

DEC 22 1994

ALDO LEOPOLD WILDERNESS RESEARCH INSTITUTE  
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Program and Research Activities  
FY 1994

Staff

Director:	David J. Parsons
Research Staff:	David N. Cole Peter B. Landres Alan E. Watson
Professional Support Staff:	David R. Spildie Hans P. Zaglauer
Program Assistant:	Marilyn J. Holgate

MISSION:

The mission of the Aldo Leopold National Wilderness Research Institute (ALWRI) is to obtain and provide information necessary to sustain wilderness resources in an ecologically and socially sound manner for the present and future. This mission is accomplished through research, technology transfer, education, cooperative studies, and partnerships within the Forest Service, other governmental agencies, non-governmental organizations (NGO's), and universities.

## BACKGROUND

The Aldo Leopold Wilderness Research Institute was established in 1993 by the U.S. Forest Service as an interagency effort to bring national and international focus to ecological and human dimensions research relevant to understanding and managing wilderness resources. The Institute, located on the campus of the University of Montana in Missoula, is an outgrowth of the U.S. Forest Service's Wilderness Management Research Unit of the Intermountain Research Station. With a mandate to both obtain and provide information, the Leopold Institute will conduct and support scientifically rigorous research as well as apply research findings to management needs.

The goals of the Institute are to provide a scientific basis for wilderness management; to integrate and coordinate research efforts; to conduct and expand wilderness research through a variety of partnerships with agencies, universities, and non-governmental organizations; to increase technology transfer of new and existing knowledge and information; and to increase technical assistance in national and international wilderness-related issues through research.

Together with the Arthur Carhart National Wilderness Training Center, the Leopold Institute is supported by an Interagency Agreement signed by the Forest Service, Bureau of Land Management, National Park Service, National Biological Survey, and Fish and Wildlife Service. Each of these agencies is represented by two members on an interagency Steering Committee that oversees activities of the Institute.

In accordance with its charter, the Leopold Institute will conduct research in at least four broad topic areas: (1) recreation and non-recreation uses, (2) physical, ecological and social characteristics and impacts on the wilderness resource, (3) development of monitoring protocols, and (4) developing information useful for wilderness management and education. Research projects will be accomplished through a combination of in-house, cooperative, and contract efforts. Over the coming months the Institute staff will work with the Steering Committee to review the charter and mission and to develop plans for implementing short- and long-term goals.

## 1994 HIGHLIGHTS

This report documents research activities supported by the Leopold Institute during FY 1994. It also lists professional and training activities accomplished by Institute staff during the past year. In addition, the following highlights should be noted:

-Institute Director (David J. Parsons) was hired effective May 16, 1994. Following over 20 years as a research scientist with the National Park Service and National Biological Survey, Dr. Parsons brings a wide breadth of experience in coordinating diverse research teams in a variety of ecological areas.

-Dr. Angela Evenden was appointed as adjunct scientist with the Institute. Angie, who serves in a dual appointment with the Northern Region and the Intermountain Station as RNA coordinator and botanist, will work with Institute scientists in developing a research agenda related to development of a monitoring strategy for ecological reference values in wilderness and other protected areas.

-Initial contacts were made with the four Department of Interior agencies; the Interagency Agreement was signed by all five participatory agencies; and Steering Committee members appointed. The first Steering Committee meeting is scheduled for November 1-3, 1994.

## BUDGET

The FY 1994 appropriated budget for the Leopold Institute was \$768,000. Funds contributed by other agencies and parties included the following:

University contributions to Research Joint Venture Agreements: \$103,136  
BLM: \$40,000  
USFS-Region 8: \$10,000  
USFS-Bitterroot Ecosystem Project: \$10,000  
Recreational Equipment, Inc. (REI): \$8,000  
National Outdoor Leadership School: \$5,000

At this time no budget increases are projected through at least FY 1996.

## RESEARCH PROGRAM

The 1994 research program of the Leopold Institute was based primarily around three Problem Areas that had been identified by the Wilderness Management Research Unit (INT-4901) with some expansion in scope to address the new Institute Charter.

### Problem 1

Research about (1) the quality of the wilderness resource and recreational experiences, (2) changes in quality over time, and (3) factors that influence those qualities.

#### Potential study areas:

recreational impacts on wildlife  
recreational impacts of packstock grazing  
sources of conflict between wilderness visitors  
trends in visitor use, behavior, attitudes, and preferences  
trends in ecological impacts  
factors that influence experience quality  
factors that influence ecological impact  
factors that influence landscape patterns

### Problem 2

Evaluative research on alternative management techniques, particularly in places that receive concentrated use.

#### Potential study areas:

improvement of site rehabilitation techniques  
improvement of packstock management techniques  
improvement of visitor education techniques  
high-use destination area--user attitudes and management techniques  
evaluation of use limitation techniques

### Problem 3

Research on appropriate indicators and standards and cost-effective monitoring techniques.

#### Potential study areas:

improvement of use estimation systems  
improvement of methods for monitoring visitor encounters  
improvement of campsite monitoring methods  
identify indicators of high-quality experiences  
identify indicators of the "health" of wilderness ecosystems  
identify visitor perceptions of appropriate standards

ALWRI-SUPPORTED RESEARCH PROJECTS IN FY 1994  
\* Studies Beyond the Data Collection Phase in FY 1994  
ADOR - Authorized Departmental Officer's Representative  
(staff member responsible for project)

PROBLEM 1: WILDERNESS RESOURCE AND EXPERIENCE QUALITY

- A.\* Trends in Wilderness Visitor Characteristics  
Principal Investigators: David Cole and Alan Watson (FS-ALWRI), Joe Roggenbuck (Virginia Tech)  
Purpose: Determine trends in visitor behavior, visitor characteristics, visitor preferences, and support for management strategies.  
Study Location: Desolation Wilderness (CA), Shining Rock Wilderness (NC), Boundary Waters Canoe Area Wilderness (MN)
- B. Use/Impact Relationships: Experimental Trampling and Camping Studies  
Principal Investigator: David Cole (FS-ALWRI)  
Purpose: Be able to predict the impacts associated with various amounts of use on environments that vary in their durability.  
Study Location: Cascades (WA), Rockies (MT, WY, CO), White Mtns (NH), Smokies (NC)
- C.\* Measuring Solitude Achievement and Examining Trends in Wilderness Visitor Characteristics  
Principal Investigators: Alan Watson (FS-ALWRI), Steve Hollenhorst (West Virginia University)  
Purpose: To develop and test specific measures of solitude achievement, relating this achievement to potential indicators, and examining trends in visitor reports about the importance of solitude and ability to achieve it.  
Study location: Eagle Cap Wilderness (OR); Linville Gorge Wilderness, (NC); Cohutta Wilderness (GA); Dolly Sods Wilderness (WV)
- D. Conflict Research in the Rattlesnake National Recreation Area  
Principal Investigator: Alan Watson (FS-ALWRI)  
Purpose: Define and measure the continuum of obtrusiveness of a list of proposed management strategies to reduce conflict between user groups.  
Study Location: Rattlesnake National Recreation Area and Wilderness
- E. Impacts of Habitat Fragmentation on Small Mammal Populations  
Principal Investigators: Peter Landres and Dave Spildie (FS-ALWRI)  
Purpose: Determine the effects of timber harvesting on lands adjacent to wilderness on small mammal populations within wilderness  
Study Location: Selway-Bitterroot Wilderness (MT)
- F. Influence of Riparian Vegetation Structure on Wildlife  
Principal Investigator: Peter Landres (FS-ALWRI)  
Purpose: Determine wildlife habitat relationships in riparian zones to investigate impacts of livestock and recreation on the wildlife that use or are dependent on riparian vegetation  
Study Location: Anaconda-Pintler Wilderness (MT)

- G. Ecological Impacts of Llamas  
Principal Investigator: David Cole (FS-ALWRI)  
Purpose: Assess the relative trampling impacts caused by llamas, horses, and hikers.  
Study Location: near Bob Marshall Wilderness (MT)
- H. Trends in Amounts of Visitor Use to Wilderness  
Principal Investigator: David Cole (FS-ALWRI)  
Purpose: Assess trends in amount of visitor use in the National Wilderness Preservation System since its inception in 1964
- I.\* Recreational Impact on Wildlife
- (1) Principal Investigators: Richard Knight (Colorado State University), David Cole (FS-ALWRI)  
Purpose: Review and synthesize existing knowledge about impacts of recreation on wildlife.
  - (2) Principal Investigators: Kevin Gutzwiller and Stanley Anderson (University of Wyoming)  
Purpose: Evaluate effects of recreational intrusions on animals in previously undisturbed places.  
Study Location: Medicine Bow Mountains (WY)
- J. On-site Wilderness Visitor Experiences  
Principal Investigators: Bill Stewart (Texas A&M), David Cole (FS-ALWRI)  
Purpose: Assess change in visitor experiences during the wilderness trip, how on-site experiences differ from post-trip evaluations of experiences, and how visitors to high-use places differ from visitors to low-use places.  
Study Location: Grand Canyon National Park (AZ)
- K. Campsite Impacts in the Midwest  
Principal Investigators: Doug McEwen (Southern Illinois University), David Cole (FS-ALWRI)  
Purpose: Evaluate campsite impacts and develop campsite monitoring techniques for wildernesses in the Midwest.  
Study Location: Garden of the Gods (IL) and Caney Creek Wildernesses (AR)
- L. Understanding the Nature and Management Implications of Short and Long Stay Wilderness Experiences  
Principal Investigators: Joe Roggenbuck and Bruce Hull (Virginia Tech), Alan Watson (FS-ALWRI)  
Purpose: Define the domains of a wilderness experience and determine how experiences develop and change during a wilderness visit  
Study Location: Juniper Prairie Wilderness (FL); Okefenokee Fish and Wildlife Refuge Wilderness (GA); Boundary Waters Canoe Area Wilderness (MN)

- M. **Packstock Impacts to Riparian and Aquatic Ecosystems**  
Principal Investigators: Charles Hawkins (Utah State University), Peter Landres (FS-ALWRI)  
Purpose: Review and synthesize the vast literature on grazing specifically for impacts to riparian and aquatic ecosystems in western U.S. wildernesses, and to provide a structured process for identifying research priorities on these impacts.
- N. **Impacts of Exotic Fish on Amphibian Populations**  
Principal Investigators: Charles Peterson (Idaho State University), Peter Landres (FS-ALWRI)  
Purpose: Quantify effects of fish stocking on amphibian populations in wilderness lakes, and develop methods and protocols for sampling amphibian distribution, relative abundance, and habitat associations in wilderness.  
Study Location: Frank Church-River of No Return Wilderness (ID)
- O. **Trampling Impacts on Arctic Tundra**  
Principal Investigators: Chrispher Monz (NOLS), David Cole (FS-ALWRI), Jeffrey Welker (Colorado State University)  
Purpose: Assess the response of moist and dry arctic tundra to trampling and altered temperatures.  
Study Location: BLM lands in the Brooks Range (AK)
- P.\* **Wilderness Visitor Experiences**  
Principal Investigators: Bill Hammitt and Scott Shafer (Clemson University) (ADOR: Alan Watson)  
Purpose: To increase knowledge about what influences the quality of visitor experiences, operationalizing privacy, primitiveness, and unconfinements.  
Study Location: Okefenokee Wildlife Refuge (GA), Cohutta Wilderness (GA)
- Q. **Packstock Impacts on Non-game Wildlife**  
Principal Investigator: Dan Pletscher (University of Montana) (ADOR: Peter Landres)  
Purpose: Assess the impacts of packstock on the diversity and population characteristics of birds and small mammals in wilderness.  
Study Location: Bob Marshall Wilderness (MT)
- R. **Effects of Exotic Fish Introductions on Lakes**  
Principal Investigator: Chuck Hawkins (Utah State University) (ADOR: Peter Landres)  
Purpose: Assess the impacts of exotic fish on other animals in wilderness lakes. Develop cost-effective techniques for monitoring wilderness lakes.  
Study Location: High Uintas Wilderness (UT)

- S. **Social Impacts and Management of Llamas as Recreational Packstock**  
 Principal Investigators: Dale Blahna (Utah State University), Kari Black (Ricks College) (ADOR: Alan Watson)  
 Purpose: To learn more about characteristics of llama use and users in wilderness and understand visitor perceptions, attitudes, and behaviors that may lead to conflict between llama use and other recreational users.  
 Study location: Yellowstone National Park (WY); Jedediah Smith Wilderness (ID)
- T. **Measuring Meanings and Consequences of Acceptability Judgments for Wilderness Impacts**  
 Principal Investigator: Mark Brunson (Utah State University) (ADOR: Alan Watson)  
 Purpose: To make available to managers and researchers a basis for understanding what wilderness visitors mean when they judge the acceptability or unacceptability of social and environmental conditions and to make available an instrument by which they can measure the broad spectrum of meanings of social acceptability.  
 Study location: Mt. Shasta Wilderness (CA); Bridger Wilderness (WY); High Uintas, Mt. Olympus, Twin Peaks, Lone Peak, Mt. Timpanogos, and Paria Canyon Wildernesses (UT)
- U.\* **Conceptual and Empirical Analysis of Visitors' Relationship to Wilderness**  
 Principal Investigator: Dan Williams (Virginia Tech) (ADOR: Alan Watson)  
 Purpose: To increase understanding of the attachment wilderness visitors experience for the wilderness resource.  
 Study location: Charles Deam Wilderness (IN); John Muir Wilderness (CA); Sequoia-Kings Canyon Wilderness (CA); Cohutta Wilderness (GA); Caney Creek Wilderness (AR); Upland Island Wilderness (TX); Rattlesnake Wilderness (MT)
- V.\* **Conflicts Between Recreation, Subsistence, and Commercial Use of Wildland Resources in Alaska**  
 Principal Investigator: Bob Muth (University of Massachusetts) (ADOR: Alan Watson)  
 Purpose: To develop a Problem Analysis on the conflict between recreation, subsistence, and commercial users of remote backcountry and wilderness of Alaska.
- W. **Perceptions of Wilderness Visitors About Livestock Grazing**  
 Principal Investigators: George Wallace (Colorado State University), John Mitchell (Rocky Mountain Forest and Range Experiment Station) (ADOR: Alan Watson)  
 Purpose: To determine the frequency of visitor encounters with sheep and cattle, whether visitors perceive negative or positive impacts from sheep and cattle grazing, visitor attitudes toward grazing issues, and to determine knowledge levels of visitors regarding grazing practices and management.  
 Study Location: Weminuche Wilderness (CO); West Elk Wilderness (CO); Flat Tops Wilderness (CO); High Uintas Wilderness (UT)



- X. The Meaning of Wilderness to Disadvantaged Job Corps Students Participating in Wilderness Discovery 7-day Backpacking Trip  
Principal Investigator: John Hendee (University of Idaho) (ADOR: Alan Watson)  
Purpose: Explore the meaning of a 7-day wilderness backpacking experience to economically disadvantaged youth participating in Job Corps training.  
Study Location: Timber Lake Civilian Conservation Center, Mt. Hood National Forest (OR); Trapper Creek Job Corps Center, Bitterroot National Forest (MT); Curlew Civilian Conservation Center, Colville National Forest (WA)
- Y. The Influence of a Wilderness Experiential Education Program on Environmental Ethics Development for Participants  
Principal Investigator: Wayne Freimund (University of Montana) (ADOR: Alan Watson)  
Purpose: To determine the influence on development of environmental ethics of participants in National Outdoor Leadership School programs in wilderness.  
Study Location: National Outdoor Leadership School, Lander, WY
- Z. Recreation Impacts on Lakes  
Principal Investigator: Richard Peterson (Portland State University) (ADOR: Peter Landres)  
Purpose: Quantify the impacts of day-use and overnight camping recreation to the physical, chemical, and biological characteristics of backcountry lakes.  
Study Location: Mt. St. Helens National Volcanic Monument (WA)
- AA. Campsite Impacts on Forest Structure  
Principal Investigator: James Taylor (Montana State University) (ADOR: David Cole)  
Purpose: Assess the impacts of camping on conifer stand structure.  
Study Location: Yellowstone National Park (WY)
- AB. Mapping Wilderness Fire Regimes  
Principal Investigators: Tom Swetnam (University of Arizona), Penny Morgan (University of Idaho) (ADOR: David Parsons)  
Purpose: Develop maps of past and potential future fire regimes (frequency, extent, severity, and seasonality of fire) in two contrasting Rocky Mountain wilderness landscapes.  
Study Location: Gila Wilderness (NM), Selway-Bitterroot Wilderness (MT)

**PROBLEM 2: MANAGEMENT OF CONCENTRATED RECREATION USE**

**A.\* Conditions, User Perceptions and Management Strategies at Concentrated Use Locations in 3 Pacific Northwest Wildernesses**

**Principal Investigators:** David Cole (FS-ALWRI), Troy Hall (FS-R6), Alan Watson (FS-ALWRI)

**Purpose:** To increase understanding of resource conditions, social conditions, and user attitudes about places in wilderness that receive concentrated use. To evaluate the effectiveness of management actions taken to mitigate resource and social impacts in such places.

**Study Location:** Alpine Lakes Wilderness (WA), Three Sisters and Mt. Jefferson Wildernesses (OR)

**B.\* Effects of Implementing a Use Limitation Program in Three Wilderness Areas in Oregon**

**Principal Investigators:** Alan Watson and David Cole (FS-ALWRI)

**Purpose:** To evaluate the consequences of implementing a use limit program in three wilderness areas through a visitor survey, an analysis of use distribution patterns, an inventory of number and condition of campsites, and an inventory of levels of visitor congestion and encounter rates.

**Study Location:** Three Sisters, Mt. Jefferson, and Mt. Washington Wildernesses (OR)

**C. Reducing Packstock Impacts on Wilderness Campsites**

**Principal Investigators:** Dave Spildie and David Cole (FS-ALWRI)

**Purpose:** Evaluate effectiveness of management actions intended to reduce packstock impacts on campsites in a subalpine lake basin: designated sites, highlines, visitor education, and site restoration.

**Study Location:** Selway-Bitterroot Wilderness (ID)

**D.\* Effectiveness of Bulletin Boards**

**Principal Investigators:** Tim Hammond and Steve McCool (University of Montana), David Cole (FS-ALWRI)

**Purpose:** Assess how the design of trailhead bulletin boards, particularly the number of messages, influences visitors' attention to and retention of low-impact messages.

**Study Location:** Selway-Bitterroot Wilderness (MT)

**E.\* Knowledge of Low-impact Practices**

**Principal Investigators:** Ed Krumpe (University of Idaho), David Cole (FS-ALWRI)

**Purpose:** Assess visitor knowledge about low-impact camping and travel techniques and test the effectiveness of different types of educational programs.

**Study Location:** Sawtooth Wilderness (ID) (probably)

- F. Improving Vegetation Establishment on Closed Subalpine Campsites  
Principal Investigators: Cathy Zabinski and Ray Callaway (University of Montana), David Cole (FS-ALWRI)  
Purpose: Identify factors that limit establishment and growth of subalpine vegetation on closed campsites and develop treatments to ameliorate limiting factors.  
Study Location: Great Burn Roadless Area (MT)
- G.\* Normative Violations in Outdoor Environments  
Principal Investigator: Tommy Swearingen (University of South Alabama) (ADOR: Alan Watson)  
Purpose: To determine the potential for explaining normative violations of low-impact behaviors in wilderness by applying ethical and moral reasoning research methods.  
Study Location: Angeles National Forest (CA)
- H.\* Revegetation of Damaged Sites  
Principal Investigators: Kathleen Johnson, David Perry, James Trappe, and Dan Luoma (Oregon State University) (ADOR: David Cole)  
Purpose: Improve our understanding of the role of mycorrhizae and other soil microbiota in the successful rehabilitation of damaged subalpine recreation sites.  
Study Location: Glacier National Park (MT)
- I.\* Restoration of Meadow and Aquatic Ecosystems Affected by Livestock Grazing  
Principal Investigators: Kathleen Matthews, Tom Dudley, Roland Knapp, and Dennis Odion (University of California) (ADOR: David Cole)  
Purpose: Evaluate effects of livestock exclosures on recovery of channel morphology, water quality, aquatic biology, and meadow vegetation. Evaluate effectiveness of existing techniques for monitoring livestock impacts.  
Study Location: Golden Trout Wilderness (CA)
- J.\* A Test Application of Norm Focus Theory in Wilderness Recreation Management.  
Principal Investigator: Mike Manfredo (Colorado State University) (ADOR: Alan Watson)  
Purpose: To determine the potential for norm focus theory (a theory from social psychology which differentiates between what people feel they should do (injunctive norm) and what they actually do (descriptive norm)) to contribute to managing wilderness recreation impact behaviors.

### PROBLEM 3: INDICATORS, STANDARDS, AND MONITORING TECHNIQUES

- A.\* Wilderness Recreation Use Estimation Methods  
Principal Investigators: Alan Watson and David Cole (FS-ALWRI), David Turner (FS-INT)  
Purpose: To develop a handbook on methods of describing wilderness recreation visit and visitor characteristics  
Study Location: Literature review and pilot testing of methods at the Cohutta (GA), Lewis Fork and Little Wilson Wildernesses (VA)
- B. Acquiring and Using Digital Data for GIS Applications in Wilderness  
Principal Investigators: Peter Landres and Dave Spildie (FS-ALWRI), Judith Fraser (FS-R1)  
Purpose: Develop guidelines for acquiring and using digital data within a GIS framework for wilderness planning and management.  
Study Location: Anaconda-Pintler Wilderness (MT)
- C. Assessing Landscape Patterns  
Principal Investigator: Peter Landres (FS-ALWRI)  
Purpose: To assess the ability of digital elevation models to predict vegetation type and landscape patterns.  
Study location: Anaconda-Pintler Wilderness (MT)
- D.\* Visitor Encounter Monitoring Techniques  
Principal Investigators: Bo Shelby (Oregon State University), Alan Watson (FS-ALWRI)  
Purpose: To develop and test systems for monitoring social conditions in wilderness  
Study Location: Alpine Lakes Wilderness (WA), Three Sisters, and Mt. Jefferson Wildernesses (OR), and Selway-Bitterroot Wilderness (ID)
- E. Acceptable Levels of Packstock Grazing  
Principal Investigators: Mitch McClaran (University of Arizona), Jan van Wagtenonk (Yosemite NP), David Cole (FS-ALWRI)  
Purpose: Assess relationship between different levels of meadow defoliation by packstock and vegetation condition of meadows.  
Study Location: Yosemite National Park (CA)
- F. Identifying and classifying montane riparian vegetation structure using GIS  
Principal Investigators: Hans Zuuring (University of Montana), Peter Landres (FS-ALWRI)  
Purpose: Develop methods that allow the rapid and accurate identification and classification of riparian and wetland vegetation in wilderness from digital data.  
Study Location: Anaconda-Pintler Wilderness (MT)

- G. Assessing the effects of spatial scale on the analysis of habitat suitability  
Principal Investigators: Karl Chang (University of Idaho), Peter Landres (FS-ALWRI)  
Purpose: Assess the influence of spatial scale (area a species occupies) on the analysis of habitat suitability in wilderness, and to develop guidelines for acquiring and analyzing digital data for this purpose.  
Study Location: Anaconda-Pintler Wilderness (MT)
- H. Monitoring the Health of Wilderness Streams  
Principal Investigator: Wayne Minshall (Idaho State University) (ADOR: Peter Landres)  
Purpose: Develop methods and sampling protocols for assessing the status of natural and human-impacted wilderness stream ecosystems.  
Study Location: Northern Rocky Mountain wilderness
- I. Threats to Wilderness at the Watershed Scale  
Principal Investigator: Thomas Wentworth (North Carolina State University) (ADOR: Peter Landres)  
Purpose: Develop and test interactive computer software that provides visualizations and descriptive statistics for drainage basins in wilderness.  
Study Location: Ellicott Rock Wilderness (NC-SC-GA)

## STUDY LOCATIONS

\* Studies Beyond the Data Collection Phase in FY 1994

### Forest Service

- R-1: Selway-Bitterroot Wilderness, MT, visitor education evaluation\*  
Selway-Bitterroot Wilderness, ID, campsite impacts and recovery  
Selway-Bitterroot Wilderness, ID, encounter monitoring  
Selway-Bitterroot Wilderness, MT, habitat fragmentation impacts  
Selway-Bitterroot Wilderness, MT, fire regimes  
Anaconda-Pintler Wilderness, MT, GIS applications  
Anaconda-Pintler Wilderness, MT, analysis of habitat suitability  
Anaconda-Pintler Wilderness, MT, riparian wildlife relationships  
Anaconda-Pintler Wilderness, MT, identifying riparian vegetation  
Anaconda-Pintler Wilderness, MT, identifying landscape patterns  
Bob Marshall Wilderness, MT, visitor perceptions of fire  
Great Burn roadless area, MT, campsite revegetation  
near Bob Marshall Wilderness, MT, llama impacts  
Rattlesnake Wilderness & NRA, MT, conflict management
- R-2: Comanche Peak Wilderness, CO, trampling and camping impacts\*  
Popo Agie Wilderness, WY, trampling and camping impacts  
Weminuche Wilderness, CO, visitor perceptions of grazing  
West Elk Wilderness, CO, visitor perceptions of grazing  
Flat Tops Wilderness, CO, visitor perceptions of grazing
- R-3: Gila Wilderness, NM, fire regimes
- R-4: High Uintas Wilderness, UT, exotic fish introductions  
High Uintas Wilderness, UT, visitor perceptions of grazing  
Sawtooth Wilderness, ID, low-impact knowledge and visitor education  
Jedediah Smith Wilderness, WY, visitor survey  
Frank Church-River of No Return Wilderness, ID, monitoring stream ecosystems  
Frank Church-River of No Return Wilderness, ID, exotic fish impacts  
Bridger Wilderness, WY, visitor judgments of social acceptability  
High Uintas Wilderness, UT, visitor judgments of social acceptability  
Mt. Olympus Wilderness, UT, visitor judgments of social acceptability  
Twin Peaks Wilderness, UT, visitor judgments of social acceptability  
Lone Peak Wilderness, UT, visitor judgments of social acceptability  
Mt. Timpanogos Wilderness, UT, visitor judgments of social acceptability  
Grand Gulch Primitive Area, UT  
Paria Canyon Wilderness, UT, visitor judgments of social acceptability
- R-5: Desolation Wilderness, CA, user survey, trends\*  
Golden Trout Wilderness, CA, livestock grazing impacts and recovery  
Mt. Shasta Wilderness, CA, visitor judgments of social acceptability

- R-6: Pasayten Wilderness, WA, trampling and camping impacts\*  
Three Sisters Wilderness, OR, campsite impacts, trends, user survey\*  
Mt. Jefferson Wilderness, OR, visitor survey, resource inventory\*  
Mt. Washington Wilderness, OR, visitor survey, resource inventory\*  
Alpine Lakes Wilderness, WA, visitor survey, resource inventory\*  
Eagle Cap Wilderness, OR, visitor survey, solitude\*  
Hells Canyon Wilderness, OR, visitor survey  
Mt. St. Helens National Monument, WA, recreation impacts to lakes
- R-8: Cohutta Wilderness, GA, use estimation, visitor survey\*  
Caney Creek Wilderness, AR, campsite impacts  
Upper Buffalo Wilderness, AR, campsite impacts  
Shining Rock Wilderness, NC, user survey, trends\*  
Ellicott Rock Wilderness, NC-SC-GA, mapping applications  
Linville Gorge Wilderness, NC, visitor survey\*  
Mt. Rogers National Recreation Area, VA, use estimation\*  
Juniper Prairie Wilderness, FL, visitor survey
- R-9: Boundary Waters Canoe Area Wilderness, MN, user survey, trends\*  
Great Gulf Wilderness, NH, trampling and camping impacts\*  
Garden of the Gods Wilderness, IL, campsite impacts  
Hercules Glades Wilderness, MO, campsite impacts  
Dolly Sods Wilderness, WV, visitor survey\*

National Park Service

Great Smoky Mountains National Park, TN-NC, trampling/camping impact\*  
Yosemite National Park, CA, packstock impacts and monitoring  
Glacier National Park, MT, site restoration  
Grand Canyon National Park, AZ, visitor survey  
Yellowstone National Park, WY, visitor survey\*  
Yellowstone National Park, WY, campsite impacts

Fish and Wildlife Service

Okefenokee Wilderness, GA, visitor survey

Bureau of Land Management

Brooks Range, AK, trampling impacts

TRAINING SESSIONS/WORKSHOPS/SITE VISITS (OTHER THAN RESEARCH)  
BY INSTITUTE STAFF  
October 1993 - September 1994

Forest Service

- National: National Advanced Wilderness Management for Line Officers,  
Huson, MT: 6/94  
Regional Wilderness Specialists Meeting, Charleston, SC: 11/93  
Workshop on Human Dimension Research, Washington, DC: 5/94  
Salish-Kootenai College, Arlee, MT: 6/94
- R-1: Winter Wilderness Managers Conference, Missoula, MT: 1/94  
Selway-Bitterroot Wilderness LAC Meeting, Powell RS, MT: 1/94  
Bob Marshall Wilderness LAC Meeting, Kalispell, MT: 2/94  
Anaconda-Pintler Wilderness Coordinators meeting, Wisdom, MT: 3/94  
Wilderness Ranger Rendezvous, Spotted Bear, MT: 8/94
- R-3: Site visit to Gila Wilderness, AZ: 5/94
- R-4: Ecosystem Management Conference, Jackson Hole, WY: 5/94  
Research-Management Roundtable, Ephraim, UT: 9/94
- R-6: Native Species Conference, Bend, OR: 3/94
- R-9: Site visit to Superior National Forest, Duluth, MN: 9/94

Other Federal Agencies

- NPS: Task Force on Wilderness Management, Washington, DC: 11/93  
Resource Management Plan Scoping Session, Grand Canyon, AZ: 2/94  
Site visit to Joshua Tree National Monument, CA: 2/94  
Site visit to Glacier National Park, MT: 8/94



## PROFESSIONAL ACTIVITIES OF INSTITUTE STAFF

### Advisory Board/Task Force Participation

Research Advisory Board for National Outdoor Leadership School, Lander, WY  
(Cole, Landres)  
Advisory Board for the Wilderness Institute, University of Montana, Missoula  
(Cole)  
Member, Strategic Task Force on Wilderness Management for R-5 (Cole)  
Member, Policy Review Committee, organizational ad hoc committee, International  
Journal of Wilderness Science, Education and Management (Watson)  
Member, Steering Committee, Institute for Tourism and Recreation Research,  
University of Montana (Watson)  
Wilderness Interdisciplinary Team, Northern Region, USDA Forest Service  
(Watson, Landres)  
Member, Ecological Society of America ad hoc committee on Ecosystem Management  
(Parsons)  
Member, National Park Service Wilderness Task Force (Parsons)  
Consultant to Carhart Wilderness Training Center on training materials (Cole,  
Landres, Watson)

### Editorial/Review Activities

Contributing book review editor for Journal of Forestry and Environmental  
Management (Cole)  
Associate Editor, Journal of Leisure Research (Watson)  
Guest Editor, Theme Issue on Conflicting Demands on Natural Resources, Leisure  
Sciences (Watson)  
Associate Editor, Ecological Applications (Parsons)  
Guest Editor, Ecological Applications (Cole)  
Journal reviews for Natural Areas Journal, Society and Natural Resources,  
Environmental Management, Ecological Applications, and Ecology, and book  
prospectus reviews for John Wiley & Sons and Blackwell Scientific (All)

### Special Assignments

Co-Chair, National Recreation and Park Association Leisure Research Symposium,  
1993 & 1994 (Watson)  
Session Chair, 5th International Symposium on Society and Resource Management,  
Ft. Collins, CO (Watson)  
Co-sponsor/steering committee member, 4th International Outdoor Recreation and  
Tourism Trends Symposium (Watson)  
Member, Sierra Nevada Ecosystem Project Science Team (Parsons)

### Presentations

Presenter, Social Aspects of Recreation Research, San Diego, CA: 2/94 (Watson)  
Guest Speaker, Wilderness and Civilization Lecture Series, University of  
Montana (Watson, Landres)  
Invited Speaker, Northeast Recreation Research Conference, Saratoga Springs, NY  
(Watson)  
Presenter, College of Forestry, Virginia Tech and Southeast Forest Experiment  
Station, Athens, GA (Watson)  
Invited speaker, Cinnabar Foundation Wilderness Forum, Bozeman, MT (Watson)

Presenter, 5th International Symposium of Society and Resource Management,  
Ft. Collins, CO (Watson)

Presenter, 5th World Wilderness Conference, Tromso, Norway (Landres)

Guest Speaker, Landscape Ecology Series, University of Montana (Landres)

Invited Speaker, Conservation Biology Seminar Series, University of Montana  
(Landres)

Other

Affiliate Faculty, University of Montana and University of Idaho (Cole,  
Landres, Parsons, Watson)

International Skills Roster of forestry and natural resources expertise, U.S.  
Agency for International Development (USAID) (Watson, Parsons)

PUBLICATIONS PRODUCED  
October 1993 - September 1994

Basman, Cem; Barro, Susan; Watson, Alan. 1994. An examination of recreation norm salience: an exploratory study. Book of Abstracts, The Fifth International Symposium on Society and Resource Management; 1994 June 7-10; Ft. Collins, CO: Colorado State University: 189.

Cole, David N. 1993. Wilderness research news. Master Network 4:3-4.

Cole, David N. 1994. Adapting LNT to different situations. Master Network 5:3-4.

Cole, David N. 1994. Backcountry impact management: lessons from research. Washington, DC: Trends. 31(3):10-14.

Cole, David N. 1994. Rationale behind fore building and wood gathering practices. Master Network 7:3, 12.

Cole, David N. 1994. The wilderness threats matrix: a framework for assessing impacts. Research Paper INT-475, Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 14 p.

Cole, David N. 1994. Wilderness restoration: toward a broad and long-term perspective. The Native Species Conference; 19\_\_ March 1-3; Bend, OR. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 7 p.

Cordell, H. Ken; McDonald, Barbara L.; Lewis, Burt; Watson, Alan; Miles, Morgan; Bowker, J.M. 1994. Variability of attitudes and values among social strata regarding wilderness and wildlife. Book of Abstracts, The Fifth International Symposium on Society and Resource Management; 1994 June 7-10; Ft. Collins, CO: Colorado State University: 150-151.

Daigle, John J.; Watson, Alan E.; Haas, Glenn E. 1994. National forest trail users: planning for recreation opportunities. Research Paper NE-685, Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 13 p.

Hollenhorst, Steve; Frank, Ernest, III; Watson, Alan. 1994. The capacity to be alone: wilderness solitude and growth of the self. In: Hendee, John C.; Martin, Vance G., eds. Proceedings of a symposium during the 5th World Wilderness Congress; 1993 September; Tromso, Norway. Ft. Collins, CO: The WILD Foundation: 234-239.

Landres, Peter. 1994. Ecological indicators: panacea or liability? In: McKenzie, D.H.; Hyatt, D.E.; McDonald, V.I., eds. Ecological indicators. Vol. 2. Amsterdam: Elsevier Applied Scientific Publishers: 1295-1318.

Landres, Peter; Cole, David; Watson, Alan. 1994. A monitoring strategy for the National Wilderness Preservation System. In: International wilderness allocation, management and research, J.C. Hendee and V.G. Martin, eds. International Wilderness Leadership Foundation, Fort Collins, CO: 192-197.

Riddick, Carol Cutler; Watson, Alan. 1993. Abstracts of the Proceedings of the 1993 NRPA Leisure Research Symposium. 1993 National Congress for Recreation and Parks; 1993 October 21-23; San Jose, CA. Arlington, VA: National Recreation and Park Association. 104 p.

Watson, Alan E.; Niccolucci, Michael J.; Williams, Daniel R. 1993. Hikers and recreational stock users: predicting and managing recreation conflicts in three wildernesses. Research Paper INT-468, Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 35 p.

Watson, Alan E.; Cronn, Richard. 1994. How previous experience relates to visitors' perceptions of wilderness conditions. Washington, DC: Trends. 31(3):43046.

Watson, Alan; Freysinger, Valeria J. 1994. Abstracts of the Paper and Poster Presentations at the 1994 NRPA Leisure Research Symposium. 1994 National Congress for Recreation and Parks; 1994 October 12-15; Minneapolis, MN. Arlington, VA: National Recreation and Park Association. 103 p.

Watson, Alan E.; Muth, Robert M.; Williams, Daniel R. 1994. The contribution of recreation conflict research to natural resource management decisions. Book of Abstracts, The Fifth International Symposium on Society and Resource Management; 1994 June 7-10; Ft. Collins, CO: Colorado State University: 245.

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Cole, David N. [In press]. Book review. The idea of wilderness: from prehistory to the age of ecology. Environmental Management.

Cole, David N. [In press]. Defining fire and wilderness objectives: applying limits of acceptable change. In: Fire in wilderness and park management. General Technical Report INT-\_\_\_, Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

Cole, David N. [In press]. Disturbance of natural vegetation by camping: experimental applications of low-level stress. Environmental Management.

Cole, David N. [In press]. Experimental trampling of vegetation. I. Relationship between trampling intensity and vegetation response. Journal of Applied Ecology.

Cole, David N. [In press]. Experimental trampling of vegetation. II. Predictor of resistance and resilience. Journal of Applied Ecology.

Cole, David N. [In press]. Recreational trampling experiments: effect of trampler weight and shoe type. Research Note INT-\_\_\_, Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

Cole, David N. [In press.] Restoration: past, present, and future. In: Restoration Training Manual. Huson, MT: U.S. Department of Agriculture, Forest Service, Arthur Carhart Training Center.

Cole, David N. [In press]. Wilderness management principles: science, logical thinking, or personal opinion. Trends.

Cole, David N.; Evenden, Angela. [In press]. Wilderness ecology and user impacts. In: Wilderness research state of knowledge and research needs. General Technical Report SE-\_\_\_\_. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station.

Cole, David N.; Landres, Peter B. [In press]. Indirect effects of recreation on wildlife. In: Knoght, R.L.; Gutzwiller, J.J., eds. Wildlife and recreationists: coexistence through management and research. Covelo, CA: Island Press.

Knight, Richard L.; Cole, David N. [In press]. Factors that influence wildlife responses to recreationists. In: Knoght, R.L.; Gutzwiller, J.J., eds. Wildlife and recreationists: coexistence through management and research. Covelo, CA: Island Press.

Knight, Richard L.; Cole, David N. [In press]. Wildlife responses to recreationists. In: Knoght, R.L.; Gutzwiller, J.J., eds. Wildlife and recreationists: coexistence through management and research. Covelo, CA: Island Press.

Landres, P.B. [In press]. An ecological perspective on wilderness campsite restoration. In: Restoration Training Manual. Huson, MT: U.S. Department of Agriculture, Forest Service, Arthur Carhart Training Center.

Landres, P.B. [In press]. The role of ecological inventorying and monitoring in managing wilderness. Trends

Watson, Alan E. [In press]. Opportunities for solitude in the Boundary Waters Canoe Area Wilderness. Northern Journal of Applied Forestry.

Watson, Alan E. [In press]. The importance of wilderness impact site restoration to visitor experiences. In: Restoration Training Manual. Huson, MT: U.S. Department of Agriculture, Forest Service, Arthur Carhart Training Center.

Watson, Alan E.; Niccolucci, Michael J. [In press]. Conflicting goals of wilderness management: natural conditions vs. natural experiences. Proceedings - Social Aspects of Recreation Research; 1994 February; San Diego, CA.

Watson, Alan E.; Niccolucci, Michael J.; Williams, Daniel R. [In press]. The nature of conflict between hikers and recreational stock users in the John Muir Wilderness. Journal of Leisure Research.

Publications by cooperators (October 1993 - September 1994)

Barbisan, D.J. 1993. Chromium-mordanted oats and 4N-HCL insoluble ash as indicators of fecal output, dry matter digestibility and dry matter intake of horses. M.S. thesis, Montana State University, Bozeman.

Gutzwiller, K.J.; Wiedenmann, R.T.; Clements, K.L.; Anderson, S.H. 1994. Effects of human intrusion on song occurrence and singing consistency in subalpine birds. The Auk. 111:28-37.

Hammitt, William. 1994. The psychology and functions of wilderness solitude. In: Hendee, John C.; Martin, Vance G., eds. Proceedings of a symposium during the 5th World Wilderness Congress; 1993 September; Tromso, Norway. Ft. Collins, CO: The WILD Foundation: 227-233.

Hammond, T.P. 1994. Factors affecting attention to and retention of low-impact messages on trailside bulletin boards. M.S. thesis, University of Montana, Missoula.

Molitor, Amy Braithwaite and McCool, Stephen F. 1994. Is fear arousal an effective method of persuading backcountry visitors to adopt behaviors to reduce confrontations with grizzly bears? Book of Abstracts, The Fifth International Symposium on Society and Resource Management; 1994 June 7-10; Ft. Collins, CO: Colorado State University: 120.

Patterson, Michael E. 1993. The normative structure of science, hermeneutics, and leisure experience. Ph.D. dissertation. Virginia Polytechnic Institute and State University, Blacksburg, VA. 287 p.

Patterson, Michael E.; Williams, Daniel R. 1994. A hermeneutic research program for gathering data to help achieve diversity in wildland recreation opportunities. In: Watson, Alan; Freysinger, Valeria J., eds. Abstracts of the Paper and Poster Presentations at the 1994 NRPA Leisure Research Symposium. 1994 National Congress for Recreation and Parks; 1994 October 12-15; Minneapolis, MN. Arlington, VA: National Recreation and Park Association: 45.

Patterson, Michael E.; Williams, Daniel R. 1994. The normative structure of science in wildland recreation research: an analysis of research programs representing a range of paradigmatic commitments. Book of Abstracts, The Fifth International Symposium on Society and Resource Management; 1994 June 7-10; Ft. Collins, CO: Colorado State University: 222.

Patterson, Michael; Williams, Daniel; Scherl, Lea. 1994. Identity and the experience of wilderness: analysis of experience narratives from Australia and the United States. In: Hendee, John C.; Martin, Vance G., eds. Proceedings of a symposium during the 5th World Wilderness Congress; 1993 September; Tromso, Norway. Ft. Collins, CO: The WILD Foundation: 240-246.

Shafer, C. Scott; Hammitt, William E. 1994. Relationships between user/resource dimensions, condition indicators, and coping behaviors in wilderness. In: Watson, Alan; Freysinger, Valeria J., eds. Abstracts of the Paper and Poster Presentations at the 1994 NRPA Leisure Research Symposium. 1994 National Congress for Recreation and Parks; 1994 October 12-15; Minneapolis, MN. Arlington, VA: National Recreation and Park Association: 50.

Silverberg, Kenneth E.; Shafer, C. Scott; Hammitt, William E. 1994. Multidimensional orientations toward a wilderness recreation experience: applying descriptors of designated wilderness. Book of Abstracts, The Fifth International Symposium on Society and Resource Management; 1994 June 7-10; Ft. Collins, CO: Colorado State University: 234-235.

Smith, Kari S.; Blahna, Dale J. 1994. Conflict and the nontraditional backcountry user: the social impacts and management of llamas as recreational

packstock. Book of Abstracts, The Fifth International Symposium on Society and Resource Management; 1994 June 7-10; Ft. Collins, CO: Colorado State University: 236-237.

Stubbs, Christopher; Roggenbuck, Joseph W. 1994. Assessing and improving wilderness recreationists' low-impact knowledge, behavioral intentions, and behavior. Book of Abstracts, The Fifth International Symposium on Society and Resource Management; 1994 June 7-10; Ft. Collins, CO: Colorado State University: 299-300.

Swearingen, Thomas C. 1994. The development of environmental ethical reasoning: a theoretical synthesis. Book of Abstracts, The Fifth International Symposium on Society and Resource Management; 1994 June 7-10; Ft. Collins, CO: Colorado State University: 300-301.

Wilson, J.P.; Seney, J.P. 1994. Erosional impact of hikers, horses, motorcycles, and off-road bicycles on mountain trails in Montana. Mountain Research and Development 14:77-88.

ACTIVE EXTRAMURAL AGREEMENTS

<u>Short title</u>	<u>Cooperator (University)</u>	<u>Date begun</u>
1. Normative violation assessment techniques	Swearingen (South Alabama)	8/90
2. Trampling/camping impacts in the Wind Rivers	NOLS	8/91
3. Subsistence issues in wilderness	Muth (Massachusetts)	6/92
4. Investigation of norms	Manfredo (Colorado State)	6/92
5. Indicators of solitude	Hollenhorst (West Virginia)	7/92
6. On-site wilderness experiences	Stewart (Texas A&M)	7/92
7. Mycorrhizae and site restoration	Trappe/Luoma (Oregon State)	7/92
8. Social aspects of llama use in wilderness	Blahna (Utah State)	5/93
9. Campsite impacts in the Midwest	McEwen (Southern Illinois)	6/93
10. Livestock grazing impacts and recovery	Knapp (California)	6/93
11. Visitor knowledge of low-impact techniques	Krumpe (Idaho)	6/93
12. Assessing the acceptability of wilderness conditions	Brunson (Utah State)	7/93
13. Packstock impacts on non-game animals	Pletscher (Montana)	8/93
14. Impacts of exotic fish introductions	Hawkins (Utah State)	8/93
15. Indicators of impact to aquatic ecosystems	Minshall (Idaho State)	8/93
16. Watershed impact software development	Wentworth (North Carolina State)	8/93
17. Visitor perceptions of livestock grazing	Wallace (Colorado State)	3/94
18. Meaning of wilderness to Job Corps students	Hendee (Idaho)	5/94
19. Effects of a wilderness experiential education program	Freimund (Montana)	6/94
20. Identification of riparian vegetation using GIS	Zuuring (Montana)	6/94
21. Revegetation of subalpine campsites	Zabinski/Callaway (Montana)	7/94
22. Recreation impact on lakes	Peterson (Portland State)	7/94
23. Understanding short and long stay wilderness experiences	Roggenbuck (Virginia Tech)	7/94
24. Fish stocking impacts on amphibians	Peterson (Idaho State)	7/94
25. Grazing impacts on riparian and aquatic systems	Hawkins (Utah State)	7/94
26. Spatial scale and habitat suitability analysis	Chang (Idaho)	7/94
27. Fire regimes in Rocky Mountain Wilderness	Swetnam (Arizona)	8/94