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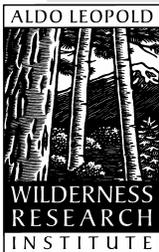
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# ANNUAL ACTIVITIES SUMMARY

## October 2005 - September 2006 (FY 2006)

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### ALDO LEOPOLD WILDERNESS RESEARCH INSTITUTE

THE MISSION OF the Aldo Leopold Wilderness Research Institute (ALWRI) is to provide scientific leadership in developing and using the knowledge needed to sustain wilderness ecosystems and values. This mission is accomplished through international leadership in research, technology transfer, education, and partnerships with governmental agencies, non-governmental organizations (NGO's), and universities.

DAVID J. PARSONS, *Program Director*  
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LAURA DOUGHTY, *Office Assistant*

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CAROL MILLER, *Research Ecologist*  
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ANNE BLACK, *Post-doc. Research Ecologist*  
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# Introduction

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The Aldo Leopold Wilderness Research Institute was established in 1993 as an interagency effort to bring national and international focus to ecological and human dimensions research relevant to understanding and managing wilderness and similarly protected areas. The Institute, located on the campus of the University of Montana in Missoula, is an outgrowth of the USDA Forest Service's Wilderness Management Research Work Unit, which was created in 1967 under the Intermountain Research Station. It is now managed through the Rocky Mountain Research Station, headquartered in Fort Collins, Colorado. With a mandate to both develop and provide information, the Leopold Institute aims to conduct and support scientifically rigorous research as well as apply research findings to management needs.

The primary goals of the Leopold Institute are: (1) to develop the scientific knowledge needed to protect and sustain wilderness and the ecological and social values derived from wilderness, and, (2) to communicate and facilitate the application of this knowledge to the wilderness management agencies and other interested groups. These goals are accomplished by coordinating efforts between agencies; conducting and expanding wilderness research through a variety of partnerships with agencies, universities, and non-governmental organizations; and increasing the application of new and existing knowledge and information. The Institute is committed to forging closer interactive ties between managers and scientists.

The Leopold Institute is supported by an Interagency Memorandum of Understanding signed by the USDA Forest Service, the USDI Bureau of Land Management, National Park Service, Fish and Wildlife Service, and U.S. Geological Survey. Representatives of each of these agencies work with the Leopold Institute to provide support and direction. Mechanisms for this collaboration include the national level interagency Wilderness Policy Council and Wilderness Steering Committee as well as individual contacts with wilderness managers and scientists.

The 2006 program of work reported on in this document is guided by the Leopold Institute's 2005 Program Charter. This Charter identifies important roles in the conduct, support, and facilitation of scientifically rigorous research and addresses the role of the Institute in providing research application and science delivery, as well as the importance of collaboration and partnerships. The Program Charter identifies five principle Problem areas which emphasize the importance of multidisciplinary approaches to challenging issues that face wilderness managers. The five problem areas identified in the charter are:

- Problem 1. Inadequate understanding of recreation experiences and the impacts of recreation hamper efforts to preserve and protect wilderness resources and experiences.
- Problem 2. Improved information is needed on how relationships between people and lands protected for their wilderness values affect and are affected by management policies and actions.
- Problem 3. There is a need for improved information to guide the stewardship of fire as a natural process in wilderness while protecting social and ecological values inside and outside wilderness.
- Problem 4. There is a lack of adequate understanding of how wilderness stewardship is influenced by the location of wilderness within larger ecological and social systems.
- Problem 5. There is a need to improve the delivery and application of scientific knowledge and tools pertinent to wilderness stewardship.

This report summarizes activities and accomplishments during FY 2006 (Oct. 1, 2005 to Sept. 30, 2006). Additional details about the Leopold Institute, its Program Charter, and Institute programs can be found at <http://leopold.wilderness.net>.

## **LEOPOLD INSTITUTE STAFF**

Additional bibliographic information on the Leopold Institute staff can be found on our website at <http://leopold.wilderness.net/staff/staff.htm>

### **Research Scientist Staff**

- David J. Parsons – Director; Ecologist
- Anne Black – Post Doctoral Fire Ecologist
- David N. Cole – Research Geographer
- P. Stephen Corn – Research Zoologist (USGS)
- Peter B. Landres – Research Ecologist
- Carol Miller – Research Fire Ecologist
- David Pilliod – Post Doctoral Research Aquatic Ecologist
- Alan E. Watson – Research Social Scientist

### **Research Support Staff**

- Neal A. Christensen – Social Science Analyst
- Brett Davis – GIS Specialist
- Blake Hossack – Zoologist, Herpetology (USGS)
- Katie Knotek – Social Science Research Associate
- Adam Liljeblad – Social Science Research Associate
- Janet Sproull – Research Assistant, World Wilderness Congress

### **Research Application Staff**

- Vita Wright – Research Application Program Leader
- Suzanne Schwartz – Wilderness Forestry Tech and Web Developer
- Tammy Mildestein – Ecology Specialist

## **Program Support Staff**

- Danette Paige – Support Services Specialist
- Sarah Parker –Office Assistant
- Laura Doughty –Office Automation Clerk

## **GENERAL HIGHLIGHTS: FY 2006**

- ◆ David Parsons initiated a new project with the National Park Service to re-sample campsites in Sequoia and Kings Canyon National Parks. These sites were initially inventoried in the late-1970's and provide a valuable baseline for tracking change.
- ◆ David Parsons served as a member of the planning committee for the 2007 George Wright Society Conference to be held in St. Paul, MN.
- ◆ David Parsons participated as a member of Ecological Society of America's proposal review panel for the National Park Foundation/Andrew Mellon Foundation's program to support post doctoral students working on plant studies in national parks.
- ◆ David Parsons was appointed as lead of RMRS Strategic Program Area (SPA) team for Recreation. The team is charged with developing a strategic plan for the future of the Station's recreation research program. David Cole serves as a co-lead on this team.
- ◆ David Parsons continues to serve on the committee to review proposals submitted to Grand Teton Natural History Association for graduate studies on the Greater Yellowstone Area through the Boyd Evison fellowship.
- ◆ David Cole, in collaboration with Troy Hall at the University of Idaho, completed fieldwork on a series of nine studies related to management of visitors in highly used wilderness in the Pacific Northwest. Additional information about these studies and resultant reports are available on the Leopold Institute's website at: [http://leopold.wilderness.net/research/fprojects/F007\\_B.htm](http://leopold.wilderness.net/research/fprojects/F007_B.htm).
- ◆ David Cole developed a new agreement with the University of Montana to host a workshop in spring of 2007 on, "Beyond naturalness: desired conditions for protected area environments."
- ◆ David Cole initiated a new project on restoration of subalpine campsites in the Sawtooth Wilderness, Idaho, including an agreement with the University of Montana to study soil restoration.
- ◆ David Cole served on the steering committee for the Third International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas, held September 13-17, 2006 in Rapperswil, Switzerland.
- ◆ Alan Watson received an award from the 8<sup>th</sup> World Wilderness Congress and the International Journal of Wilderness for international leadership in wilderness science, October 2005, Anchorage, Alaska.
- ◆ Alan Watson provided funding and mentoring to 4 international students (China, Brazil, Zambia and Canada) at the 8th World Wilderness Congress in Anchorage, Alaska.
- ◆ Alan Watson served as Editor of a special issue of the International Journal of Wilderness, "Anticipating change for wildland fire use in wilderness ecosystems," April 2006. Katie Knotek organized the symposium at the 8<sup>th</sup> World Wilderness Congress on which the special issue was based.

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- ◆ Alan Watson provided consultation with Northwest Russia Association of National Parks and Zapovednik Directors, October 2005, Lake Ladoga, Russia.
- ◆ Alan Watson acted as Fulbright Senior Protected Area Specialist to the Komarov Botanical Institute, Russian Academy of Sciences, St. Petersburg and Moscow, Russia, October 2005.
- ◆ Alan Watson initiated the following three research projects in FY2006: “Factors of change influencing experiences and relationships with Wilderness: implications for stewardship,” “Mapping personal and community meanings for planning and use of wildland fire and forest fuels treatments,” and “GIS applications in mapping community meanings for fuel treatment analysis.”
- ◆ Alan Watson completed the following two research projects in FY2006: “The Situk River, Yakutat Resident Study: A Report on Local Relationships to Place” (with Neal Christensen), and “Managing with Mindfulness: Learning from High Reliability Organizations to Improve Public Outreach for Fire and Fuels Management” (with Anne Black).
- ◆ Alan Watson was appointed RMRS National Fire Plan Portfolio head for Social Science.
- ◆ Peter Landres received the Forest Service National Wilderness Award for "Excellence in Wilderness Stewardship Research". Peter was awarded for his outstanding accomplishments in developing and implementing a national protocol for monitoring wilderness character. He was nominated by a group of national forest managers and the Washington Office.
- ◆ Peter Landres secured agreement from the National Wilderness Program Leaders from each of the four wilderness management agencies to work together developing recommendations for a single protocol to monitor wilderness character across the entire National Wilderness Preservation System. Additional project details are available on the Leopold Institute website at: <http://leopold.wilderness.net/research/fprojects/F014.htm>.
- ◆ Peter Landres completed the pilot testing of the new wilderness character monitoring protocol at the end of June 2006. Pilot testing was conducted in all nine Forest Service regions: on-site pilot testing was conducted at 4 locations, and off-site testing was conducted at 5 locations.
- ◆ Peter Landres Completed the 230-page Technical Guide for Monitoring Selected Conditions Related to Wilderness Character.
- ◆ Peter Landres served as co-lead of the Steering Committee developing a new Arthur Carhart National Wilderness Training interagency course: “Natural and Cultural Resources Monitoring in Wilderness.”
- ◆ Carol Miller initiated a three year Joint Fire Science funded project to improve and evaluate approaches for mapping burn probabilities in a quantitative wildland fire risk analysis framework. She will be lead PI on this three year collaborative project with Mark Finney (*Rocky Mountain Research Station*), Alan Ager (*Pacific Northwest Research Station*) and Marc Parisien (*Canadian Forest Service/UC Berkeley*).
- ◆ Carol Miller served on the Steering Committee for the “1st Fire Behavior and Fuels Conference,” held in Portland, OR in March 2006 and had lead responsibility for organizing a special panel session on WFU.

## Highlights

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- ◆ Carol Miller participated in Rocky Mountain Research Station's fire ecology research strategy meeting (Sep 20-22) during which a fire ecology research agenda was created for the Station. This agenda will likely be used to facilitate cross-station collaboration of National Fire Plan research.
- ◆ Carol Miller developed cooperative agreements for three projects to capture "deep smarts" of WFU (Wildland fire use) managers, to look at WUI (Wildland urban interface) and its growth relative to wilderness areas and WFU opportunities and to collect an additional year of post-fire data on stream communities.
- ◆ Carol Miller served on a committee for improving the understanding of Wilderness values by fire management staff so that suppression activities do not unnecessarily impact these values. A guidebook was drafted for Wilderness administrators to distribute to incident management teams.
- ◆ Steve Corn lead a workshop session on stressors of amphibian populations at the 2nd Alaska Amphibian Conference in Juneau, AK.
- ◆ Steve Corn presented a summary of his projects to the staff at Northern Rocky Mountain Science Center, Science Review in Bozeman, MT.
- ◆ Vita Wright met with Robert Bennetts, Inventory & Monitoring Coordinator for the National Park Service, to co-develop a concept paper on the Diffusion of Innovations theory and how it can help integrate the NPS Vital Signs Monitoring results into management.
- ◆ Katie Knotek completed the project, "High reliability organization of public involvement in agency decisions to accomplish wilderness fire management objectives."
- ◆ Katie Knotek developed new study plan, "Understanding landscape values and meanings for the planning and application of fuel treatment and fire management on the Flathead Indian Reservation, Montana."
- ◆ Anne Black developed and coordinated science delivery efforts for the National Science Synthesis Team. She developed and supervised FedSource, Enterprise Team and METI contracts and contractors to conduct project evaluation, website development, and web-based examples and training materials.
- ◆ Anne Black was a participant in the "Trunk Monkeys" community of practice to identify, employ and test effectiveness of HRO concepts on the ground
- ◆ Anne Black was accepted into the 2006 Class of Leadership for Collective Intelligence training, Dialogos, Inc. which consists of 5 4-day workshops over 10 months.
- ◆ Anne Black was appointed as RMRS National Fire Plan Science Portfolio head for Science Application and Delivery.
- ◆ Anne Black developed and supervised contracts/contractors (METI, LC Services) to conduct field, analysis and write-up for Joint Fire Science Program Social Mapping project.
- ◆ Brett Davis reviewed a manuscript for inclusion in 'The International Journal of Wilderness' as a guest associate editor.

## **RESEARCH HIGHLIGHTS: FY 2006:**

The following Research Highlights were submitted for the Rocky Mountain Research Station's 2006 Research Accomplishments Report:

### **The Importance of Monitoring Wilderness Character**

**Submitted by Peter Landres**

Congress, in passing the 1964 Wilderness Act and all subsequent wilderness legislation, designated over 106 million acres of federal land as wilderness. The primary administrative mandate from these laws, and the policies of the four federal agencies who manage wilderness, is to preserve the wilderness character of this land. Despite over a hundred wilderness laws and long-standing agency policies, wilderness character has never been defined in terms that allow the agencies to evaluate management outcomes in preserving it. Even though wilderness field and program managers, scientists, non-government organizations, and even the Government Accountability Office have for years called for methods to track cumulative changes to wilderness character, until now there has been no definition of this central concept and no means for assessing how wilderness character is changing.

Scientists at the Aldo Leopold Wilderness Institute are leading the effort to define wilderness character, and develop new and practical methods to monitor how wilderness character is changing over time. In collaboration with wilderness managers and monitoring program leaders from across the nation, this project has developed a working definition for wilderness character, identified a set of indicators and measures to be monitored, developed a cost-effective approach for gathering and reporting the data, and secured funding for this development and pilot testing. The full range of managers, from wilderness field staff to program leaders to line officers, strongly supports development of this monitoring because they believe it is of fundamental importance to the preservation of wilderness. In addition, in the course of developing this monitoring, whole new lines of wilderness social science research are being explored.

This monitoring will allow, for the first time, the means for tracking trends in wilderness character. The benefits of this information are many, including 1) improving accountability by linking performance measures and outcomes of wilderness stewardship directly to the mandates of wilderness legislation and agency policy; 2) improving decisionmaking by knowing how specific attributes of wilderness character have changed in the past and how short-term projects are likely to affect these attributes; 3) improving the setting of priorities by knowing how different proposed actions are likely to affect wilderness character; 4) establishing legacy information on wilderness character that captures the institutional memory of wilderness managers so long-term and cumulative changes to wilderness character can be assessed; and 5) improving public trust and confidence in agency stewardship of wilderness.

More information on this new monitoring can be found in the publications "Monitoring selected conditions related to wilderness character: a national framework" RMRS GTR-151, downloadable at [http://www.fs.fed.us/rm/pubs/rmrs\\_gtr151.html](http://www.fs.fed.us/rm/pubs/rmrs_gtr151.html) and "Developing indicators to monitor the 'outstanding opportunities' quality of wilderness character" in the International Journal of Wilderness, Volume 10, No. 3. Four additional articles in this same issue of the International Journal of Wilderness explore new social science research fields related to wilderness character and its stewardship. Additional information on this monitoring is available on the Leopold Institute's website at: <http://leopold.wilderness.net/research/fprojects/F014.htm>.

## **Visitor Experiences in High-Use Wildernesses in the Pacific Northwest:**

### **Submitted by David Cole**

Wilderness use, particular in areas close to large metropolitan areas, is increasing and a large part of this growth comes from day use. There is considerable controversy about appropriate management of popular wilderness trails and destination areas. Much of the controversy stems from divergent interpretations of the language from the 1964 Wilderness Act that describes what wilderness should offer visitors: "outstanding opportunities for solitude or a primitive and unconfined type of recreation." There is growing debate about what causes more degradation of solitude or primitive and unconfined recreation: growing crowds of people or Forest Service imposed use limits and regulations, especially limits on day use. Tough, value-laden decisions must be made about appropriate management objectives regarding the experiential conditions wilderness should provide. This issue is a particular concern in the Pacific Northwest, where heavy recreation use occurs in wilderness areas close to large cities such as Seattle and Portland.

To inform these decisions, a major collaborative project was undertaken, beginning in 2002 between the Aldo Leopold Wilderness Research Institute (Dr. David Cole), the University of Idaho (Associate Professor Troy Hall) and the Pacific Northwest Region of the Forest Service (Regional Wilderness Specialist Susan Sater). A series of nine research and administrative studies were conducted in Forest Service wildernesses in Oregon and Washington between 2002 and 2005. Goals of the research were to understand the nature of human experience in wilderness and how experiences vary between heavily and lightly used places, as well as between day and overnight trips. Data were collected on what people experienced, their evaluations of those experiences and their opinions about what the Forest Service should do to manage wilderness experiences. Some people were interviewed at length while on their wilderness trips, while many more filled out questionnaires after their trip. At more popular trailheads, people were given questionnaires as they exited the wilderness. To collect information from users of more remote places, questionnaires were mailed to their homes. Finally, in addition to gathering information from on-site visitors of wilderness, information was also gathered at meetings of stakeholders particularly interested in wilderness. These meetings also provided an opportunity to study the degree to which visitor information was influenced by information presented at meetings or by group discussions about values.

This project was unique in recreation research for its high degree of collaboration between management and research as well as the ability to simultaneously apply multiple methods in many different wildernesses. Data collection has been completed but report writing has only begun. Results clearly show that visitor opinions about appropriate wilderness management are highly divergent and that providing visitors with information and venues for discussing and deliberating about management do not reduce polarization. Wilderness managers are going to have to make tough decisions about issues for which there is little consensus among the public. Experiential conditions in heavily-used places in wilderness are suboptimal. Visitors recognize that there are lots of people around, that there is more crowding than they prefer, that solitude is harder to find and more frequently interrupted. However, most visitors consider crowding to not be a very serious problem. They learn to cope with crowding, either through advanced planning (e.g. avoiding popular places on sunny weekends) or simply by rationalizing crowding as a necessary evil in such a beautiful place so close to the large cities where they live. When faced with the alternative of Forest Service imposed use limits, most visitors appear inclined to prefer that they be allowed to adapt and adjust to conditions, to be free to choose whether or not to visit a crowded place. Additional information about these studies and resultant reports are available on the Leopold Institute's website at: [http://leopold.wilderness.net/research/fprojects/F007\\_B.htm](http://leopold.wilderness.net/research/fprojects/F007_B.htm).

## **Managing the Unexpected in Public Outreach for Fire and Fuels Management**

**Submitted by Katie Knotek**

Many unexpected events can occur when conducting public outreach for fire and fuels management, such as contentious public meetings, withdrawal of key publics from participation, harassment of personnel within the organization, and litigation. To reduce the likelihood of such events occurring, wildland fire management organizations need some framework to guide their public outreach. Social scientists from the Aldo Leopold Wilderness Research Institute drew upon the work of Weick and Sutcliffe (*Managing the Unexpected: Assuring High Performance in an Age of Complexity*, 2001) and their theory on managing with mindfulness to develop and test a potential framework to meet this need.

The framework includes five central mindfulness processes that can be applied to planning and conducting public outreach: 1) recognize potential barriers to accomplishment of management objectives, 2) resist simplification of information or interpretations, 3) ensure situational awareness of events as they occur, 4) be prepared to respond to and recover from unexpected events, and 5) call upon appropriate expertise in decision-making and management efforts. Scientists tested the usefulness and applicability of the framework using, as a case study, the USDA Forest Service's (USFS) public outreach efforts conducted during the planning and implementation of the South Fork of the Sun River Prescribed Burn (a multi-phase operation being implemented in the Scapegoat Wilderness, Montana). If the framework could be used to document and understand the effectiveness of the agency's public outreach, then it may be useful in making future efforts related to fire and fuels management more effective.

In-depth interviews were conducted with a sample of agency representatives on the Lewis and Clark National Forest and non-agency public representatives from local communities who were aware of and/or participated in this public outreach (e.g., private landowners, outfitter/guides, local recreationists, non-governmental organization representatives, etc.) to document the agency's efforts. In the interviews, both agency and public representatives discussed at length such things as public meetings, newspaper articles, one-on-one contacts with private landowners, internal agency briefings, informational mailings, briefings to key publics (county commissioners, governor's staff, media), and other such efforts utilized by the agency.

Analysis of these specific actions used by the agency and perceptions of their effectiveness provided insight into the applicability of the five central mindfulness processes. For example, public representatives acknowledged the value of the agency's efforts to engage the public early on in the planning of the prescribed burn, which indicated the agency recognized and responded to a possible barrier to accomplishment of its public outreach objectives. Through the framework, it was also possible to document and understand how some actions or inactions by the agency could have benefited from more attention to the mindfulness processes. For example, some public representatives felt that specific personal concerns were not addressed by the agency, which indicated the agency might have simplified some information received through public outreach. Thus, use of the framework provided the agency with information on how it might continue to foster or improve its mindfulness when conducting public outreach for fire and fuels management.

This research provides an example of a framework that can be used to document and understand the effectiveness of an organization's outreach efforts. As a case study, the methods and results of the research provide a means of comparison to additional cases and a tool for other land management agencies and units. Just as it was used in this study to evaluate and improve upon the USFS's (specifically the Lewis and Clark National Forest's) public outreach efforts, the framework of mindfulness processes can be similarly utilized by other wildland fire management organizations to guide their performance in planning and conducting public outreach for similar fire and fuels management projects.

The research was presented to fire and fuels scientists and managers at the 1st Fire Behavior and Fuels Conference: Fuels Management – How to Measure Success and will be detailed in the article, “Organizational characteristics that contribute to success in engaging the public to accomplish fuels management at the wilderness/non-wilderness interface,” published in the conference proceedings. The research was also presented to Public Information Officers at the 2006 Northern Rockies Incident Management Teams Meeting and to Public Affairs Officers at the 2006 Northern Region Public Affairs Conference. The final project report is available on the Leopold Institute’s website at: <http://leopold.wilderness.net/unpublished/UNP110.pdf>.

## **Describing wilderness experiences for backcountry visitors in Denali National Park, Alaska**

**Submitted by Alan Watson**

Scientists at the Aldo Leopold Wilderness Research Institute have an established record of helping managers and planners from all the federal land management agencies understand critical elements of experiences desired by the public visiting protected wildlands. The National Park Service has a national mandate to conserve scenery, natural and historic objects, and wildlife to provide for the enjoyment of National Parks in a manner as will leave them unimpaired for future generations. In Alaska, as a result of language in the Alaska National Interest Lands Conservation Act of 1980, recreation visitors to the expanded Denali National Park and Preserve are expected to receive a wilderness recreation experience in both wilderness and protected backcountry. Managers encountered difficulty trying to define management goals for providing an appropriate type of experience at very remote glaciers where people congregate, like landing areas where day visitor flightseers want to experience this remote location and mountain climbers and cross-country skiers are preparing for or leaving from very intense multi-day visits to very challenging places in the Park.

The Ruth Amphitheater, Kahiltna Base Camp, and the Pika, Buckskin, and Eldridge Glaciers in Denali National Park and Preserve have exceptional scenic values, provide access to some world renowned climbing destinations, and are the primary destination for air taxis and scenic airplane tours in the Park. Recreational visitation to these areas has grown dramatically in recent years. For example, scenic landings in the Ruth Amphitheater increased from 220 in 1991 to 1,800 in 2001. The number of climbers on Mount McKinley has doubled in the last 25 years with 659 attempts to summit in 1980 and 1,340 in 2006. This study provides information to: 1) assist park managers understand the factors influencing visitor experiences at these backcountry sites, and 2) support selection of management actions that reduce user conflicts and improve visitor experiences in these high use, but remote areas.

Qualitative interviews with dayusers, skiers, mountain climbers and air taxi operators provided substantial insight into some of the dimensions of experiences the Park managers may want to try to protect. A follow-up quantitative survey of day and overnight users allowed further refinement of definitions of these experience elements and understand some of the things that influence them. For example, about 30 percent of the day users indicated that the number of planes on the glacier they landed on did not matter to them, and just under half said that the number of planes passing overhead did not matter to them. Almost half indicated that the number of large dayuse groups on the glacier did not matter to them. About 29 percent of multi-day users felt that other climbing groups had a negative influence on their experiences - about the same number who felt that the number of aircraft passing overhead had a negative influence on them. About one-fifth thought the number of people camped by them, either away from the landing area or at the landing area, had a negative influence on their experiences. Less than half reported having negative aspects of the experience attributable to the numbers of climbers or flightseers they saw at the base camp landing area. The air taxi operators tended to have a positive influence on 84 percent of multi-day visitor experiences, 77 percent felt the members of their group improved their visit, and around two-thirds tended to evaluate interaction with management as a positive aspect of their experience. In

## Highlights

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research, we increased our understanding of not only who the visitors are, but also who the pilots are that provide access to backcountry glaciers for both day and multi-day users. We also learned a great deal about the experiences day users and multi-day users receive while in the backcountry, as well as greater understanding of the things that influence those experiences. Through this research we are also better able to understand how people respond to some specific things we expect them to encounter in the backcountry, and their reaction to possible management actions to address human impacts there.

## **Summary of Accomplishments: FY 2006**

The following CRIS progress reports were submitted documenting accomplishments for the Leopold Institute's 5 Problem Areas:

### **Problem Area 1 - Recreation:**

During FY2006, Leopold Institute scientists made substantial progress in addressing the broad area of understanding the effects of recreation use and recreation management strategies on wilderness attributes and visitor experiences. David Cole's research efforts included studies of visitors to high-use wildernesses in Oregon and Washington for which field work was completed and reports have been written for seven of nine coordinated studies. This work has improved understanding of the nature of visitor experiences, visitor evaluations of those experiences, how visitors cope with the situations they encounter and visitors' management preferences. It is setting the stage for development of a vision, including establishment of indicators and standards, for wilderness recreation management in the face of increasing wilderness use, particularly in areas close to metropolitan centers. Alan Watson's research efforts in Denali National Park & Preserve focused on defining experiences and influences on experiences of climbers of Mt. McKinley and flightseers who landed on glaciers in the Denali backcountry. This research described major elements of experiences there and potential indicators for protecting experiences. Research in the Bob Marshall Wilderness updated studies of trends in visit and visitor characteristics and explored the effects of fire on visits, visitors and their support for wildland fire use policies. Progress was also made in documenting trends in ecological impact in different wildernesses and effective means of restoring damaged recreation sites. Three publications document the effectiveness of varied treatments in restoring damaged soil and vegetation on subalpine campsites in the Eagle Cap Wilderness. Scarification, soil amendments and planting all accelerate recovery rates.

Impact Statement: The growing importance of understanding the human dimension implications of natural resource management decisions has made this research more critical than ever. This research is being used to design monitoring programs, establish objectives for managing backcountry and wilderness zones, and to understand likely public response to proposed management actions.

### **Problem Area 2 - Relationships:**

During FY2006, Institute scientists and cooperators published several articles on this topic, attempting to expand understanding of the concept of relational marketing in the public sector and providing improved methods for understanding stakeholder response to proposed management actions. An important publication described the potential for design and implementation of a monitoring program that focuses on change in relationships with wilderness affected by management actions and response to management actions influenced by relationships with wilderness. This monitoring guidance paper was expanded beyond the original public purpose marketing elements of trust, commitment, and perceptions of social responsibility to include inventory and monitoring of the meanings people ascribe to wilderness and other wildlands. Other publications (published and in press) on trust were aimed at development of effective, efficient monitoring tools and greater understanding of how trust is influenced by agency actions or inactions. Besides research to understand relationships with the Selway-Bitterroot Wilderness, scientists studied relationships sports anglers, subsistence users, commercial fisheries, and local residents held with the Situk River on the Tongass National Forest. This project was cooperative with the Alaska Department of Natural Resources, the Alaska Department of Fish & Game, the Tongass National Forest and the Tlingit Tribe of Yakutat, Alaska. A large project was initiated in 2006 to understand not only how visit and visitor characteristics are changing at the Boundary Waters Canoe Area Wilderness in Minnesota, but also why these things are changing. Specific interest is in understanding how charging user fees, reducing

# Accomplishments

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group size limits, prescribed fire policies, technology advances and demographics within the region influence visitor experiences and relationships between local communities and wilderness. Another project initiated in 2006 is a cooperative consultation with the Confederated Salish & Kootenai Tribes in Montana to assist them in mapping the meanings community members attach to the Mission Mountain Tribal Wilderness and adjoining Tribal Buffer Zone, in order to provide public input into fire and fuels management decisions.

Impact Statement: This work has provided science mediation in controversial planning decisions by bringing multiple organizations and communities together to agree on information needs, listen to scientific findings and discuss implications for management decisions on the Tongass and Bitterroot National Forests. This work has added conceptual frameworks for monitoring the relationship between the public and public wildlands in a way that management can be evaluated in terms of protecting or restoring these relationships, e.g., establishing baselines and monitoring levels of trust. This work has also contributed new methodologies for illustrating and considering human relationships with public wildlands in landscape level fuel treatment decisions.

### **Problem Area 3 - Fire:**

Our fire research continues to include a mixture of in-house and cooperative projects that are jointly funded by the NFP and JFSP. Carol Miller provides leadership for the program, which is conducted by a cross-disciplinary team of biologists, ecologists, social scientists, and science delivery experts. These researchers are using wilderness to learn how to use fire as a cost-effective management strategy that is socially acceptable and beneficial to natural ecosystems. This year significant accomplishments were made in efforts to better understand the social and ecological consequences of fire and fuels management strategies. We also were involved in substantial science delivery activities:

- We continued work on a project to develop methods to quantify and track the cumulative consequences of past suppression decisions ('Sequential Effects') and to create a 'Map Library' of potential fire spread and effects from future ignitions. Fire behavior models will determine where fires would have spread and what effects (including smoke production) would have resulted, had they not been suppressed. The Map Library portion of the project was delivered to Park management, providing valuable information to support the decision whether or not to suppress future ignitions. This research is important because managers need to understand the effects of fire management strategies on fire regimes, vegetation and fuel conditions, and socio-economic trade-offs over time.
- New field research was initiated to assess the establishment and spread of non-indigenous invasive plants following wildland fire in remote wilderness settings. Naturally-ignited fire is allowed to play its natural role in wilderness, but the consequences of fire on the occurrence of non-indigenous invasive plants in areas remote from known source populations is completely unknown. This research will provide spatially-explicit, empirically-based statistical models for predicting the post-fire occurrence of non-indigenous invasive plants in wilderness. The results of this research aim to improve the detection and evaluation of potential risks from non-indigenous invasive plants following fire in wilderness, in turn suggesting priorities for control and eradication of this important threat to wilderness.
- We have examined the social and historical factors leading to the implementation of a large prescribed fire in the Bob Marshall Wilderness Complex in Western Montana. We interviewed management staff and community members living in and around the towns of Choteau and Augusta, MT to understand how the Forest Service organized public involvement and how specific actions influenced participant and management perceptions of successful or unsuccessful application of mindfulness principles. This case study identified effective communication and collaboration techniques that can be applied to other situations. Results have been used to clarify how high

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reliability organizing principles can improve the effectiveness of the agency when engaging the public in decisions to accomplish fire and fuels management objectives.

- Questions about attitudes toward management-ignited fire were included in a survey of recreation visitors to the Bob Marshall Wilderness Complex. Local visitors from the counties adjacent to the Bob Marshall Wilderness Complex were more supportive than distant visitors of management-ignited fires to both reduce chances of fire escaping to non-wilderness lands and to restore the natural role of fire in wilderness. This research is important because although Wildland Fire Use is the most cost-effective fuel management strategy in large wilderness areas, its success will depend on public support and minimizing conflicts with visitors.
- One of the most important constraints on a manager's ability to implement wildland fire use is the proximity to values at risk in the wildland urban interface. A new collaborative project (North Central Research Station, Oregon State University) was launched to examine the implications of increasing housing densities in the wildland urban interface on the feasibility of wildland fire use.
- A new project initiated in 2006 will examine how current and recent past wildland fire policies in the Boundary Waters Canoe Area Wilderness have influenced the relationships regional communities have with this Wilderness. A survey of recreation visitors will also provide understanding about how fuel accumulations from blowdowns, prescribed fire and wildland fire use activities in the Boundary Waters is affecting route choices, enjoyment of wilderness as wilderness, and visitor experiences.
- Successful cost-effective restoration of fire to fire-adapted ecosystems, requires that the fire community manage fire safely and reliably. We completed an annotated bibliography, Organizational Management Tools for Wildland and Prescribed Fire Managers.
- As Wildland Fire Use is added to the fuel managers' toolbox for lands outside of wilderness, the need for tools that allow managers to comprehensively assess tradeoffs among the risks and benefits of fire in a quantitative, actuarial sense is rapidly increasing. A collaborative project (RWU-4401, PNW-Wildland Threat Center, UC Berkeley, Canadian Forest Service) was launched to compare and evaluate burn probability modeling approaches for use in an operational risk analysis framework. In addition, a framework for assessing fires' positive, neutral and negative impacts to any resource was extended to aquatic systems (collaboration with RWU-4353).

**Impact Statement:** This research is important because sustainable fire management needs to include wildland fire use (WFU) and other non-aggressive management responses to fire. The lessons learned from applying WFU in large, remote wilderness areas can be translated to the adjacent front country and to smaller wilderness areas. This research is improving the quality and consistency of fire and fuels management decisions and helping managers devise effective strategies that capitalize on the opportunities for WFU within and outside wilderness.

## **Problem Area 4 - Wilderness in Larger Systems:**

**Element 4a. Invasive species:** During FY2006 greenhouse experiments were completed by Peter Landres and University of Montana cooperator Ray Callaway on the effects of fire-produced charcoal on the germination and establishment of spotted knapweed seeds, and the effects of this charcoal on mediating the effect of knapweed-produced allelopathic herbicide on the establishment and growth of native bunchgrasses. During the 2006 field season, Landres initiated new field research to document the occurrence of non-indigenous invasive in remote wilderness backcountry areas. To develop empirically-based statistical models for predicting the occurrence of the invasive plants in remote backcountry areas, new field methodologies were developed. Landres also co-organized a session on the restoration of Whitebark pine in the Greater Yellowstone Ecosystem following invasion of the nonnative Whitebark pine blister rust.

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David Pilliod, former Leopold Institute post-doctoral fellow, is the lead author on a synthesis paper in preparation that uses a meta analysis of several studies in the northern Rocky Mountains and Pacific Northwest to examine effects of trout on occurrence of amphibians at multiple scales.

Element 4b. Global change impacts on wildlife: Steve Corn, with funding from USGS and the National Park Service and in collaboration with scientists from Idaho State University and the USGS Fort Collins Science Center, surveyed 543 individual wetlands in 65 small watersheds in Rocky Mountain, Yellowstone, Grand Teton, and Glacier National Parks. Naïve and estimated occupancies of amphibian species in 2006 continue to reflect a trend of decreasing occupancy from north to south. As expected, watershed occupancy is higher than wetland occupancy and probably provides the best method for tracking trends of uncommon species, such as boreal toads.

Steve Corn presented an invited paper, Amphibians and Climate Change, at MtnClim 2006, the annual meeting of the Consortium for Integrated Climate Research on Western Mountains.

Steve Corn published a paper describing effects on tailed frogs in *Canadian Journal of Zoology*, and a paper describing effects of the 2001 Moose fire on pond-breeding species is currently in review at *Ecological Applications*. Another paper describing the effects of the Moose Fire on the chemistry and temperature of wetlands is in the USGS review process and will be submitted to the journal *Wetlands*.

A proposal from Steve Corn and Sophie St.-Hilaire (Idaho State University) was funded through the USGS/NPS Park Oriented Biological Support Program. The goals of this study are to determine the prevalence of *chytrid* fungus in Grand Teton National Park and the comparable pathogenicity of locally-cultured isolates of the fungus to boreal toads. Experiments are underway to determine what environmental conditions are necessary to result in mortality associated with this fungal agent.

Element 4c. Wilderness water: Alan Watson completed an investigation of the impacts and benefits of wilderness dams in the Selway-Bitterroot Wilderness, which resulted in one publication that explains the history of these dams, perceptions of local people and experts about the ecological disruption effects and hydrologic connections with quality of life and economic pursuits of adjacent communities.

Element 4d. Wilderness monitoring protocols: Peter Landres led completion of the 230-page Technical Guide for Monitoring Selected Conditions Related to Wilderness Character that was written by a team of over 40 agency resource specialists, and agency and university scientists. Landres received the Forest Service National Wilderness Research Application award for his work developing wilderness character monitoring. Landres co-led pilot testing of this monitoring protocol in all nine Forest Service regions, with \$270,000 received from the National Forest Systems Inventory and Monitoring program to conduct this testing. Landres co-led the final review all pilot test results leading to the final decisions about the Technical Guide, which will be completed in early FY2007. Also during FY2006, Landres was selected to chair a new interagency team (Bureau of Land Management, US Fish and Wildlife Service, Forest Service, and National Park Service) with responsibility to develop recommendations for monitoring wilderness character across the entire National Wilderness Preservation System. Landres organized a session on "A practical approach to monitoring wilderness character with application to Alaska and other countries" at the 8th World Wilderness Congress.

Alan Watson, working with scientists and managers of Parks Canada, extended research to develop new methods to identify major elements of wilderness visitor experiences and understand major factors of influence on them. These factors of influence, and sometimes the experience dimensions themselves, provide the foundation for selection of indicators and prescription of monitoring to protect human experiences in wilderness. This work resulted in a workshop in Canada bringing together U.S. and Canada managers and scientists, as well as a workshop proceedings that is in press.

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Impact Statement: All wildernesses are impacted by regional (and global) threats, and research by Leopold Institute scientists is uniquely focusing on wilderness ecological and social values at risk from these threats. This research will help managers understand the potential consequences from these threats as well as the potential consequences from alternative management decisions taken to mitigate them.

## **Problem Area 5 - Science Application & Delivery:**

The Institute's Research Application Program includes activities aimed at current research delivery and application as well as efforts to understand and improve research delivery and application processes. The program is jointly funded by the RMRS, BLM, and FWS. Vita Wright provides leadership for the program, which is conducted by the program leader, as well as staff including a web developer and part-time technical assistance by various University of Montana students. This year, accomplishments were made to gain an understanding of influences to the use of science by federal agency managers and in synthesizing literature for wildlife management and fire management in wilderness. We also worked with staff in all the Leopold Institute program areas to deliver science using Internet resources. In addition to the accomplishments reported here, research delivery and application accomplishments by Institute scientists are reported in each program area.

- Studied the personal and organizational communication literature, and prepared and submitted the paper, *Communication barriers to applying federal research in support of land management in the United States*, to the proceedings of the International Conference on Transfer of Forest Science Knowledge & Technology. This paper explores the potential for misunderstanding between research communicators and managers, and emphasizes the need to understand audiences prior to communicating research results. The manuscript has been reviewed and accepted, and will be published in FY07.
- At the request of the National Park Service Inventory & Monitoring Program, co-authored a concept paper, *Diffusion of innovation: a theoretical framework for understanding how scientific knowledge and tools are adopted by managers*. This paper will appear on a web site the NPS is developing to facilitate science integration.
- Published the results of a meeting with National Park Service natural resource specialists and managers we organized to gather perspectives on barriers to the use of new knowledge and tools, and how to overcome these barriers, within the National Park Service. The publication, *Overcoming barriers to the use of science in National Parks (session summary)*, was included in the George Wright Society Conference proceedings.
- Completed a search for relevant wildlife and recreation publications and finalized the manuscript, *Backcountry recreation impacts to terrestrial wildlife: an annotated reading list*. This bibliography will help backcountry wildlife and recreation managers cross disciplinary boundaries to understand the issues each discipline must balance in order to both provide recreational experiences and minimize impacts to wildlife. It will be published as a Rocky Mountain Research Station General Technical Report in FY07.
- Finalized the manuscript, *Organizational management tools for wildland fire managers: an annotated reading list*, which includes knowledge from several social science disciplines as it relates to fire safety. This knowledge will be used in trainings to improve organizational culture and practices related to firefighter safety and prescribed fire management, thus reducing the potential for fire escapes and loss of life. This bibliography will be published as a Rocky Mountain Research Station General Technical Report in FY07.
- Expanded ALWRI Online Resources to provide access to research through the following Project Details & Resources Pages. These web pages provide the latest knowledge and tools needed to

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address challenging fire, recreation, and social issues. They are available at <http://leopold.wilderness.net/research/fprojects.htm>

- Fire Effects Planning Framework [F005]
- Learning from the past: retrospective analyses of fire behavior in Yosemite and Sequoia-Kings Canyon National Parks [F006]
- Visitor experiences in wilderness: applications to management of heavily-used wildernesses and day users [F007]
- Campsite restoration techniques [F008]
- Computer simulation modeling of recreation use: developing a practical management tool [F009]
- Baseline data collection and monitoring: trends in recreation use and impacts [F010]
- Wilderness recreation management techniques: compiling and integrating scientific and experiential knowledge [F011]
- Recreation ecology research: expanding, synthesizing and sharing knowledge [F012]
- Dilemmas of wilderness management: exploring conflicting values [F013]
- Wilderness Character Monitoring [F014]
- Technical & Social Influences to the success of science delivery and application [F016]

Impact Statement: This program is important because, in order to obtain the full investment of research dollars, researchers and research communicators need to effectively transfer scientific knowledge and tools to land managers so they can apply them to planning and management objectives.

Leopold Institute projects include in-house research and research application studies, as well as cooperative projects with scientists from other federal agencies and universities. This section provides brief descriptions of projects that were either initiated or completed in FY 2005.

On-going projects are listed by title and Principal Investigator. Additional details are available on the Institute's website: <http://leopold.wilderness.net/research.cfm>

## **PROJECTS AND AGREEMENTS INITIATED IN FY 2006:**

**GIS APPLICATIONS IN MAPPING COMMUNITY MEANINGS FOR FUEL TREATMENT ANALYSIS.** Steve Carver – *University of Leeds*, Alan Watson – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** The purpose of this agreement is to foster international cooperation between the Aldo Leopold Wilderness Research Institute, the University of Montana and the University of Leeds to advance GIS methodologies in application to evaluate the impact on values at risk related to fuels management on the Flathead Indian Reservation and National Forest lands in the Western U.S.

**FACTORS OF CHANGE INFLUENCING EXPERIENCES AND RELATIONSHIPS WITH WILDERNESS: IMPLICATIONS FOR STEWARDSHIP.** William Borrie – *University of Montana*, Alan Watson – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** The purpose of this agreement is to address two of the objectives of a larger research program aimed at understanding the factors of change that influence experiences and relationships with wilderness. The findings from this study will be important for understanding the impacts of management activities on relationships between the public and public lands and further implications for stewardship.

**GROWTH IN THE WILDLAND URBAN INTERFACE AND ITS IMPLICATIONS FOR WILDLAND FIRE USE.** Roger Hammer – *Oregon State University*, Carol Miller – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** The purpose of this agreement is to study the changing relationship between the wildland urban interface (WUI) and the feasibility of wildland fire use (WFU) as a fire management strategy in and around Wilderness areas.

**TECHNICAL AND SOCIAL INFLUENCE ON THE SUCCESS OF SCIENCE DELIVERY IN FEDERAL LAND MANAGEMENT AGENCIES.** Mike Patterson – *University of Montana*, Vita Wright – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** The purpose of this agreement is to ensure that a Forest Service study to evaluate the factors influencing adoption of scientific knowledge by fire managers and identifying barriers to effective communication and application of science delivery efforts.

**EVALUATING APPROACHES TO MAPPING BURN PROBABILITIES FOR A QUANTITATIVE WILDLAND FIRE RISK ANALYSIS FRAMEWORK.** Carol Miller – *Aldo Leopold Wilderness Research Institute*; Alan Ager – *Western Wildland Environmental Threat Assessment Center*; Mark Finney – *RMRS Fire Lab*; Marc Parisien – *Canadian Forest Service*

**PROJECT DESCRIPTION:** This project is a collaboration that brings together experts from Canada and the United States who have been studying burn probability modeling and wildland fire risk analysis. This project, funded by the Joint Fire Science Program, has three objectives:

- Using artificial and real landscapes, compare burn probability (BP) models to evaluate the accuracy, practicality and effectiveness of each for mapping BP in different fire regimes.
- Assess the spatial factors that affect and contribute to BP at the landscape scale to better understand what makes landscapes more or less susceptible to burning.
- Incorporate an improved BP modeling capability into an operational framework for assessing wildland fire risk and demonstrate this application on a case study landscape.

**POST-FIRE RECOVERY OF STREAM AMPHIBIANS, BENTHIC MACROINVERTEBRATES, AND RIPARIAN VEGETATION IN A FEDERALLY DESIGNATED WILDERNESS.** David Pilliod – *Cay Poly Corporation*, Carol Miller – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** The purpose of this agreement is to determine the factors influencing recovery from wildland fires of stream amphibian populations, benthic macroinvertebrate communities, and riparian habitat conditions.

**CHANGING EXPERIENCES AND RELATIONSHIPS WITH WILDERNESS: IMPLICATIONS FOR MANAGEMENT.** Ingrid Schneider – *University of Minnesota*, Alan Watson – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** The purpose of this agreement is to address multiple tasks of a larger research program aimed at understanding the factors of change that influence experiences and relationships with wilderness. The findings from this study will be important for understanding the impacts of management activities on relationships between the public and public lands and further implications for wilderness stewardship.

**LESSONS LEARNED FROM FIRE USE PRACTITIONERS AND FIRE BEHAVIOR**

**ANALYSTS.** Dave Thomas – *Ogden, UT*, Carol Miller – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** The purpose of this agreement is to apply concepts of learning organizations in the gathering and collecting of experience and wisdom from the people who have planned and implemented the Wildland Fire Use program.

**RESTORATION OF SOIL ON WILDERNESS CAMPSITES.** Tom DeLuca – *University of Montana*, David Cole – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** The purpose of this agreement is to better understand the effectiveness of varied treatments in restoring soil such that recovery of native vegetation on wilderness campsites occurs more rapidly.

**DESIRED FUTURE CONDITIONS FOR WILDERNESS.** Laurie Yung – *University of Montana*, David Cole – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** The purpose of this agreement is to gather, discuss and disseminate ideas that can be helpful in formulating prescriptive statements about desired future conditions for wilderness and, therefore, contribute to improved wilderness planning and management.

**APPLYING CONCEPTS OF HIGH RELIABILITY AND ORGANIZATIONAL LEARNING IN THE FIRE MANAGEMENT COMMUNITY.** Anne Black – *Aldo Leopold Wilderness Research Institute*; Dave Thomas – *U.S. Forest Service*; Kathleen Sutcliff – *University of Michigan Ross Business School*; Dave Cleaves & James Saveland – *Rocky Mountain Research Station*; Deirdre Dether & Brett Fay – *R4*; Dave Christenson, Johnetta Holt, & Paula Nasiatka – *Wildland Fire Lessons Learned Center*

**PROJECT DESCRIPTION:** This project will develop opportunities to identify and apply the concepts of high reliability within the fire community, and to capture and document effective practices.

**RAPID ASSESSMENT OF COMMUNITY RELATIONSHIPS TO THE BITTERROOT NATIONAL FOREST.** Kari Gunderson –*Aldo Leopold Wilderness Research Institute*; John Titre – *Park Studies, Inc.*

**PROJECT DESCRIPTION:** a. Provide guiding principles and a specific methodology plan for data collection and analysis for 1) low resolution/large breadth assessments, and 2) high resolution, narrow breadth assessments for a landscape level fuel treatments project coordinated by the Bitterroot ecosystem Management Research Project,  
b. Provide review and feedback during implementation of the study plan, including analysis and input to applied modeling efforts,  
c. Develop and provide an annotated bibliography of relevant place-based planning and management articles that describe the purpose of place-based planning, methods of data collection and analysis, and applications.

**CAMPSITE SURVEY: SEQUOIA AND KING CANYON NATIONAL PARKS.** David Parsons – *Aldo Leopold Wilderness Research Institute*; Greg Fauth – *Sequoia and Kings Canyon National Parks*

**PROJECT DESCRIPTION:** This project will resurvey a subsample of the over 7,000 campsites found in the backcountry of Sequoia and Kings Canyon National Parks. These campsites were originally inventoried in the late 1970's and early 1980's. They provided a basis for the original establishment of daily trailhead quotas for backcountry use in those two parks. Changing use levels and patterns as well as management actions (establishment of bear boxes, rehabilitation of campsites too close to water, etc.) during the 1980's and 1990's have created a need to see how the distribution and impact levels of the parks campsites might have changed.

**EFFECTS OF JUDICIAL DECISIONS ON WILDERNESS STEWARDSHIP.** Kathryn Mutz – *University of Colorado, School of Law*; Peter Landres – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** The purpose of this agreement is to identify and summarize the effects of judicial decisions related to the Wilderness Act of 1964 and subsequent wilderness legislation on agency responsibility for managing designated wilderness.

**RESTORATION OF CAMPSITES IN SUBALPINE FOREST IN THE SAWTOOTH WILDERNESS, IDAHO.** David Cole – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** Test the effectiveness of restoration techniques in restoring soil and vegetation conditions on long-denuded campsites. In particular, survival and growth of transplanted *Vaccinium scoparium* will be assessed. Treatments employed are (1) scarification, (2) amendments of two types and two amounts of locally-collected organic matter, (3) amendments with a bioorganic fertilizer, (4) application of a mulch mat, (5) watering, and slash piling.

**UNDERSTANDING LANDSCAPE MEANINGS FOR THE PLANNING AND APPLICATION OF FUEL TREATMENT AND FIRE MANAGEMENT ON THE FLATHEAD INDIAN RESERVATION, MONTANA.** Alan Watson & Katie Knotek – *Aldo Leopold Wilderness Research Institute*, Laurie Yung – *University of Montana*

**PROJECT DESCRIPTION:** This study will be cooperatively conducted by the Confederated Salish and Kootenai Tribes (CSKT), the Aldo Leopold Wilderness Research Institute (ALWRI) and the Bitterroot Ecosystem Management Research Project (BEMRP) of the USDA Forest Service Rocky Mountain Research Station, and The University of Montana Wilderness Institute. The research will apply methods recently developed and refined by BEMRP in a current landscape-level fuel treatment project on the Bitterroot National Forest. These methods will be used to identify the range, types, intensity and spatial distribution of individual and community meanings associated with the Mission Mountains landscape and to described how the potential

application of fuel treatment in the Tribal Buffer Zone may affect them. The conceptual model and methods developed in this study will demonstrate applicability across management jurisdictions, communities, cultures, and resource conditions, as well as other landscape-level fuel treatment and fire management efforts in the Northern Rockies and across the United States.

## **PROJECTS ON-GOING IN FY 2006:**

(See the Institute's web site for additional details: <http://leopold.wilderness.net/research.cfm>)

**BASELINE DATA AND TRENDS IN RECREATION IMPACTS ON WILDERNESS CAMPSITES.** David Cole - *Aldo Leopold Wilderness Research Institute*

**UNDERSTANDING VISITOR EXPERIENCES IN PORTIONS OF WILDERNESS THAT RECEIVE HEAVY USE, PARTICULARLY BY PEOPLE ON DAY VISITS.** David Cole - *Aldo Leopold Wilderness Research Institute*, Troy Hall - *University of Idaho*

**VISITOR CONFLICT IN HIGH-USE WILDERNESS IN THE NORTHEAST.** Rudolph Schuster - *State University of New York*, David Cole - *Aldo Leopold Wilderness Research Institute*

**EFFECTIVENESS OF SOIL AMENDMENTS, TRANSPLANTING, AND SEEDING IN ACCELERATING THE REVEGETATION OF DISTURBED SUBALPINE CAMPSITES, EAGLE CAP WILDERNESS, OREGON.** David Cole - *Aldo Leopold Wilderness Research Institute*

**DEFINING THE ROLE OF TRUST IN COLLABORATIVE RELATIONSHIPS TO MAKE WILDERNESS STEWARDSHIP DECISIONS.** William Borrie - *University of Montana*, Alan Watson - *Aldo Leopold Wilderness Research Institute*

**DEVELOPING AN UNDERSTANDING OF WILDERNESS EXPERIENCES AND MEANINGS: AUYUITTUQ AND QUTTINIRPAAQ NATIONAL PARKS OF CANADA, NUNAVUT.** Alan Watson - *Aldo Leopold Wilderness Research Institute*, Parks Canada, Paul Lachapelle, Stephen F. McCool - *University of Montana*

**BITTERROOT NATIONAL FOREST - HYDROLOGIC AND HUMAN CONNECTIVITY: WILDERNESS DAMS AND QUALITY OF LIFE IN THE BITTERROOT VALLEY.** Kari Gunderson, Alan Watson - *Aldo Leopold Wilderness Research Institute*, Catherine Pringle - *University of Georgia*

**YAKUTAT COMMUNITY STUDY.** Neal Christensen, Alan Watson - *Aldo Leopold Wilderness Research Institute*

**LEARNING FROM THE PAST: RETROSPECTIVE ANALYSES OF FIRE BEHAVIOR IN YOSEMITE AND SEQUOIA-KINGS CANYON NATIONAL PARKS.** Carol Miller, Anne Black, Brett Davis - *Aldo Leopold Wilderness Research Institute*, Tony Caprio - *Sequoia-Kings Canyon National Park*, Michael Beasley - *Yosemite National Park*

**CLIMATE DRIVERS OF FIRE AND FUEL IN THE NORTHERN ROCKIES: PAST, PRESENT AND FUTURE.** Emily Heyerdahl, Matthew Rollins - *RMRS Fire Lab*, Penny Morgan - *University of Idaho*, Carol Miller - *Aldo Leopold Wilderness Research Institute*

**COMPARING FIRE SCAR ANALYSIS, FIRE ATLAS RECORDS, AND FIRE SIMULATIONS.** Carol Miller - *Aldo Leopold Wilderness Research Institute*, Thomas Swetnam, Calvin Farris - *University of Arizona*

**SIMULATION OF WILDLAND FIRE USE (WFU) TO MEET RESTORATION OBJECTIVES IN WILDERNESS.** Carol Miller - *Aldo Leopold Wilderness Research Institute*, Robert E. Keane, Russ Parsons - *Fire Sciences Lab*

**VARIABILITY IN FIRE REGIMES ACROSS SPACE AND TIME.** Carol Miller - *Aldo Leopold Wilderness Research Institute*, Penny Morgan - *University of Idaho*

**WILDERNESS FIRE REPORTING.** David Parsons, Peter Landres, Vita Wright, Carol Miller, Doug Tempel - *Aldo Leopold Wilderness Research Institute*, Susan Sater - *U.S. Forest Service Pacific Northwest Region (R6)*, Chris Ryan - *U.S. Forest Service Northern Region (R1)*, Steve Boutcher - *U.S. Forest Service Washington Office*

**EVALUATING THE EFFECTS OF MANAGEMENT-IGNITED FIRE ON THE INFLUX OF EXOTIC PLANTS IN WILDERNESS.** Peter Landres - *Aldo Leopold Wilderness Research Institute*

**EFFECTS OF CHARCOAL FROM DIFFERENT FUELS AND FIRE SEVERITIES ON THE DEMOGRAPHY AND PHYTOTOXIC IMPACTS OF SPOTTED KNAPWEED FOLLOWING WILDFIRE.** Ray Callaway - *University of Montana*, Peter Landres - *Aldo Leopold Wilderness Research Institute*

**MONITORING EFFECTS ON TRUST IN COLLABORATIVE PLANNING FOR A LANDSCAPE-LEVEL FUELS TREATMENT PROJECT ON THE BITTERROOT NATIONAL FOREST.** Katie Knotek, Alan Watson - *Aldo Leopold Wilderness Research Institute*, William Borrie - *University of Montana*

**PREDICTING INDIVIDUAL RESIDENTIAL DEVELOPMENT NEAR WILDERNESS FOR STRATEGICALLY PLANNING FUEL TREATMENTS IN THE BITTERROOT NATIONAL FOREST, MONTANA.** Neal Christensen, Peter Landres - *Aldo Leopold Wilderness Research Institute*

**ORGANIZATIONAL MANAGEMENT TOOLS FOR WILDLAND FIRE MANAGERS: AN ANNOTATED READING LIST.** Greg Larson - *University of Montana*, Vita Wright - *Aldo Leopold Wilderness Research Institute*

**UNDERSTANDING THE EFFECTS OF FIRE MANAGEMENT PRACTICES ON FOREST HEALTH: IMPLICATIONS FOR WEEDS AND VEGETATION STRUCTURE.** Anne Black, Peter Landres - *Aldo Leopold Wilderness Research Institute*

**THE FIRE EFFECTS PLANNING FRAMEWORK (FEPF).** Anne Black, Carol Miller - *Aldo Leopold Wilderness Research Institute*

**DEVELOPMENT AND DELIVERY OF SCIENCE SYNTHESIS:FUELSTOOLS AND TRAINING MATERIALS.** Anne Black - *Aldo Leopold Wilderness Research Institute*

**METHODS FOR ESTIMATING DESERT TORTOISE ABUNDANCE.** Steve Corn - *Aldo Leopold Wilderness Research Institute*, Philip A. Medica - *U.S. Fish and Wildlife Service*, C. Richard Tracy - *University of Nevada, Reno*, Ronald W. Marlow - *University of Nevada*

**AMPHIBIAN RESEARCH AND MONITORING INITIATIVE.** Steve Corn, Blake Hossack, David Pilliod - *Aldo Leopold Wilderness Research Institute*, Charles R. Peterson - *Idaho State University*, Andrew Sheldon, Chris Funk, Bryce Maxell, Aimee Wyrick - *University of Montana*

**DECLINING AMPHIBIANS IN THE PACIFIC NORTHWEST: DO STOCKED GAME FISH SPREAD PATHOGENIC AQUATIC FUNGI THAT CAUSE MASS MORTALITY OF AMPHIBIAN EGGS?**

David Pilliod - *Aldo Leopold Wilderness Research Institute*, Jill McNeill, Vern Winston - *Idaho State University*, Bruce Bury, Chris Pearl - *USGS Forest and Rangeland Ecosystem Sciences Center*

**CHYTRID FUNGUS IN THE ROCKY MOUNTAINS: ESTABLISHING DISTRIBUTION & EVALUATING THREAT TO BOREAL TOADS.**

David Pilliod - *Aldo Leopold Wilderness Research Institute*, Erin Muths - *USGS Biological Resources Division*

**EFFECTS OF PRESCRIBED AND WILDLAND FIRE ON AQUATIC ECOSYSTEMS IN WESTERN FORESTS.**

Steve Corn, David Pilliod - *Aldo Leopold Wilderness Research Institute*, Bruce Bury, Erin Hyde, Chris Pearl - *USGS Forest and Rangeland Ecosystem Sciences Center*

**PERSONAL AND SOCIAL INFLUENCES TO THE SUCCESS OF SCIENCE DELIVERY AND APPLICATION EFFORTS.**

Vita Wright - *Aldo Leopold Wilderness Research Institute*, Mike Patterson – *University of Montana*, Charisse Sydoriak - *BLM National Science and Technology Center*, John Szymoniak, Cynthia Miner - *Pacific Southwest Research Station*, James Saveland - *Rocky Mountain Research Station*, Ruth Jacobs - *USGS Forest and Rangeland Ecosystem Sciences Center*

**LEOPOLD INSTITUTE WEB SITE.**

Suzanne Schwartz, Vita Wright - *Aldo Leopold Wilderness Research Institute*, Lisa Eidson - *University of Montana Wilderness Institute*

**TRENDS IN CAMPSITE IMPACTS IN THE SOUTHWEST.**

David Cole - *Aldo Leopold Wilderness Research Institute*; Pam Foti, - *Northern Arizona University*

**INTEGRATING SOCIAL VALUES IN VEGETATION MODELS VIA GIS: THE MISSING LINK FOR THE BITTERROOT NATIONAL FOREST.**

Anne Black, Alan Watson, Carol Miller - *Aldo Leopold Wilderness Research Institute*

**HIGH RELIABILITY ORGANIZATION OF PUBLIC INVOLVEMENT IN AGENCY DECISIONS TO ACCOMPLISH WILDERNESS FIRE MANAGEMENT OBJECTIVES.**

Katie Knotek, Alan Watson, Carol Miller - *Aldo Leopold Wilderness Research Institute*

**LEARNING FROM THE PAST: RETROSPECTIVE ANALYSES OF THE FIRE BEHAVIOR IN YOSEMITE AND SEQUOIA-KINGS CANYON NATIONAL PARKS.**

Carol Miller, Anne Black, Brett Davis - *Aldo Leopold Wilderness Research Institute*; Mike Beasley and Tony Caprio - *National Park Service*

**MONITORING EFFECTS OF TRUST IN COLLABORATIVE PLANNING FOR A LANDSCAPE-LEVEL FUELS TREATMENT PROJECT ON THE BITTERROOT NATIONAL FOREST, MONTANA.**

Alan Watson, Katie Knotek - *Aldo Leopold Wilderness Research Institute*; William Borrie - *University of Montana*

## **PROJECTS COMPLETED IN FY 2006:**

### **ANALYSIS OF BARRIERS TO WILDLAND FIRE USE (WFU) IN FOREST SERVICE**

**WILDERNESS AREAS.** Carol Miller - *Aldo Leopold Wilderness Research Institute*, Dustin Doane - *University of Idaho*

**PROJECT DESCRIPTION:** This study helped to identify the barriers to implementing WFU in FS wilderness areas. A national internet survey of FS wilderness fire management officers was used to understand the factors that influence the WFU recommendation. Although we encountered problems with the administration of the survey and had a low response rate, we were able to identify primary barriers to WFU in wilderness, thereby establishing a foundation for mitigating these barriers, and for improving organizational effectiveness and the quality and consistency of fire management decisions. This study documented that decisions to implement WFU are influenced by organizational culture, environmental factors, resource availability and public support.

**WHERE:** National survey, administered from Moscow, ID.

**PRODUCTS:**

Doane, Dustin; O’Laughlin, Jay; Morgan, Penelope, Miller, Carol. 2006. Barriers to wildland fire use: a preliminary problem analysis. *International Journal of Wilderness*. 12(1): 36-38. Leopold Publication Number 575

A Master’s thesis at University of Idaho was completed by Dustin Doane. Journal articles are in preparation.

### **RAPID ASSESSMENTS OF COMMUNITY RELATIONSHIPS TO THE BITTERROOT**

**NATIONAL FOREST.** Kari Gunderson, Alan Watson - *Aldo Leopold Wilderness Research Institute*, John Titre - *Park Studies, Inc.*

**PROJECT DESCRIPTION:** a. Provide guiding principles and a specific methodology plan for data collection and analysis for 1) low resolution/large breadth assessments, and 2) high resolution, narrow breadth assessments for a landscape level fuel treatments project coordinated by the Bitterroot ecosystem Management Research Project, b. Provide review and feedback during implementation of the study plan, including analysis and input to applied modeling efforts, c. Develop and provide an annotated bibliography of relevant place-based planning and management articles that describe the purpose of place-based planning, methods of data collection and analysis, and applications.

**WHERE:** Communities around the Bitterroot National Forest.

**PRODUCTS:**

Park Studies, Inc. will provide an annotated bibliography of relevant place-based planning and management articles that describe the purpose of place-based planning, methods of data collection and analysis, and applications.

### **MACROINVERTEBRATE ASSEMBLAGES IN MOUNTAIN STREAMS IN BURNED (WILDLAND AND PRESCRIBED) AND UNBURNED WATERSHEDS ON THE PAYETTE NATIONAL FOREST, IDAHO.** Katherine Strickler - *University of Idaho*, David Pilliod - *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** This study will characterize the effects of prescribed and wildland fire on aquatic invertebrate communities. Funding is provided by the Joint Fire Sciences Program.

**WHERE:** Payette National Forest, ID

**INTEGRATING SOCIAL SCIENCE RESEARCH WITH WILDLAND FIRE SCIENCE: ASSESSING VALUES AT RISK FROM THE BITTERROOT COMMUNITY WILDFIRE PROTECTION PLAN.** Alan Watson - *Aldo Leopold Wilderness Research Institute*, Jim Burchfield, Paul Lachapelle, Tam Ubben - *University of Montana*

**PROJECT DESCRIPTION:** To understand how Bitterroot residents regard the efficacy of the actions recommended and carried out under the Community Wildfire Protection Plan. 23 individuals representing a diversity of interests were interviewed in 2004 and 2005. People were asked to describe how recommended fuel treatments conformed to people's attitudes, values, and community norms regarding forest lands in the Bitterroot, and whether the treatments were addressing priority values at risk. Results seem to indicate that the management of wildland use fires in wilderness will be guided more by physiographic, weather, and demographic conditions than the intensity of treatments in the wildland urban interface.

**WHERE:** Bitterroot Valley, Montana

**PRODUCTS:**

Burchfield, James; Lachapelle, Paul; Ubben, Tam. 2005. Integrating social science research with wildland fire science: assessing values at risk from the Bitterroot Community Wildfire Protection Plan. University of Montana, College of Forestry and Conservation. Final report to the Leopold Institute.

**FIRE MANAGEMENT STRATEGIES FOR WILDERNESS AND OTHER PROTECTED WILDLANDS: THE POTENTIAL CONTRIBUTION OF LANDSCAPE-SCALE ANALYSES OF FIRE HISTORY.** Carol Miller - *Aldo Leopold Wilderness Research Institute*, Lisa Graumlich, Todd Kipfer - *Montana State University*

**PROJECT DESCRIPTION:** The purpose of this project is to understand factors that control the frequency, severity, and spread of natural fires across landscapes. Analysis of long term fire and climate patterns will be used in combination with simulation models to assess management options for fires and fuels in wildland ecosystems. Tree-ring based studies of fire history and long-term climate reconstructions will play a key role in this research.

**WHERE:** Various national forests and parks.

**SUPPORTING THE WILDERNESS INFORMATION NETWORK WITH RESEARCH MATERIALS.** Vita Wright – *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** The purpose of this agreement is to update and improve the accessibility of research materials that the Aldo Leopold Wilderness Institute (RWU-4901) distributes through the Internet with an emphasis on database development and management.

**WHERE:** Aldo Leopold Wilderness Research Institute

**INTEGRATING SOCIAL VALUES IN VEGETATION MODELS VIA GIS: THE MISSING LINK FOR THE BITTERROOT NATIONAL FOREST.** Anne Black, Alan Watson, Carol Miller - *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** This project, funded by the Joint Fire Science Program, seeks to advance the scientific basis for integrating social values into forest and fuel management planning while filling a locally important knowledge and data gap identified by the Bitterroot NF. The project also seeks to provide managers with the means to assess potential public response to vegetation management along the Bitterroot Front by demonstrating how social values may be integrated into vegetation models. Our objectives are to:

- identify and represent the local public's relationship to the Bitterroot Front – their special places, meanings, uses, and landscape values in GIS datasets - and incorporate into the SIMPPLE/MAGIS vegetation simulation model and scheduler to assess possible affects of hazardous fuels reduction efforts on these relationships.
- verify these datasets with all users - the public, the land managers, and the model developers.
- provide to managers a usable guide for replicating methods in the future
- publish our conceptual model - providing scientific basis for integration of human values into vegetation simulation models.

**WHERE:** Bitterroot National Forest, MT

**PRODUCTS:**

FINAL REPORT - Integrating Social Values in Vegetation Models via GIS: The Missing Link for the Bitterroot National Forest

**HIGH RELIABILITY ORGANIZATION OF PUBLIC INVOLVEMENT IN AGENCY DECISIONS TO ACCOMPLISH WILDERNESS FIRE MANAGEMENT OBJECTIVES.** Katie Knotek, Alan Watson, Carol Miller - *Aldo Leopold Wilderness Research Institute*

**PROJECT DESCRIPTION:** A qualitative study focusing specifically on the USDA Forest Service (USFS), as a wildland fire management organization, and how it can learn from high reliability organizations to improve public outreach for its fire and fuels management. Public outreach conducted during the planning and implementation of the South Fork of the Sun River Prescribed Burn in the Scapegoat Wilderness, Rocky Mountain Ranger District, Lewis and Clark National Forest, is used as a case study.

**WHERE:** Rocky Mountain District, Lewis and Clark National Forest, including the communities of Choteau and Augusta, MT.

**PRODUCTS:**

Knotek, Katie. 2005. Human aspects of fire and fuels management in the Northern Rockies. Eco-Report (Fall 2005). Missoula, MT: Bitterroot Ecosystem Management Research Project, USDA Forest Service, Rocky Mountain Research Station.

Leopold Publication Number 573

Knotek, Katie; Watson, Alan. E. 2006. Organizational characteristics that contribute to success in engaging the public to accomplish fuels management at the wilderness/non-wilderness interface. In: Andrews, Patricia L.; Butler, Bret W., comps. *Fuels Management – How to Measure Success: Conference Proceedings*. 28 – 30 March 2006; Portland, OR. Proceedings RMRS-P-41. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Leopold Publication Number 590

Organizational Characteristics that Contribute to Success in Engaging the Public to Accomplish Fuels Management at the Wilderness/Non-Wilderness Interface - Presented at the *1st Fire Behavior and Fuels Conference: Fuels Management – How to Measure Success*, March 28-30, 2006, Portland, OR.

Managing the Unexpected in Public Outreach for Fire and Fuels Management - Summary article featured in the Rocky Mountains Cooperative Ecosystem Studies Unit (CESU) Newsletter, Sept. 2006.

FINAL PROJECT REPORT: - Managing with Mindfulness: Learning from High Reliability Organizations to Improve Public Outreach for Fire and Fuels Management

In addition to conducting and coordinating research and research application projects, Leopold Institute staff organize and participate in conferences and symposia, host visiting scientists and managers, participate on committees and task forces, work collaboratively with University staff and graduate students, edit and review manuscripts for journals, books, and proceedings, review research proposals, and make presentations at scientific and management conferences and training sessions. A sampling of those activities are listed below.

## PRESENTATIONS TO SCIENTIFIC/PROFESSIONAL ORGANIZATIONS:

Presentation Title	Meeting Name and Location	Staff
Delivering the goods: a case study on moving research results to the field	Science Synthesis:FuelsTools, Missoula, MT	A. Black
Translating and communicating fire research results in forms useful to managers	USGS Wildland Fire Science Workshop, Tucson, AZ	A. Black
Integrating Physical, Ecological and Social sciences using a spatially explicit dynamic simulation model	International Association of Landscape Ecologists Annual Meeting, San Diego, CA	A. Black
Integrating Social Science into Ecosystem Theory using a spatially explicit dynamic simulation system	Missoula Fire Lab, Missoula, MT	A. Black
Research to support wildland fire use decisions in Yosemite National Park	Yosemite Fire Science Symposium, Yosemite National Park	B. Davis
Retrospective fire modeling to quantify the cumulative effects of suppression	JFSP Governing Board field trip, Lubrecht Experimental Forest, MT	B. Davis
The Leopold Institute and wilderness research: past, present and future	Geography and Recreation Management Department, Flagstaff, AZ	D. Cole
The adaptable human: investigations of experiences in and opinions about management of heavily-used wilderness	International Symposium on Society and Natural Resources, Vancouver, BC	D. Cole
Integrating recreation ecology and the social sciences; promises and pitfalls	International Symposium on Society and Natural Resources, Vancouver, BC	D. Cole
Recreational displacement versus avoiding undesirable recreation settings	International Symposium on Society and Natural Resources, Vancouver, BC	D. Cole
Assessing attitudinal change caused by information and deliberation in public meetings	International Symposium on Society and Natural Resources, Vancouver, BC	D. Cole
Recreation ecology research: lessons from the past	Third International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas, Rapperswil, Switzerland	D. Cole
Line-Distance Sampling of Desert Tortoises in the Mojave Desert, 2001—2005	American Society of Ichthyologists and Herpetologists/Herpetologists' League/Society for the Study of Amphibians and Reptiles, New Orleans, LA	S. Corn
Species-specific responses of amphibians to wildfire in Glacier	Northwest Science Association/ Idaho Chapter of The Wildlife Society, Boise, ID	S. Corn

## Activities

National Park		
The U.S. Geological Survey's Amphibian Research And Monitoring Initiative	Northwest Science Association/ Idaho Chapter of The Wildlife Society, Boise, ID	S. Corn
Assessing bias in the estimation of abundance using distance sampling	Society for Northwestern Vertebrate Biology, Olympia, WA	S. Corn
A model for understanding social elements of change in wilderness fire stewardship	8 <sup>th</sup> World Wilderness Congress, Anchorage, AK	K. Knotek
Managing with mindfulness: Learning from high reliability organizations to improve public outreach for fire and fuels management	Bitterroot Ecosystem Management Program Executive Committee meeting, Missoula, MT	K. Knotek
Organizational characteristics that contribute to success in engaging the public to accomplish fuels management at the wilderness/non-wilderness interface	1 <sup>st</sup> Fire Behavior and Fuels Conference: Fuels Management-How to Measure Success, Portland, OR	K. Knotek
Managing with mindfulness to improve public outreach in fire and fuels management	Northern Rockies Geographic Area Incident Management Teams Meeting, Missoula, MT	K. Knotek
Organizational characteristics that contribute to success in engaging the public to accomplish fire and fuels management at the wilderness/non-wilderness interface	Northern Region Public Affairs Officers Conference, Missoula, MT	K. Knotek
Case study of applying HRO	Managing the Unexpected in Fire Management Operations: A Third Workshop on High Reliability Organizing, Missoula, MT.	K. Knotek
Contrasting experience orientations at Denali National Park and Preserve	12 <sup>th</sup> International Symposium on Society and Resource Management, Vancouver, B.C.	K. Knotek
Breaking boundaries in developing monitoring indicators for recreation visitor experiences at Denali	Alaska Park Science Symposium, Denali National Park and Preserve, AK.	K. Knotek
Steps for increasing the benefits and reducing the impacts of science in wilderness	8 <sup>th</sup> World Wilderness Congress, Anchorage, AK	P. Landres
Does the U.S. approach to monitoring wilderness character fit wilderness in other countries?	8 <sup>th</sup> World Wilderness Congress, Anchorage, AK	P. Landres
An international comparison of wilderness laws: a first step	8 <sup>th</sup> World Wilderness Congress, Anchorage, AK	P. Landres
Poster: Evaluating Approaches for Mapping Burn Probabilities	The Joint Fire Sciences Program Governing Board, Lubrecht Experimental Forest, MT	C. Miller
Poster: Climate drivers of fire and fuel in the northern Rocky Mountains: past, present and future	1 <sup>st</sup> Fire Behavior and Fuels Conference, Portland, OR	C. Miller
Poster: Research to improve wilderness fire stewardship	USGS Fire Science Workshop, Tucson, AZ	C. Miller

## Activities

Poster: Wilderness fire research in the context of larger social and ecological systems	World Wilderness Congress, Anchorage, AK	C. Miller
Poster: Can wildland fire use restore historical fire regimes in wilderness?	The Joint Fire Science Program PI meeting, San Diego, CA	C. Miller
Wilderness fire stewardship with an aim toward a moving target	World Wilderness Congress, Anchorage, AK	C. Miller
Research to Support Wildland Fire Use Decisions in Yosemite National Park	Yosemite Fire Science Symposium, Yosemite National Park, CA	C. Miller
Poster: Research to Improve Wilderness Fire Stewardship	USGS Fire Workshop, Tucson, AZ	D. Parsons
Poster: Providing Research to Sustain Wilderness Stewardship	Technical Session of 8 <sup>th</sup> World Wilderness Congress, Anchorage, AK	D. Parsons
Relationships between humans and wilderness resources	Komarov Botanical Institute, Russian Academy of Sciences, St. Petersburg, Russia	A. Watson
Defining wilderness experiences among visitors to Alaska wilderness	St. Petersburg State University, St. Petersburg, Russia	A. Watson
Linking war and peace and protected areas in Russia	Forest Sciences Laboratory, RMRS, Missoula, MT; RMRS-HQ, Ft. Collins, CO	A. Watson
Beyond traditional Wisdom: linking traditional knowledge to wilderness protection	American Indian Science and Engineering Society, Student Chapter, Missoula, MT	A. Watson
Trust in public purpose marketing	International Symposium on Society and Resource Management, Vancouver, B.C.	A. Watson
Poster: Technical and Social Influences to the Success of Fire Science Delivery	The Joint Fire Science Board Meeting, Missoula, MT	V. Wright

### SHORT COURSES/TRAINING PRESENTED:

<b>Course/Training</b>	<b>Location</b>	<b>Staff</b>
ScienceSynthesis:FuelsTools	Redlands, CA; San Bernardino, CA; Los Padres, CA; Cleveland, OH	A. Black
Managing the Unexpected Workshop	Missoula, MT	A. Black
Visitor Impacts: The Science Behind the Management	Missoula, MT	D. Cole
Backcountry impact research and monitoring at Grand Canyon National Park	Grand Canyon, AZ	D. Cole
Trends over 20 years on backcountry campsites at Grand Canyon National Park	Grand Canyon, AZ	D. Cole
Natural vs. Untrammeled	Helen, GA	D. Cole
Wilderness research at the Aldo Leopold Wilderness Research Institute	Helen, GA	D. Cole
Site Inventories: Element 6 of the Ten Year Wilderness Stewardship Challenge	Helen, GA	D. Cole
Provided GIS consultation to Sam Cushman, RMRS/Forestry Sciences Lab –Ecology Unit	Missoula, MT	B. Davis

## Activities

Provided Support for the burn probability model BurnPro, developed at ALWRI. to Scott Daily, graduate student, University of Nevada	Missoula, MT	B. Davis
Provided GIS training/support to David Wright, Ecologist, RMRS/Forestry Sciences Lab – Ecology Unit	Missoula, MT	B. Davis
The challenge of ecological restoration in wilderness: What do we gain? What do we lose? at the Carhart Center’s National Wilderness Stewardship training course	Missoula, MT	P. Landres
A practical approach to monitoring wilderness character at the interagency Carhart Center’s on monitoring	Las Vegas, NV	P. Landres
Develop monitoring goals and objectives at the interagency Carhart Center’s on monitoring	Las Vegas, NV	P. Landres
Evaluating proposals for monitoring and research at the interagency Carhart Center’s on monitoring	Las Vegas, NV	P. Landres
Preserving wilderness character: the context for natural and cultural resource monitoring in wilderness” at the interagency Carhart Center’s on monitoring	Las Vegas, NV	P. Landres
A practical approach for monitoring wilderness character at the Arthur Carhart Regional Wilderness Stewardship Training	Montecito, CA	P. Landres
Ecological restoration in wilderness: What do we gain? What do we lose?; Arthur Carhart Regional Wilderness Stewardship Training	Montecito, CA	P. Landres
International Wilderness Management Training, with Wilderness Action Group of South Africa and the WILD Foundation	Anchorage, AK	A. Watson

### SELECTED TECHNOLOGY TRANSFER ACTIVITIES:

<b>Activity</b>	<b>Staff</b>
Met with 4151 staff to brief on JFSP-Social progress and integration opportunities with SIMPPLLE.	A. Black
Developed and supervised development of voice-over, dynamic web-delivered training powerpoints for Science Synthesis Project.	A. Black
Supervised and envisioned integrated website for Science Synthesis project.	A. Black
RMRS representative to the National Fire SPA portfolio team on Fire Science Delivery.	A. Black
Member of RMRS Fire SPA team.	A. Black
Member of National Science Synthesis and Integration team.	A. Black
Site visits to Linville Gorge, Shining Rock and Ellicott Rock Wildernesses.	D. Cole
Presented initial Farsite simulation Map Library to Yosemite and Sequoia-Kings Canyon National Parks personnel and received feedback.	B. Davis
Mailed revised Map Library to Yosemite and Sequoia-Kings Canyon National Parks personnel for use during the 2006 fire season.	B. Davis
Administered trust monitoring instrument at Trapper-Bunkhouse public meeting and	K. Knotek

## Activities

field trip to Darby MT.	
Invited lecture on “Ecological restoration in wilderness: What do we gain? What do we lose?” to the University of Montana The U.S. Environmental Movement course.	P. Landres
Invited lecture and discussion on “Wilderness in the United States: the role of ‘wilderness character’ in 42 years of agency stewardship” at a joint meeting of students from the United States and New Zealand conducted at the University of Montana.	P. Landres
Participated in the Boise NF fire management meeting to discuss TELSA simulation modeling.	C. Miller
Provided, upon request, to R3 USFS, information about status of fire plans in NPS and USFS wilderness areas.	C. Miller
Expanded ALWRI Online Resources: Project Details & Resources Web Pages <a href="http://leopold.wilderness.net/research/fprojects.htm">http://leopold.wilderness.net/research/fprojects.htm</a>	S. Schwartz

In FY2006 Leopold Institute staff and collaborators published the following papers. Publications can be ordered from the Leopold Institute's web site: <http://leopold.wilderness.net/pubs.cfm>.

- Adams, Michael J.; Hossack, Blake R.; Knapp, Roland A.; Corn, Paul Stephen; Diamond, Stephen A.; Trenham, Peter C.; and Fagre, Dan B. 2005. Distribution patterns of lentic breeding amphibians in relation to ultraviolet radiation exposure in western North America. *Ecosystems* 8:488–500.
- Black, A.; Opperman, T. 2005. Fire Effects Planning Framework: a user's guide. Gen. Tech. Rep. GTR-RMRS-163WWW. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 63 p.
- Brooks, Paul D.; O'Reilly, Catherine M.; Diamond, Stephen A.; Campbell, Don H.; Knapp, Roland; Bradford, David; Corn, Paul Stephen; Hossack, Blake; and Tonnessen, Kathy. 2005. Spatial and temporal variability in the amount and source of dissolved organic carbon: implications for UV exposure in amphibian habitats. *Ecosystems* 8:478–487.
- Cole, David N. 2006. Monitoring to Protect the character of individual wildernesses. *In*: Aguirre-Bravo, Celedonio, et al. Eds. 2004. Monitoring Science and Technology Symposium: Unifying Knowledge for Sustainability in the Western Hemisphere; 2004 September 20-24; Denver, CO. Proceedings RMR P-37-cd. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Cole, David N. 2006. Visitor and recreation impact monitoring: is it lost in the gulf between science and management? *The George Wright Society Forum* 23(2): 11-16.
- Cole, David N.; Hall, Troy E. 2006. Wilderness zoning: should we purposely manage to different standard? *In*: Harmon, David. People, places and parks. Proceedings of the 2005 George Wright Society Conference on Parks, Protected Areas and Cultural Sites. Hancock, MI: The George Wright Society: 33-38.
- Cole, David N.; Spildie, David R. 2006. Restoration of plant cover in subalpine forests disturbed by camping: success of transplanting. *Natural Areas Journal* 26: 168-178.
- Corn, P.S. 2005. Climate change and amphibians. *Animal Biodiversity and Conservation* 28:59–67.
- Diamond, Stephen A.; Trenham, Peter C.; Adams, Michael J.; Hossack, Blake R.; Knapp, Roland A.; Stark, Stacey L.; Bradford, David; Corn, P. Stephen; Czarnowski, Ken; Brooks, Paul D.; Fagre, Dan; Breen, Bob; Detenbeck, Naomi E.; and Tonnessen, Kathy. 2005. Estimated ultraviolet radiation doses in wetlands in six national parks. *Ecosystems* 8:462–477.
- Doane, D., O'Laughlin, J., Morgan, P., Miller, C. 2006. Barriers to wildland fire use: a preliminary problem analysis. *International Journal of Wilderness* 12(1): 36-38.
- Glaspell, B.; Watson, A.; Kneeshaw, K.; Pendergrast, D. 2006. It's elemental my dear! What makes an experience different at Gates of the Arctic National Park and Preserve? *Natural Enquirer*. 7(1): 6-15.
- Hossack, Blake R. 2006. Amphibians and wildfire in the U.S. northwest. *International Journal of Wilderness* 12:26, 43.

- Hossack, Blake R.; Corn, Stephen P.; Pilliod, David S. 2005. Lack of Significant Changes in the Herpetofauna of Theodore Roosevelt National Park, North Dakota, Since the 1920s. *American Midland Naturalist* 154: 423-432.
- Hossack, Blake R.; Diamond, Stephen A.; Corn, Stephen P. 2006. Distribution of boreal toad populations in relation to estimated UV-B dose in Glacier National Park, Montana. *Canadian Journal of Zoology* 84(1):98-107.
- Knotek, K. 2005. Human aspects of fire and fuels management in the Northern Rockies. Eco-Report (Fall 2005). Missoula, MT: Bitterroot Ecosystem Management Research Project, USDA Forest Service, Rocky Mountain Research Station.
- Knotek, K. 2005. Social and institutional influences on wilderness fire stewardship. *International Journal of Wilderness*. 11(3): 30 & 12.
- Knotek, K. 2006. Understanding social influences on wilderness fire stewardship decisions. *International Journal of Wilderness* 12(1): 22-25.
- Landres, P.B. 2005. Balancing the benefits and impacts of science in Alaska's wilderness. *Alaska Park Science* 4(2): 44-46.
- Lawson, Steven; Itami, Robert; Gimblett, Randy; Manning, Robert. 2006. Benefits and challenges of computer simulation modeling of backcountry recreation use in the Desolation Lake area of the John Muir Wilderness. *Journal Of Leisure Research*. 38(2): 187-207.
- Liljeblad, A. & Borrie, W.T. 2006. Trust in Wildland Fire and Fuel Management Decisions. *International Journal of Wilderness* 12(1): 39-43.
- Miller, C. 2006. Wilderness fire management in a changing world. *International Journal of Wilderness* 12(1): 18-21,13.
- Muths, Erin; Jung, Robin E.; Bailey, Larissa L.; Adams, Michael J.; Corn, P. Stephen; Dodd, C. Kenneth, Jr.; Fellers, Gary M.; Sadinski, Walter J.; Schwalbe, Cecil R.; Walls, Susan C.; Fisher, Robert N.; Gallant, Alisa L.; Battaglin, William A.; and Green, D. Earl. 2005. The U.S. Department of Interior's Amphibian Research and Monitoring Initiative: a successful start to a national program. *Applied Herpetology* 2:355-371.
- Parsons, David J. 2006. Revisiting Wilderness Science Priorities. *International Journal of Wilderness* 12(2):22,35.
- Pilliod, David S.; Bull, Evelyn L.; Hayes, Jane L.; Wales, Barbara C. 2006. Wildlife and invertebrate response to fuel reduction treatments in dry coniferous forests of the Western United States: a synthesis. Gen. Tech. Rep. RMRS-GTR-173. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 34 p.
- Roeper, Nancy; Landres, Peter; Fisher, Don. 2006. The Global Wilderness Seminar for Government Agencies: A Meeting at the Crossroads of Wildlands Stewardship. *International Journal of Wilderness* 12(2):45-46.

## Publications

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Scherer, Rick D.; Muths, Erin; Noon, Barry R.; and Corn, Paul Stephen. 2005. An evaluation of weather and disease as causes of decline in two populations of boreal toads. *Ecological Applications* 15:2150–2160.

Therrell, Lisa; Cole, David; Claassen, Victor; Ryan, Chris; Davies, Mary Ann. 2006. Wilderness and backcountry site restoration guide. Tech. Rep. 0623–2815–MTDC. Missoula, MT: U.S. Department of Agriculture Forest Service, Missoula Technology and Development Center. 394 p.

Wright, Vita. 2006. Overcoming Barriers to the Use of Science in National Parks (Session Summary). Pages 400-404 *In*: Harmon, David, ed. People, Places, and Parks: Proceedings of the 2005 George Wright Society Conference on Parks, Protected Areas, and Cultural Sites. Hancock, Mich.: The George Wright Society. April 2005. Philadelphia, PA.