks in recreation, allowing recreation professionals to develop a common language, identity, and sense of purpose about the importance of recreation. Some have referred to a “community of practice” in recreation that would promote collegiality, encourage professional development, develop institutional memory, and build recreation knowledge (Wenger 1999). If a community of practice is desired, many of the ideas generated by respondents may be considered. A commitment to developing recreation knowledge and leadership to promote the Forest Service as a leading source of that knowledge may be needed to achieve these goals.

Areas of Future Research

This research was designed as an exploratory study to understand dynamics of organizational capacity beyond the standard measures of personnel, facilities, and budget line items. Open-ended interviews with recreation managers and researchers allowed us to understand the depth and complexity of the Forest Service operating environment, and learn about the opportunities and constraints that managers and researchers face. This broad brush examination of the role of scientific information in decisionmaking helped to identify possible relations between key variables that can be explored in future studies.

- **Mapping social networks among scientists and managers.** Further research is needed to understand how university and station scientists are interacting with managers and at what level of the agency. Are certain managers more prone to working with researchers? At what level of the agency do they operate? Is scientist interaction part of their job description (e.g., boundary spanner), or is this an assumed role, based on an individual propensity to interact with the research community?
- **Identifying characteristics of successful research-management interactions.** Respondents in this study mentioned specific cases where collaboration between managers and scientists was perceived to be successful. By selecting several cases and conducting followup interviews with key individuals involved, factors associated with successful interaction in specific conditions may be identified. What factors or conditions contributed to the success of this interaction? What stage(s) of the process did managers and researchers become involved? What resources were required?

- **Understanding the role of science in recreation decisionmaking.** Using findings from this exploratory study, a followup survey of recreation managers and scientists may be developed to explore the role of various factors in shaping recreation management actions of various kinds. This study could help to further delineate the role of science in decisionmaking in relation to other factors and identify what conditions promote a tendency toward science-based decisionmaking.
- **Exploring the use of experiential or case-based knowledge in decision-making.** Managers often noted that scientific information and recreation research did not play a direct role in everyday actions, but provided a foundation. Instead, managers relied on anecdotal accounts and stories from colleagues to make judgments and decisions. Research is needed to explore how and under what conditions these experiential forms of knowledge are incorporated. What elements of these experiential cases are most useful to managers? How might these sources of knowledge be legitimized and institutionalized?
- **Developing indicators of scientific capacity in natural resource institutions.** Qualitative results from the present study revealed a variety of interdependent factors that influence a manager's ability to identify information needs, access information sources, work with researchers, and interpret and utilize scientific information in problemsolving. Declines in human and financial capabilities affect managers' ability to work with researchers and to incorporate scientific information in their everyday work. A followup survey with managers will extract and weigh the significance of various factors that affect the propensity for science-based decisions. Survey data of a larger sample will provide the basis for theory development in organizational capacity.

Conclusions

This research explored agency capacity for producing and using scientific information in addressing recreation issues. We hope that study findings may help to improve agency success in promoting effective information exchange through interactions between researchers and managers. We began this report by asking the question: "Has the Forest Service evolved from an agency of forestry experts to an agency of decision-process managers with the capacity to incorporate a broader array of scientific information into management decisions?" Interviews with recreation professionals and agency researchers suggest that in today's operating environment, new forms of scientific knowledge and a renewed commitment to

explore alternative forms of science exchange may be needed for the agency to maintain its role as a provider of knowledge, tools, and applications useful to address management concerns.

Forest Service managers and researchers in the study described a situation of declining workforce, increasing workloads, diminished budgets, and a lack of time to adequately address problems. Many also perceived that recreation occupied a lesser status within the agency compared to more high-profile programs, such as fire management or commodities production, as exemplified by trends in budget allocations and personnel classifications. Meanwhile, managers face pressing and often conflicting demands from recreation users, interest groups and citizens as well as national and international policy agendas. Capacity constraints make it difficult for managers to identify information needs, access information sources, or incorporate scientific information in everyday decisionmaking. Moreover, diminished agency capacity in recreation appears to have disrupted long-term professional networks, which potentially inhibits the ready exchange of scientific information. Interagency initiatives, such as “Operation Outdoors,” were successful in building capacity for recreation in the 1960s. Yet, these efforts require significant investment in time and financial resources to recreation. As the Nation struggles to finance disaster cleanup, war, and wildfire, such a commitment seems unlikely.

Forest Service recreation professionals function in an everyday work environment that is dominated by comprehensive planning and environmental analysis. New forms of information are sought to enhance these processes and managers are looking both internally and externally to accomplish these goals. Forest Service research stations once were recognized as national leaders in the production of recreation knowledge. Current managers have been resourceful in finding recreation tools and information from a variety of sources, including nonprofit agencies and private industry as well as universities. Managers appear to rely primarily on information that is easily accessible, site-specific, and immediately relevant. Although empirical research is valued by managers as a foundation for knowledge, they also seek applied studies, experiential cases, fine-scale sociodemographic and market data, and dynamic tools for “real-time” recreation management.

Historically, science exchange in the U.S. Forest Service has taken place using a variety of approaches that promote interaction between managers and researchers. Conferences, field trips, formal training, brown-bag presentations, consultation, and collaborative research all have been used at various times and in various combinations to address recreation problems and challenges. Managers appear to acknowledge more formal forms of interaction, such as training and site visits, whereas researchers emphasize interaction that is informal, iterative, and long term. Leaders

in recreation both in NFS and R&D support a range of structures and processes that promote interaction and facilitate awareness, collegiality, and mutual commitment to address complex recreation problems. Strides are being made to bring researchers and managers together. The national recreation conference in 2005 served as an initial step in developing a community of practice. In addition, national recreation research planning has coalesced as part of the Recreation SPA process. As the agency faces budget declines, resources for science exchange may be constrained.

The Forest Service encourages managers to make decisions based on science. Adjustments may be necessary to increase the exchange of scientific information. Forest Service R&D maintains its multifaceted roles as a provider of fundamental (theory-driven) and applied research, a reliable source of scientific data, and a producer of innovative tools, models, and applications for land managers. Recreation managers interviewed in this study supported the role of R&D as provider of scientific research. Yet, under conditions of financial constraint, opportunities for land managers to support targeted administrative studies have waned, putting pressure on other parts of the agency to serve this role. The Forest Service may need to consider evaluating its existing capacity to produce site-specific data that is timely, relevant, and responsive to manager needs.

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Appendix: Interview Guide—Managers

CAPACITY FOR USING KNOWLEDGE IN RESOURCE MANAGEMENT

The goal of our study is to explore the interaction between research and management within the USDA Forest Service. We are focusing on recreation management and research to identify models of interaction that have been effective, as well as barriers to effective knowledge exchange.

A. BACKGROUND/CAPACITY ISSUES

A1. Tell me a little bit about your background and professional history.

Where are you from? _____

What did you study in school?

Degree	Major	School

What other training have you had (relevant to your current position)?

How many years have you worked for the Forest Service? _____

How many years have you worked in this [ranger district/forest]? _____

What other forests/districts have you worked in? Other positions held?

Years	National Forest	Ranger District	Positions

A2. Tell me about your job.

How long have you held this position? _____

What are (were) your responsibilities? What is your job description?

Has your job changed over time? How?

Does your (current) job title accurately reflect your position description? _____

Why or why not? _____

[If not] What title would you give yourself that better reflects what you do?

B. RECREATION MANAGEMENT ISSUES AND APPROACHES

B1. What have emerged as the most significant recreation management issues that you have faced over the course of your career?

What were the issues? Could you give me some examples?

How did these issues become issues? (Who/how decided it was an issue?)

Have you noticed changes over time in how issues are identified?

B2. How did you initially respond to the issue/problem? (What was/is your approach for dealing with the issue?)

Did you seek out information to help you? (If so, where did you look?)

Did you turn to other individuals or institutions (agencies) for help?
[internal/external]

[If so,]What assistance did they provide? How did they help you?

What else did you do to address the problem?

Was this a typical approach for you to deal with an issue?

Did you feel you had appropriate and adequate skills and resources to address this issue? Why/why not/examples

Was this issue resolved or is it ongoing? How was the issue resolved?

B3. Now I want to ask you about the role of research in resolving these recreation problems and issues.

What were your information (research/knowledge) needs with regard to recreation management or planning? **OR** What are your needs with regard to recreation management or planning?

Have you had opportunities to communicate those needs? In what ways?

Does the Forest Service have structures or processes to encourage interaction between managers and researchers? (Does this take place on a formal or informal basis?)

Have you worked with recreation researchers to address these issues? Give examples of how... [e.g., workshops, conferences, one-on-one, indirectly]
Also who, context, setting

What types of interactions have been most effective for you?

Have there been studies, tools, or models that you have found to be useful? (in recreation management, planning, or decisionmaking) Why?

What is the best way for you to access research/scientific information?

What format of presentation has been most helpful to you? [e.g., technical reports, computer models, manuals, presentations, websites, workshops, videos, demonstration projects]

How important (or relevant?) is research information to recreation management decisions? (What other factors influence recreation actions and decisions?)

C. RESEARCH-MANAGEMENT INTERACTIONS OVER TIME

C1. Have you had the opportunity to interact with scientists or researchers to address recreation issues during your career?

If yes, proceed w/ C1a. If no, go to C2.

C1a. In what ways have you worked with researchers? How have you worked with researchers? NOTE: Only ask if not addressed above.

C1b. How would you characterize or evaluate your interactions with researchers?

C1c. What aspects of these interactions did you find successful or productive? Examples Why?

C1d. Have you observed any particular challenges in working with researchers?

C1e. Have you observed any trends/changes over time in the interactions?

C2. How might you describe an “ideal interaction” between land managers and scientists in addressing resource management problems?

C3. What factors prevent or enable this “ideal interaction” to occur? [e.g., institutional barriers, education, funding]

C4. Do you have a regular group of people with whom you interact to address resource management issues? Who?

D. INSTITUTIONAL CAPACITY FOR RECREATION MANAGEMENT

Now let’s talk about your observations/thoughts on recreation management in the FS over time.

D1. How has recreation (broadly) been viewed within the Forest Service over time? Have you noticed any changes in support for recreation? (personnel, funding, leadership, etc.)

D2. Have you noticed trends or changes in support for recreation research over time?

D3. Have you observed any changes in training for recreation staff over time?

D4. Have you noticed any changes in responsibilities of recreation staff over time?

D5. Have you observed any changes in the capacity (ability) of researchers to convey or communicate relevant research findings to Forest Service resource managers? (e.g., workshops, conferences, trainings, reports)

D6. Have you observed any changes in the capacity (ability) of the Forest Service to communicate the needs of resource managers to researchers?

D7. In your view, what should be the role of Forest Service research?

E. WRAP-UP

E1. Is there anything else related to the interaction between recreation research and management that you would like to discuss?

E2. Do you know of specific district or forest level researchers/managers with knowledge on this topic that you would recommend I interview?

E3. Would you be willing to be contacted in the future about this research or participate in a workshop on this topic?

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