

## **Toward Restoration and Recovery: Adaptive Management and Monitoring Studies for the 2000 Wildfires**

**USDA Forest Service – Regions 1 and 4, and Rocky Mountain Research Station**

**Other Collaborators - US Geological Survey, Natural Resources Conservation Service, Montana Bureau of Mines and Geology, Washington State University and University of Montana**

### **Project Reports**

The following are the projects. If they are completed, that is noted, otherwise, the page number is provided for more detail on the ongoing effort.

<b>Topic Area</b>	<b>Study</b>	<b>Lead Contact</b>	<b>Page No. or Status</b>
<b>WATER, SOILS AND AQUATIC BIOTA</b>			
Aquatic Ecosystems	<b>Technology Transfer</b> for projects (related to aquatic systems)	Kerry Overton, RMRS	Pg. 3
	<b>Synthesis of knowledge</b> on fire and fire-related management in aquatic ecosystems.	Bruce Rieman, RMRS	Publication available
	<b>Indicators and monitoring</b> approaches – Effects of stand-replacing wildfire on stream ecosystems	Charlie Luce, RMRS	Pg. 4
	Decay of downslope continuity of post-fire <b>water repellency</b> and its influence on BAER treatment effectiveness	Charlie Luce, RMRS	Pg. 5
	Consequences of fire and thinning on <b>soil processes and nutrient cycling</b>	Debbie Page-Dumroese, RMRS	Pg. 7
	Calibration of <b>model for peak discharge</b> and other flooding and debris-flow hazards	Susan Cannon, USGS Robert Wintergerst, R1	Ongoing – funding was transferred to USGS several years ago.
Riparian	<b>Streamside forest and large woody debris patterns</b> in ponderosa pine/Douglas fir forests under fire-excluded and fire-existing conditions	Sherry Wollrab, RMRS; Kerry Overton, RMRS	Pg. 9
Fisheries	Fire and <b>non-native fishes</b>	Mike Young, RMRS; Jason Dunham, RMRS	Pg. 12
Amphibians	Effects of wildland fire and prescribed fire on <b>amphibians and aquatic habitats</b>	David Pilliod, RMRS	Pg. 15

<b>Topic Area</b>	<b>Study Area</b>	<b>Lead Contact</b>	
<b>VEGETATION</b>			
<b>Native Seed Revegetation - Effectiveness</b>		Durant McArthur, RMRS; Jim Olivarez, R1 – Co-leads	
	Publication-Revegetation in the Northern Rockies	Dan Ogle, NRCS	Publications available.
	Publication-Revegetation in the Great Basin	Durant McArthur, RMRS	Pg. 18
	Revegetation monitoring	Beth Hodder, Flathead NF	(not funded by R1 this FY)
	Revegetation monitoring	Dick Wenger, Salmon-Challis NF	Pg. 17
	Revegetation monitoring	Robert Campbell, Fish Lake NF	(status not provided)
<b>Post-fire Fuel Treatment Monitoring</b>			
	Effects of salvage on vegetation, fauna, birds, and fisheries (Incl. Monitoring Design)	Mike Young, RMRS; Les Marcum, UM; Paul Alaback, UM; Kerry Foresman, UM; Dick Hutto, UM	Pg. 19
	Salvage and policy, economic and social implications	Bob Schrenk, R1 David __, RMRS; Jack Thomas, UM	(status not provided)
	Effects of salvage on riparian	Beth Gardner, Flathead NF	Report available.
	Effects of salvage on erosion	Pete Robichaud, RMRS	Pg. 20
<b>Invasive Weeds Monitoring</b>			
	New invasive species detect/eradication, predicted weed response and weed treatment effectiveness	Steve Sutherland, RMRS	Pg. 22
	Palm Pilot data recording method	Leonard Lake, Nez Perce NF	Completed
	Weeds Monitoring	Dianne Schuldt, Salmon-Challis NF	Pg. 17
<b>SOCIAL</b>			
		Dan Williams, RMRS; Cindy Swanson, R1 – Co-leads	
	Understanding communities at the wildfire interface	Dan Williams, RMRS; Cindy Swanson, R1	Pg. 25

## *Water, Soils and Aquatic Biota*

**Project Title:** Technology Transfer for R1/R4 Adaptive Management and Monitoring Fire Projects

**Project Leader:** Kerry Overton/Sherry Wollrab

**Participating Research Contacts:** R1/R4 Project Researchers

**Participating Forests/Grassland Contacts:** R1/R4 Forests

### **Funds**

**Total Project Cost:** \$88,878

**Timeframe (within 2001-2005):**

**2003:** \$35,000

**2004-2005:** (remaining costs): \$36,000

**Progress from 2002-2003:** A Fire & Aquatic Ecosystem WWW Web Site was designed in 2002 with R1/R4 Adaptive Management and Monitoring Fire Projects, Boise Aquatic Sciences Lab and R1/R4/RMRS Technology Transfer funding: “<http://www.fs.fed.us/rm/boise/teams/fisheries/fire/firehome.htm>”.

The Web site is the primary mechanism for transferring information and products generated by the R1/R4 Fire Projects. It currently provides project descriptions and 2001-2002 status reports of the R1/R4 Adaptive Management and Monitoring Fire Projects, as well as a Fire & Aquatic Bibliography, and the products of the Fire & Aquatic Ecosystem Workshop.

We hosted a workshop among R1/R4 Adaptive Management and Monitoring Fire Project participants (January 2003) to share information regarding monitoring indicators, sample-inventory-monitoring methods, project results, published and unpublished reports, and bibliographies. The information acquired at this workshop has been posted on the Fire & Aquatic Ecosystem WWW Web Site.

**Plans for 2004:** We plan on collecting the latest information from the R1/R4 Adaptive Management and Monitoring Fire Projects. We plan on organizing one or two workshops to transfer the information to the practitioners. We are going to attempt to find some field projects to apply the information to establish some living examples.

**Products and/or tech transfer expected in 2004:** An updated Fire & Aquatic Ecosystem WWW Web Page, R1/R4 practitioner workshops, and some example field projects.

<http://www.fs.fed.us/rm/boise/teams/fisheries/fire/firehome.htm>

### **Issues that need discussion with the R1/R4/RMRS Steering Group?:**

We currently do not know if we have the \$36,000 available for planned FY04 activities because of fire borrowing.

1/15/04km

**Project Title:** Development of indicators and monitoring approaches to define the effects of stand replacing wildfire on stream ecosystems

**Project Leader:** Charlie Luce

**Participating Research Contacts:** Jack King, Bruce Rieman, Jason Dunham

**Participating Forests/Grassland Contacts:** Pat Green, Nick Gerhardt (Nezperce NF); Dave Burns (Payette NF), Kathy Geier-Hayes (Boise NF).

#### **Funds**

**Total Project Cost:** \$141,120

**Timeframe (within 2001-2005):** 2001-2004

**2003:** \$108,644

**2004-2005:** (remaining costs): \$0

#### **Progress from 2002-2003:**

A crew of 10 summer seasonals completed measurements on 30 streams on the Nez Perce, Payette, and Boise National Forests. Data were collected on stream width, depth, woody debris, and substrate and on bank vegetation. The specifics of the data collected are included in the attached field protocol. The data are now being analyzed to determine if there is a systematic difference in stream characteristics as a function of time since the watershed last experienced widespread fire. In addition a reach was measured to correlate measurement techniques used for studying riparian fire effects (PI Wollrab).

#### **Plans for 2004:** (Description of work.)

In 2004 we will complete analysis of the data to understand temporal changes in stream channels with time and decide which indicators might be most indicative of changes in streams following fire.

#### **Products and/or tech transfer expected in 2004:** (Incl. Web links if you have them)

We expect to develop two products in FY 2004. One will be an analysis of the sampling properties of stream characteristics based on the 2002 data along with the detailed protocol used in 2004. A comparison of this monitoring protocol with that used in by the riparian study may be included.

In addition we expect to present preliminary findings about how stream characteristics change over time since fire. Publication is likely in FY 2005.

#### **Issues that need discussion with the R1/R4/RMRS Steering Group?:** (list)

1/15/04km

**Project Title:** On the Decay of Downslope Continuity of Post-Fire Water Repellency and Its Influence on BAER Treatment Effectiveness

**Project Leader:** Charlie Luce

**Participating Research Contacts:** Jim Clayton (emeritus)

**Participating Forests/Grassland Contacts:** T.J. Clifford (Boise NF), Terry Hardy (Boise NF), Henry Shovic (Gallatin NF)

#### **Funds**

**Total Project Cost:** \$148,000

**Timeframe (within 2001-2005):** 2001-2004

**2003:** \$60,500

**2004-2005:** (remaining costs): \$14,500

**Progress from 2002-2003:** (Description of work accomplished; attach more detailed description, map, or pictures that could be used for tech transfer on the web or w/in compiled monitoring report.)

Measurements were taken again at the Trail Creek Fire (4<sup>th</sup> year of measurements) and the Fridley Fire (3<sup>rd</sup> year of measurements).

Analyses were completed to determine the relationship between particle size distributions and the initial continuity of water repellency. Also analyses were completed showing the decay of water repellency over the 4 years at Trail Creek.

The computer model to calculate runoff from water repellent slopes (with and without log erosion barriers) has been coupled with a climate generator and the two programs are being set up to run on the web to provide calculations estimating the probabilistic effectiveness of log erosion barriers as a function of easily measured site characteristics. The name of the new Model is FERGI (Fire enhanced runoff and gully initiation).

The measurement techniques used in this study, data from the study, and the newly developed model were used as the basis for peak runoff estimates for three fires on the Boise and Payette National Forests in the summer of 2004. The results were used as a basis to choose against installing log erosion barriers over a large area, saving the government on the order of 6 million dollars. Without the analysis the BAER team would have recommended installation of the barriers.

Data on continuity of water repellency and its time decay were used in two papers published in Water Resources Research in FY 2003 and on a third paper in Journal of Geophysical Research – Earth Surface Processes that is in press. Another paper on fire effects using this data is in review.

Some results were presented at a Friends of the Pleistocene field trip, the Region 4 Hydrology/soil science/fish biology/botany meeting, the Western Division of the

1/15/04km

American Fisheries Society, and at a Geological Society of America special session on wildfire impacts on watersheds.

**Plans for 2004:** (Description of work.)

We expect to complete analyses of the temporal trends and soil characteristic relationships and assemble a publication on the results. Another paper will be produced on the expected effectiveness of log erosion barriers conditioned on the continuity of water repellency. In addition we expect to complete the FERGI web site to allow field users to estimate the probabilistic effectiveness of treatments for controlling runoff for their site.

**Products and/or tech transfer expected in 2004:** (Incl. Web links if you have them)

The FERGI website should be completed within the next few months, depending on availability of time from permanent staff. Presentations will continue as will production of publications.

**Issues that need discussion with the R1/R4/RMRS Steering Group?:** (list)

Continuing work on the FERGI website requires assistance from temporary employees to gather weather and geographic data. We had set aside \$14,500 for FY 2004 in hopes that fire borrowing would not occur. It did occur, and the \$14,500 has been lost, greatly slowing our progress getting the website up. Any efforts to restore these funds would be very helpful to the completion of the project.

**Project Title:** Consequences of fire and thinning on soil processes and nutrient cycling

**Project Leader:** Deborah Page-Dumroese

**Participating Research Contacts:** Martin Jurgensen (MTU), Tom Rice (RMRS), Michael Amacher (RMRS), Jeff Evans (RMRS), Pete Robichaud (RMRS)

**Participating Forests/Grassland Contacts:** Sharon DeHart (R1); Ed Lieser, (Flathead National Forest); Jeff Bruggink (R4); John Lott (Caribou-Targhee National Forest)

#### **Funds**

**Total Project Cost:** \$397,973

**Timeframe (within 2001-2005):**

**2003:** \$200,000

**2004-2005:** (remaining costs): \$50,000

**Progress from 2002-2003:** (Description of work accomplished; attach more detailed description, map, or pictures that could be used for tech transfer on the web or w/in compiled monitoring report.)

**What are the consequences of prescribed fire (and mechanical thinning) on nutrient reserves in suppressed stands?** In 2002-2003 we conducted pre-harvest sampling on the Flathead National Forest and Caribou-Targhee National Forest. These two sites (one forested, one rangeland) will be treated with prescribed fire and (for the Flathead NF) harvested. Mineral soil, surface organic matter, and each vegetation layer (herbaceous, shrub, overstory) are being analyzed for C, N, Ca, Mg, K, organic matter content, etc.

**Does fire changes nutrient cycling processes?** In cooperation with Dr. Michael Amacher, additional samples were collected in 2003 from burned FIA plots. Chemical analyses will be matched to pre-burn data to evaluate changes after varying types of wildfire.

**What are the key processes that influence erosion and soil productivity?** In cooperation with Dr. Pete Robichaud, soil samples were collected from burned and unburned BAER plots. Nutrient analyses are proceeding. Nutrient changes associated with erosion from burned plots may be significant on a watershed scale and may influence regeneration success. In addition, the wood decomposition study sites (installed on the BAER plots in 2002) were sampled in June and October. These wood decomposition study sites will be used to determine the impact of BAER treatments on below-ground productivity changes.

**Integrating soil productivity and erosion research findings with management.** We are in the process of putting locally important research papers, administrative studies, and/or personal experience information on our web site (<http://forest.moscowfsl.wsu.edu> - click on microbial processes). This information will be synthesized into a publication for managers so they can evaluate management and fire impacts on soil productivity and site resiliency.

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**Plans for 2004:** (Description of work.) Post-treatment soil sampling will take place as soon as each study site has finished treatment. We will continue to collect wood decomposition samples from our BAER treatment plots. Continuation of our efforts to put information on our web site (see above).

**Products and/or tech transfer expected in 2004:** (Incl. Web links if you have them). Synthesis paper on management or fire impacts on soil productivity. Additional web information will become available as we are able to get it into a compatible format.



1/15/04km

**Project Title:** Streamside Forest and Large Woody Debris Characteristics in Burned and Unburned Ponderosa Pine/Douglas-Fir Forests

**Project Leader:** Sherry Wollrab

**Participating Research Contacts:** Kerry Overton

**Participating Forests/Grassland Contacts:** Krassel Ranger District, Payette National Forest

**Funds** (approximate)

**Total Project Cost:** \$104,540

**Timeframe (within 2001-2005):** 2001-2004

**2003:** \$36,000

**2004-2005:** \$15,000

**Progress from 2002-2003:** (Description of work accomplished; attach more detailed description, map, or pictures that could be used for tech transfer on the web or w/in compiled monitoring report.)

During 2002-2003, we collected data in streamside forests and streams for four unburned and three burned streams in the South Fork Salmon and Big Creek watersheds. Our work focused on streamside forest structure and composition, and instream large woody debris structure and dynamics within ponderosa pine/Douglas-fir streamside forest types(see photo below). These streamside forests are represented by historically frequent/low or mixed intensity fire regimes. Thus, we want to describe the implications of fire exclusion, as well as fire, on these systems to provide managers with useful information for effects analyses and assessment of alternatives for fire management in streamside forests. Our objectives are to:

- 1) Characterize and contrast stand structure and composition, and LWD dynamics and structure in burned and unburned streamside forests.
- 2) Describe relationships between streamside stands and instream LWD.
- 3) Evaluate methods and variables that will improve LWD and streamside forest assessment and monitoring.

To address objectives 1 and 2, we collected data for 12 systematically located, 50 m stream reaches and within 50 m x 20 m plots in adjacent ponderosa pine/Douglas-fir streamside forests, along both sides of the stream. Our focus in the stream sampling was large woody debris because of its important role in stream systems, linkage to streamside forest structure, and potential for being affected by fire dynamics.

For objective 3, we conducted intensive continuous sampling overlapping the systematically spaced plots to evaluate whether the spaced plots adequately represent the stream and streamside forest parameters of interest. In addition, Charlie Luce (see adaptive management project entitled "Indicators and Monitoring Approaches for

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Understanding Effects of Wildfire on Stream Ecosystems”) used different sampling methods to collect similar data on an overlapping section of stream. These data will be used to examine the strengths and shortfalls of each method and provide recommendations to the Forests for sampling streamside forests and instream large woody debris.

Coordination with the Payette National Forest has been ongoing since 2001. In May 2003, three personnel (myself, Charlie Luce, and David Pilliod) working on R1/R4 Adaptive Management and Monitoring Projects with study areas on the Payette National Forest, coordinated a visit to the Krassel Ranger Station. We presented the status of our projects, shared information, and received feedback. This project was also presented at a Region 4 meeting, and to NOAA fisheries and Fish and Wildlife personnel in 2002, and at the R1/R4 Adaptive Management and Monitoring meeting in January 2003.

Data from both this year and last have been entered into a spreadsheet and analysis has been initiated. A detailed report addressing objective 1, characterization, is currently being finalized. A synthesis of literature pertaining to streamside forest and LWD dynamics has been completed and will be available as part of the report.

**Plans for 2004:** (Description of work.)

Data analysis, summaries, and reports will continue in 2004, depending upon funding availability. A presentation on the project is planned for the Western Division American Fisheries Society in February 2004.

**Products and/or tech transfer expected in 2004:** (Incl. Web links if you have them)

- Presentation at Western Division American Fisheries Society (Feb. 2004)
- Report on characterization of burned and unburned streamside forests and LWD, including a literature synthesis, to be distributed at Regional meetings, and through the World Wide Web (Jan. 2004)
- Presentation to Payette National Forest on progress and results (spring 2004)
- Presentations at Regional workshops (as scheduled).
- Update of the Fire and Aquatic Ecosystems Bibliography (<http://www.fs.fed.us/rm/boise/teams/fisheries/fire/bibliography.htm>)
- Participation on a team addressing forested RHCA/RCA management in relation to PACFISH/INFISH monitoring

**Issues that need discussion with the R1/R4/RMRS Steering Group?:** (list)

Approximately \$15,000 was lost from this project from fire transfer in 2003. Because the Regions had indicated this money could be carried over and should be used for the full life of the project, the funding was intended to support the principal investigator (Sherry Wollrab) through the analytical and reporting phase of the project. The PI working on this project is supported largely on soft money; therefore, the loss of the funding means that the position will have to be supported through other work. If funding is not returned

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in FY04, the analysis and reporting cannot be completed and the initial investment in the project of more than \$104,000 will be severely impacted.



Cabin Creek, Payette National Forest - a burned ponderosa pine/Douglas-fir streamside forest

1/15/04km

**Project Title:** Do Fires Favor Nonnative Fishes?

**Project Leader:** Michael K. Young

**Participating Research Contacts:** Jason Dunham

**Participating Forests/Grassland Contacts:** Mike Jakober and Rob Brassfield,  
Bitterroot National Forest

#### **Funds**

**Total Project Cost:** \$171,000 (all figures approximate)

**Timeframe (within 2001-2005):** 2001-04

**2003:** \$50,000

**2004-2005:** (remaining costs): \$63,000

**Progress from 2002-2003:** (Description of work accomplished; attach more detailed description, map, or pictures that could be used for tech transfer on the web or w/in compiled monitoring report.)

We completed fish community and habitat sampling of over 20 reaches, about half of which were adjacent to burns, that have been historically sampled by personnel from the Bitterroot National Forest and Montana Department of Fish, Wildlife, and Parks. As a companion to this study, these personnel are also sampling another 20 reaches. Sampling of all reaches was completed in 2001, 2002, and 2003.

A presentation based on sampling in the first two field seasons was given at the Annual Meeting of the Western Division of the American Fisheries Society.

Within the anadromous portion, fieldwork was initiated in 2002. This work focused on Panther Creek, which is a major tributary to the main Salmon River near Salmon, Idaho. In late winter to early summer of 2002, we worked with local biologists on the Salmon-Challis National Forest to refine study objectives and select sites for fieldwork in the basin. The objectives for FY 2001-2002 were to develop a foundation for future work (2003-2005). There were four specific objectives tied to this initial effort: 1) acquisition of existing information on aquatic vertebrate populations (fish and amphibians), local habitat and landscape characteristics, including information on fire history; 2) preliminary field sampling in burned and unburned streams for comparison of aquatic vertebrate distribution and diversity; 3) development of sampling methods for aquatic vertebrates; 4) empirical modeling of stream temperature gradients, with special reference to the effects of post-fire stream heating. A progress summary for each objective is listed below.

1) Acquisition of existing information. We have acquired GIS coverages, including data from the Salmon-Challis National Forest to create a base layer of digital elevation maps, streams, roads, and fire histories for the Panther Creek basin. We have also modeled stream characteristics using models from Utah State University to describe basic characteristics of each stream segment in the basin, including elevation, contributing

drainage area, and channel slope. This information played an important role in guiding fieldwork for 2002.

2) Preliminary sampling of aquatic vertebrates in burned and unburned streams. We have collected information on aquatic vertebrates (fish and amphibians) at nearly 20 sites in nine streams with different fire histories. Our focus was on populations in smaller, headwater streams, which are hypothesized to be most vulnerable to the effects associated with fire. This new data will be merged with existing information available within the Panther Creek basin in future efforts. This larger database will allow further evaluation of associations between aquatic vertebrates and fire, and provide a basis for designing future sampling efforts.

3) Development of sampling methods. Sampling at the sites is intensive, involving multiple electrofishing passes and mark-recapture. This is because the objective is to establish baselines for sampling, based on a rigorous assessment of sampling efficiency. In spite of the fact that electrofishing has been used to sample fish populations for several decades, there has been no effort of this kind to understand sampling efficiency, with the exception of bull trout. Work from 2001-2002 will provide an important contribution to population monitoring associated with fire effects and in general for aquatic vertebrates.

4) Empirical modeling of stream temperature gradients. Our work in other regions shows that stream temperatures can be predicted accurately using elevation-based empirical models. The relationship between elevation and stream temperature is a measure of the rate of stream heating. Our hypothesis is that fire history (e.g., time since fire, burn severity, area burned upstream) should have an influence on patterns of stream heating. We predict stream temperatures to increase following fire, due primarily to loss of vegetation and changes in channel structure. Because most aquatic vertebrates in headwater streams depend on cold water, we expect the amount and distribution of suitable habitat to change following fire. Our interest is in quantifying loss of thermal habitat, and understanding how long it takes for burned systems to return (if they do) to pre-fire conditions. Other research on aquatic vertebrates shows the amount and distribution of suitable habitat is a key factor related to population persistence. In Panther Creek, we have deployed over 60 thermographs in seven streams in 2002 to measure stream heating in relation to fire history. We will complement this dataset with existing information collected by the Salmon-Challis National Forest and other agencies.

In 2003, we initiated data summaries and analysis. This work is ongoing. Manuscripts on sampling efficiency, detectability, and monitoring protocols for stream salmonids to be completed and submitted for publication in 2004. Analysis of stream temperature data to be completed in 2004. In 2003, we were only able to spend about \$4000 of our allocation. The remainder was returned for fire borrowing. Thus, we were not able to dedicate time to some of the objectives described above. If funds lost in 2003 are recovered, we hope to finish field work and assembly of existing data to fully address the question of fire and influences on invasions of nonnative brook trout in Panther Creek.

**Plans for 2004:** (Description of work.)

1/15/04km

One objective is to complete analyses of data on the Bitterroot National Forest portion of this research.

For the Panther Creek study, we hope to complete analysis of existing data without additional financial support (e.g., we will do this with “in kind” contributions). Collection of new data is contingent on return of “borrowed” funds from FY 2003.

**Products and/or tech transfer expected in 2004:** (Incl. Web links if you have them)

Master’s thesis by Clint Sestrich, Montana State University.

Presentation at the annual meeting of the Oregon Chapter of the American Fisheries Society.

Presentation at Idaho Chapter American Fisheries Society (2003)

Presentation at annual Bull Trout Workshop (2003)

**Issues that need discussion with the R1/R4/RMRS Steering Group?:** (list)

Fire borrowing again halted portions of the field work. We are uncertain whether these funds will be restored. If not, no further work in 2004, other than completion of the thesis, is anticipated.

For the anadromous portion of this study, we anticipate completion of work to validate fish monitoring protocols in 2004. This work will be completed through “in kind” support from RMRS 4353, if further funds are not available. The purpose of the first field season (2002) was to provide a solid foundation for future work to directly link nonnative trout invasions, native fish occurrence, and habitat to wildfire influences. This work cannot be completed without continued and more secure funding.

1/15/04km

**Project Title:** Effects of wildland fire and prescribed fire on amphibians and aquatic habitats in the Northern Rocky Mountains

**Project Leader:** David S. Pilliod

**Participating Research Contacts:** Steve Corn, USGS, Missoula; Terrie Jain, RMRS, Moscow; Carol Miller, ALWRI, Missoula

**Participating Forests/Grassland Contacts:** Sam Hescoock and Mary Faurot, Krassel RD, Payette NF

#### **Funds**

**Total Project Cost:** \$150,000

**Timeframe: 2001-2005**

**2002:** \$58,887

**2003:** \$87,073

**2004-2005:** \$0

#### **Progress in 2003:**

The goal of the project is to quantify the effects of wildland fires and prescription burning on stream communities and habitats on the Payette National Forest, Idaho.

#### *Wildland Fire Study:*

In 2003, we sampled for stream amphibians and measured habitat conditions in 21 streams (10 within watersheds that burned in the 2000 Shellrock/Diamond Peak Fire and 11 in unburned watersheds). We collected benthic macroinvertebrate samples in 13 of these streams. We collected water samples for major ion analysis in 8 streams and measured hourly water temperatures in 15 streams.

#### *Prescribed Fire Study:*

We continued to monitor amphibian populations and habitat conditions in 10 streams and macroinvertebrate communities in 8 streams as part of an experimental before-after-control design that will examine the effects of prescription burning to reduce fuel loads in areas of the South Fork Salmon Sub-basin. Two spring burns (Reegan and Parks) and 2 fall burns (Fitsum and Dutch Oven) have been scheduled for 2004 (originally scheduled for 2003).

#### **Plans for 2004:**

In 2004, we will use existing Joint Fire Science Program Funding (JFSP-01-1-3-12) to monitor stream amphibian populations and habitats in 21 streams and macroinvertebrate communities in 16 streams on the Payette National Forest. The 10 streams included in the prescription burn experiment will be sampled more intensively (e.g., immediately before and after the fires). For example, we will take additional water samples to determine changes in water chemistry during and after the fire, we will place additional temperature recorders in the streams to determine increases in water temperature, and set up sediment traps to record inputs of sediment. Amphibians and invertebrates will be sampled after the spring burns and before the fall burns. Canopy cover and woody debris and other habitat characteristics will be recorded at amphibian and invertebrate sampling locations.

**Products and/or tech transfer expected in 2004:**

We will be presenting preliminary results to Forest biologists and fire management personnel on the Payette National Forest. We will be writing up a portion of the wildland fire results for publication in a peer-reviewed journal and presenting this paper at regional meetings. As information and reports become available, we update our project web site: [http://leopold.wilderness.net/staff/projects/project\\_003.htm](http://leopold.wilderness.net/staff/projects/project_003.htm)

**Issues that need discussion with the R1/R4/RMRS Steering Group?:** (list)

Due to 1-2 year delays in the prescription burns, we will be unable to complete the project as proposed. However, Payette National Forest has been funded and approved to complete their planned fuel reduction projects associated with this study in 2004. Therefore, we would like to extend the prescribed fire portion of this project for an additional 2 years (2005-06). We have submitted a proposal to the Joint Fire Science Program to fund this extension so that we can provide information on the effects of fuel reduction projects on stream ecosystems to Payette Forest. This information will improve fuel management decisions, planning, and NEPA assessments and evaluations on the Payette Forest and have broad applicability to Regions 1 and 4. If not funded by JFSP, we would like to request additional funding from R1/R4 National Fire Plan Adaptive Management and Monitoring Program to complete this project.



## *Native Seed and Plant Revegetation – Effectiveness Monitoring*

**Project Title:** Invasive Weeds and Native Seed Revegetation Effectiveness

**Project Leader:** Diane Schuldt and Dick Wenger

**Participating Research Contacts:** Dr. Jeffrey J. Yeo, contractor

**Participating Forests/Grassland Contacts:** NA

### **Funds**

**Total Project Cost:** \$70,000

**2001:** Study design drafted

**2002:** Study approved, contract awarded, sampling sites located, baseline data collected and Year One summary report

**2003:** No work conducted or costs incurred

**2004:** Sampling sites re-read (second year of data collected) and Year Two summary report.

**Progress from 2002-2003:** The two projects listed above are located within the boundaries of the 2000 Clear Creek fire. The projects are closely located and were combined into a single, multi-year contract awarded in 2002 to Dr. Jeffrey Yeo of Challis, Idaho. Sampling sites were established and baseline data were collected in Summer 2002. Sites are to be re-sampled every other year, so no data were collected in 2003.

### **Invasive Weeds**

The rangeland vegetation types in the project area were stratified based on vulnerability to soil erosion, noxious weed invasion and domestic livestock grazing. One hundred, sixteen permanent 25-meter monitoring transects were randomly selected and established based on the area of rangeland vegetation within four strata. Ground cover, vegetation, shrub density and soil erosion attributes were collected at each transect.

### **Native Seed Revegetation Effectiveness**

Mountain mahogany stands, including planted and unplanted stands, were stratified by fire intensity. One hundred, eighty-four permanent plots of 12.5 meters<sup>2</sup> were established within the two strata. The number of rooted stems in each plot were counted and categorized as seedlings, sprouts, planted seedlings or mature.

**Plans for 2004:** All 300 sampling sites will be re-sampled in Summer 2004. A Year Two summary report will be prepared in Fall 2004.

**Products and/or tech transfer expected in 2004:** None in 2004.

**Issues that need discussion with the R1/R4/RMRS Steering Group?:** None

1/15/04km

**Project Title:** Publication of Restoring Western Ranges and Wildlands (Revegetation Great Basin)

**Project Leader:** E. Durant McArthur

**Participating Research Contacts:** In house

**Participating Forests/Grassland Contacts:** In house

**Funds**

**Total Project Cost:** \$49,680

**Timeframe (within 2001-2005):**

**2003:**

**2004-2005:** (remaining costs): \$49,680

**Progress from 2002-2003:** (Description of work accomplished; attach more detailed description, map, or pictures that could be used for tech transfer on the web or w/in compiled monitoring report.)

The manuscript has been completed, all 28 chapters (History, Setting, Research Background, Basic Considerations, Restoration—Artificial Treatments, Climate and Terrain, Soil Factors, Plant Competition, Mechanical Control, Herbicides, Prescribed Burning, Seedbed Preparation, Wildlife Habitat, Nutritive Principles, Plant Pathology, Management, Guidelines, Grasses, Forbs, Chenopod Shrubs, Composite Shrubs, Rosaceous Shrubs, Other Family Shrubs, Seed Collection, Seed Production, Seed Germination, Seed Testing Regulations, Transplanting and Interseeding. All the Grass chapter have been edited.

**Plans for 2004:** (Description of work.)

Editing of the grass chapter, completion of an index, production, and printing (this is where the \$49,680 will be used along with additional financial resources.

**Products and/or tech transfer expected in 2004:** (Incl. Web links if you have them)  
Publication of this major book.

**Issues that need discussion with the R1/R4/RMRS Steering Group?:** Finishing this major work should be of great value to land managers and others interested in the complete revegetation and restoration process.

## ***Post-Fire Fuel Treatment Monitoring***

**Project Title:** Patterns of plant, bird, amphibian, and small mammal occurrence in salvage-logged and unsalvaged burned conifer forests

**Project Leader:** Drs. Paul Alaback, Kerry Foresman, Richard Hutto

**Participating Research Contacts:** Dr. Les Marcum (coordinator)

**Participating Forests/Grassland Contacts:** Sue Heald (Bitterroot NF)

### **Funds**

**Total Project Cost:** \$343,750 (includes U of MT match)

**Timeframe (within 2001-2005):** 2.66 yr

**2003:** \$52,681.96 including match

**2004-2006:** (remaining costs): \$291,068.04 including match

**Progress from 2002-2003:** (Description of work accomplished; attach more detailed description, map, or pictures that could be used for tech transfer on the web or w/in compiled monitoring report.)

Funds were finally received in mid-year 2003. We completed planning sessions to discuss overall strategy given the time since the fires of 2000 and the new opportunity provided by fires of 2003. We hired a GIS technician to acquire data layers from the Bitterroot and Lolo National Forests, Plum Creek Timber Company, and State Lands. A good deal of information is lacking from the state lands data layer, but we have completed a survey of potential sites available from the pool of 2000 and 2003 fires and broken down by vegetation type, mean tree dbh, tree density or stocking level, and presence or absence of salvage operations.

**Plans for 2004:** (Description of work.)

The goal for 2004 will be to complete a full field season, using salvaged and unsalvaged sites drawn from the pool of available sites on the Lolo and Bitterroot National Forests.

**Products and/or tech transfer expected in 2004:** progress report

**Issues that need discussion with the R1/R4/RMRS Steering Group?:** none

1/15/04km

**Project Title:** Monitoring effectiveness of postfire rehabilitation treatments at the small watershed scale

**Project Leader:** Dr. Peter Robichaud

**Participating Research Contacts:** Dr. William Elliot

**Participating Forests/Grassland Contacts:** Jeff Bruggink, R-4; Bruce Sims, R-1; Mark Story, Gallatin NF; Sally Champion, Humbolt-Toiyabe NF. John Lane, Custer NF, Dean Sirucek, Flathead NF.

### **Funds**

**Total Project Cost:** \$473,000

**Timeframe (within 2001-2005):** 4 yrs

**2003:** Spent \$165,000; \$107,000 transferred to fire suppression

**2004-2005:** Expecting \$80,000 returned from fire transfer.

### **Progress from 2002-2003:**

Several potential wildfire sites were visited during the busy 2003 fire season. These include Hot Creek Fire, Boise NF; Roberts Fire and Wedge Canyon Fire, Flathead NF; Black Mountain Fire, Lolo NF; Myrtle Creek Fire, Idaho Panhandle NF; Sims Fire, Clearwater NF; and Kraft Springs Fire, Custer NF within Regions 1 and 4. Other wildfires visited were in Regions 3 and 5.

Two sub-watershed sites in high burn severity areas were selected and monitoring equipment was installed. The first site is on the Kraft Springs Fire, Custer NF, Region 1, where we are looking at a salvage logging operation (10 ac) and a control (10 ac). Detailed measurements of log volume removed, skid trail location, etc were observed. Only one small rain event occurred after installation. The second site was on the Roberts Fire, Flathead NF, Region 1. These sites on high burn severity areas consists of a 10-ac straw mulch treated watershed and a 10-ac control watershed with no treatment. The straw mulch was aerially applied at 1 t/ac that achieves about 70 percent ground cover. At each site, sediment storage areas, flumes and complete weather stations were installed.

Salvage logging was also completed on the Hayman Fire, Pike-San Isabel NF in September 2003. Thus we have two sites with salvage logging activities that can be used for comparisons.

**Plans for 2004:** Continue monitoring paired sub-watershed sites on Fridley Fire (installed in 2001), Gallatin NF; Cannon Fire (installed in 2002), Humbolt-Toiyabe NF; Roberts Fire (installed 2003), Flathead NF; and Kraft Springs Fire (installed 2003), Custer NF. Evaluate data from our sites to determine storm characteristics and sediments yields from this year's events.

Identify additional potential salvage logging sites during 2004 and install monitoring equipment.

1/15/04km

**Products and/or tech transfer expected in 2004:** Informally disseminate monitoring results to BAER teams and Forest personnel as data become available. Present current results at regional workshop and national BAER training as well as several professional national meetings.

The new BAER web site has data on BAER treatment effectiveness (<http://fsweb.gsc.wo.fs.fed.us/baer/index.html>) that was collected during the review of the BAER program and existing knowledge of treatment effectiveness.

Weather and runoff data is updated daily and is available on our web page at <http://forest.moscowfsl.wsu.edu/engr/weather>.

Write summaries of treatment effectiveness to date.

Data collected from these paired watersheds are being used to validate our modeling efforts. Our most recent erosion prediction tool, Erosion Risk Management Tool (ERMiT) provides probabilities of erosion in the first 4 years after a wildfire and the effects of various BAER treatments. Beta versions were used in the 2003 fire season with full implementation expected for 2004.

**Issues that need discussion with the R1/R4/RMRS Steering Group?:**

Will adequate funds be returned from fire transfer to complete the studies?

Can approval for salvage logging operations be expedited?

## ***Invasive Weeds***

**Project Title:** Monitoring the Impact of Wildfire, Fire Suppression, and Post-burn Restoration on Exotic Weed Invasion

**Project Leader:** Steve Sutherland, RMRS and Lou Kuennen, Kootenai NF

**Participating Research Contacts:** Steve Sutherland

**Participating Forests/Grassland Contacts:** Jim Olivarez (R1), Jay Winfield (Helena NF), Sherrie Ritter (Bitterroot NF), Leonard Lake (Nez Perce NF)

### **Funds**

**Total Project Cost:** \$519,000

**Timeframe (within 2001-2005):** 2001-2005

**2003:** ?

**2004-2005:** (remaining costs): \$160,000

**Progress from 2002-2003:** (Description of work accomplished; attach more detailed description, map, or pictures that could be used for tech transfer on the web or w/in compiled monitoring report.)

- Re-measured all accessible macro-plots in the western portion of the Bitterroot NF (Blodgett fire, Little Blue fire, and the Wilderness Complex fires (Selway-Bitterroot and Frank Church Wilderness Areas)). The Elk City road washed out and we were not able to visit all macroplots in the wilderness complex.
- Re-measured all 1mx1m permanent quadrats in accessible macroplots
- Re-measured 1mx1m permanent quadrats along dozer lines in Blodgett fire
- Established two new transects with 20, 1mx1m permanent quadrats along road closure in Robinson Gulch to determine impact of road closure and re-contouring on weeds.
- Re-measured 1mx1m permanent quadrats along contour felled trees in Blodgett fire
- Re-measured and relocated macroplots and permanent quadrats in an area that had fuels reduction to monitor the impact of fuels treatment on weed invasion and expansion
- Worked with Helena NF on their post-fire, weed monitoring program
- Re-measured permanent cheatgrass plots (burned and unburned) to determine post-fire cheatgrass establishment and/or expansion under ponderosa pine
- Established and measured permanent cheatgrass plots to determine post-fire cheatgrass establishment and/or expansion in bunchgrass community
- Conducted preliminary monitoring to determine the impact of fire on spotted knapweed biocontrol agents
- Presented second years results at Idaho Weed Control Association
- Presented second years results to Clearwater National Forest Leadership Team
- Presented seminar on Wildfire and Weeds in the Northern Rockies at the Fire Sciences Lab

1/15/04km

- Instructor at the FireMon: Fire Effects Monitoring and Inventory System Workshop
- Contracted for web site update  
<http://www.firelab.org/fep/research/weeds/weedshome.htm>

**Plans for 2004:** (Description of work.)

- Submitted a Joint Fire Sciences Proposal on Determining the Threat of Post-fire Cheatgrass Populations to the Ponderosa Pine-Bunchgrass Communities in the Northern Rockies
- Analyze the data collected in the 2003 field season for the Bitterroot NF and Helena NF fires
- Examine these results and modify 2004 sampling protocol as needed
- Prepare and submit manuscripts on:
  - Post-fire weed invasion of weed-free sites
  - Post-fire weed response to fire suppression and BAER restoration
  - Post-fire weed response in bunchgrass communities

Next field season,

- Re-measure all macro-plots
- Re-measure all 1mX1m permanent quadrats with weeds
- Re-measure all 1mX1m permanent quadrats in ponderosa pine
- Re-visit the dozer lines to look at the distribution and density of existing weed species and look for the presence of new weed species
- Re-visit the contour felling to look at the distribution and density of existing weed species and look for the presence of new weed species
- Re-visit the cheatgrass plots under ponderosa pine and in bunchgrass communities
- Re-visit the Robinson Gulch road closure to look at the distribution and density of existing weed species and look for the presence of new weed species
- Work with Helena NF on their post-fire, weed monitoring program

**Products and/or tech transfer expected in 2004:** (Incl. Web links if you have them)

- Presented results to school teachers at the Audubon Community Naturalist Workshop: Natural History of Fire
- Presented poster On the Impact of Fire Suppression and Baer Restoration on Weeds at 7<sup>th</sup> International Conference on the Ecology and Management of Alien Plant Invasions
- Presented paper on Wildfire and Weeds in the Northern Rockies: 3 years of Post-fire Data at the 2<sup>nd</sup> International Wildland Fire Ecology and Fire Management Congress
- Will present paper on Monitoring Changes in Weed Populations: Post-fire and Post-herbicide Treatment at the Montana Weed Control Association
- Will present paper On the Impact of Fire Suppression and Baer Restoration on Weeds at the Society for Range Management Meetings
- Will have updated information on web site  
<http://www.firelab.org/fep/research/weeds/weedshome.htm>

1/15/04km

**Issues that need discussion with the R1/R4/RMRS Steering Group?:** (list)

Fire borrowing is still affecting productivity. There are no monies to pay for data collection, entry, and/or analysis after end of fiscal year. There are no monies to pay for travel to present results to managers and the academic community. There is still a delay in knowing and receiving budget to plan for the next field season.



## ***Social***

**Project Title:** Understanding Communities at the Wildfire Interface: Human Dimensions of Adaptive Management and Effectiveness Monitoring in the Forest Service, Regions 1 and 4

**Project Leader:** Daniel R. Williams, RMRS; Cindy Swanson, R1

**Participating Research Contacts:** Matt Carroll, Washington State University, Jim Burchfield and Steve McCool, University of Montana

**Participating Forests/Grassland Contacts:** Uinta National Forest, Salmon National Forest, Custer National Forest, Helena National Forest

### **Funds**

**Total Project Cost:** \$425,000

**Timeframe (within 2001-2005):**

**2004-2005:** (remaining costs): \$24,000

**Progress from 2001-2002:** (Description of work accomplished; attach more detailed description, map, or pictures that could be used for tech transfer on the web or w/in compiled monitoring report.)

The project team has identified a recommended set of four case study communities, Helena MT, Ashland, MT, Santaquin, UT, and Salmon, ID. The team is currently working on a conceptual model for monitoring social impacts of wildfire is being drafted and should be complete by the end of 2002. Qualitative fieldwork has been completed in Santaquin, Salmon and Ashland and should begin next month in Helena. In addition, funds from Region 3 and RMRS were made available to conduct comparable qualitative fieldwork on the Hayman fire on the Pike NF in Region 2 and the Rodeo Fire on the Apache-Sitgreaves NF in Region 3. Data from the Hayman fire is already being used as part of a "fire review" being conducted by the Region 2/RMRS at the request of Congressman Mark Udall.

**Plans for 2003:** (Description of work.)

The major tasks for 2003 are to continue to analyze the qualitative data and refine and review the conceptual model. In addition, assuming the remaining funds (currently sequestered for 2002 fire suppression) are forthcoming, the project team will design and execute a social survey of the four communities to identify residents perceptions of wildfire impacts.

**Products and/or tech transfer expected in 2003:** (Incl. Web links if you have them)

One product (the qualitative fieldwork protocol) has already been transferred to fires from the 2002 fire season (Hayman, Rodeo). In addition the project expects to have a broader draft social assessment protocol developed during 2003 that may be used for guiding future fire recovery monitoring efforts.

1/15/04km

**Issues that need discussion with the R1/R4/RMRS Steering Group?:** (list)

My main issue at this time is the status of the "Reprogrammed" funds borrowed for 2002 fire suppression and when and whether these funds will be "paid back"