The Watersheds Research Cooperative Initiative

Purpose and Scope

The purpose of the Watersheds Research Cooperative (WRC) is to conduct research and develop new knowledge on intensive forest management and water-related values. Intensive forest management is the current and expected forest practices used to grow and harvest commercial forests that are sustainable, economically feasible, and environmentally acceptable. Water-related values are those associated with fisheries and aquatic habitat and include water quality, fisheries, amphibians, aquatic invertebrates, and nutrients. The research will focus on the interface between harvesting and cultural practices along streams and their local, as well as downstream, effects on fish and aquatic habitat.

WRC is intended to be a Pacific Northwest regional cooperative. Thus, another goal of the cooperative is to foster communication among researchers involved in this type of research and function as a clearinghouse for information on the researchers and research.

The new knowledge developed through the Cooperative is expected to be available to help guide management of intensively managed forestland, inform public policy, and be available to enlighten the general public. The Cooperative intends to develop research sites that can serve as demonstration areas for interested parties to view the treatments and be informed of the results.

Context

Water quality and healthy, productive native fisheries are highly held values for Oregonians. Oregon has led the nation in science-based forest policy and regulation of forest management activities to protect water and fish since the Oregon Forest Practices Act (FPA) was passed in 1971. Forest landowners have embraced the application of scientific information to guide development of rules that govern timber harvest, reforestation, road building, streamside protection, and other forestry practices that effect water and fish. For forest protection rules to function over time, the scientific information base behind them must evolve continually to reflect contemporary forest conditions, forestry practices, and societal values.

Water is of immense importance throughout the West. Concerns about the impacts of forestry practices on water quality and fish habitat have received much attention in the last decade, particularly with declines in many salmon and steelhead populations and perceptions that those declines were influenced by forest practices. Some recent discussions have indicated that the scientific information base available to understand the effects of contemporary forest management practices on the water quality and soil productivity within younger managed forests is outdated. Most of the available literature on environmental effects of roads and harvesting on forest watersheds for use in guiding policy decisions in the PNW comes from older studies that reflect historic road construction, harvesting, and stream protection practices. Those practices have changed substantially since older studies were conducted and published. New long-term scientific studies are needed if Oregonians desire information on contemporary practices within the context of current forest management landscapes and watersheds.

Existing research on the effects of forest management practices on water and fish was carried out during a time when forest management involved the initial harvest of naturally grown primary forests and the conversion of old growth or mature forest stands to younger age forests. Such forest management practices required the initial construction of a road system, then the use of large, heavy machinery to harvest and transport large logs. Until the early 1970s, virtually no forest practice rules existed.

Today, smaller machinery harvests smaller, uniform logs from middle-age forests, using an existing road system that has been upgraded or constructed to higher standards under the guidance of a comprehensive set of forest practice rules that include streamside protections.

Objectives

The Cooperative will:

- Generate new data from paired watershed studies on private industrial and state young even-aged and mixed-age forests that will be harvested using state-of-the-art equipment and practices where the intent is to manage the forests, in perpetuity, for the sustainable production of wood and fiber with adequate environmental protections. (Initial studies will focus on even-age private forestlands with the intent to extend future studies to state forestlands and private forestlands managed for mixed-age stands)
- Investigate the on-site effects of contemporary forest practices on water quality in headwater streams.
- Investigate the subsequent accumulation off-site of the effects of harvesting in headwater streams on water quality and fisheries in a large, fish-bearing stream.
- Investigate the processes that propagate water quality effects downstream.
- Extend the knowledge and technology from these studies to forest managers and policy makers throughout Oregon and the Pacific Northwest.

Hinkle Creek

The first installation of the Watersheds Research Cooperative is located 25 miles northeast of Roseburg in the Hinkle Creek watershed, a tributary to the Umpqua River. The Hinkle Creek study is on a 5,000-acre watershed owned and managed by Roseburg Forest Products. It currently supports 55-year old, harvest regenerated Douglas-fir forests and contains an existing road network currently being upgraded to contemporary standards. The Hinkle Creek Paired Watershed Study represents a "proof of concept" installation. As of summer 2003 all of the components of this watershed study were established. The agreement is that Roseburg Forest Products will 1) stay out of the North. Fork for 10 years so it can be used as a control, and 2) conform to a previously agreed upon harvest schedule in the South Fork that has harvest entries scheduled in 2005 and 2008. Thus, the life of the project is nominally until 2011.

Hinkle Creek will also serve as the location of a demonstration area that will allow people to observe the interactions of modern intensive forest management with watershed health, water quality, and fisheries.

The Long-Term Vision

The long-term vision for the Cooperative is to replicate the Hinkle Creek installation across a number of sites in Oregon (and perhaps other states) and have several replicates of the experimental design to enhance the ability to infer from the study data to other places. This is a visionary and expensive goal that will depend on significant funding success. A scaled down vision is to use the Hinkle Creek experience as a proof of concept and follow up with a long-term, robust effort in a protected experimental forest somewhere on non-industrial forestland (e.g., ODF State land) that will act as a managed forest analogue to the H. J. Andrews Experimental Forest. This research forest would allow manipulative studies to be carried out on harvest-regenerated forestland that will be managed in perpetuity for the production of wood. There is currently no place where manipulative treatments can be installed within a paired watershed infrastructure to allow investigation of the environmental effects of intensive forest management over a long time period.

WRC Members. As of April 2005, Cooperative members:

- Oregon State University
- Roseburg Forest Products
- U.S. Geologic Survey (USGS)
- Douglas County
- Oregon Forest Industries Council (OFIC)
- Oregon Department of Forestry (ODF)
- Oregon Department of Fish and Wildlife (ODFW)
- National Council for Air and Stream Improvement (NCASI)
- Friends of Paul Bunyan Foundation/Associated Oregon Loggers (AOL)
- Oregon Forest Resources Institute (OFRI)
- Douglas Timber Operators
- Bureau of Land Management (BLM)
- Starker Forests
- Plum Creek Timber
- Forest Capital Partners

Collaborating Organizations
Diverse and committed organizations have provided operating funds and in-kind support as well as the infrastructure and hard work essential to the project's success. These collaborators include:

- Oregon Watershed Enhancement Board
- U.S. Geologic Survey Forest and Range Ecosystem Science Center
- Department of Fisheries and Wildlife, OSU College of Agricultural Sciences
- Forest Engineering Department, OSU College of Forestry
- Forest Science Department, OSU College of Forestry
- Resource Management Services
- Umpqua Fisheries Enhancement Derby

Potential barriers

The vision of expanding to additional paired watershed installations requires significantly more financial and in-kind resources. Assuming greater funding becomes available, the second challenge is locate the necessary paired watersheds with the appropriate forest conditions, organizational flexibility for intensive management, and with options for long-term control of management regimes that support the science objectives.

Tentative Benchmarks

- Establish secure finding for the WRC:
    - Establish stable total cash funding for the Hinkle Creek study at $900,000 per year by 2006.
        - Obtain support through the Oregon Congressional delegation or federal agencies for at least $675,000 per year by 2006.
        - Obtain support from the Oregon legislature or state agencies for at least $75,000 per year by 2006.
        - Obtain support from Oregon counties for at least $75,000 per year by 2006.

        - Obtain support from the Oregon forest industry for at least $75,000 per year by 2006.
        - Continue existing in-kind support for scientist salaries from Oregon State University and the USGS FRESC.
    - Increase the number of installations to three paired study sites by 2010, each funded at $1.02 million/yr (inflation adjusted by 2.5% annually), for a total cash budget of $3.06 million/yr.
        - Obtain support through the Oregon Congressional delegation or federal agencies for at least $2.025 million per year by 2010.
        - Obtain support from the Oregon legislature or state agencies for at least $345,000 per year by 2010.
        - Obtain support from Oregon counties for at least $345,000 per year by 2010.
        - Obtain support from Oregon forest industry for at least $345,000 per year by 2010.
        - Continue existing in-kind support for scientist salaries from Oregon State University and the USGS FRESC.
    - Secure at least one competitive grant per year by 2006, with a target value of $200,000. Increase competitive grant funding to $500,000 by 2010.
- Scientist participation and outputs:
    - Increase the number of principal investigators conducting research under the auspices of WRC from at least 6 by 2005 to 12 by 2010.
    - Recruit 2 graduate students per year for WRC projects by 2005, increasing to at least 5 per year by 2010.
    - Publish one refereed journal publication per year by 2006, increasing to at least 2 per year by 2010.
    - Present WRC results at 2 professional meetings per year by 2005, increasing to at least 6 per year by 2010.
- Outreach activities:
    - For the Hinkle Creek study, establish a relationship with the Roseburg School District to provide watershed management learning opportunities and field trips for K-12 children. Provide field trips for 5 teachers and 50 kids per year by 2005, increasing to 10 teachers and 100 students by 2010. Provide additional opportunities for data from Hinkle Creek to be used for student CAM projects.
    - Present results from Hinkle Creek studies in 3 OSU classes by 2004, increasing to 6 by 2010.
    - Present results to WRC cooperators at an annual meeting and science symposium each year.
    - Develop outreach events for professional land managers and scientists as research results provide opportunities. Target one per year by 2004, increasing to at least 3 per year by 2010.
    - Additional outreach opportunities and educational relationships will be developed as additional research installations are established in other areas of the state.
- Engaging policy makers and the public:
    - Use the WRC as a catalyst for collaborative communications among Oregon state and federal agencies responsible for forest environments and their management; eg, ODEQ, ODF, ODFW, BLM, FS, NMFS.
    - Engage OSU NRI immediately as a mechanism for broadening the awareness and context of the WRC programs and accomplishments within the state and region.
    - Engage ODF staff, as members of WRC, to convey significant science findings to the Board of Forestry annually.

- Engage OFRI staff to help translate WRC science findings into a publication for education of policy-makers and public by 2010.

Leadership and Organization

The Forest Engineering Department is providing primary leadership for this initiative at this time. The Watersheds Research Cooperative Director is Dr. Arne Skaugset. The paired watershed study approach is his vision; his passion for this effort has motivated Roseburg Forest Products to dedicate the Hinkle Creek watershed to this effort and encouraged scientists to join the efforts.

The membership categories for cooperators are contractual and liaison. Contractual members are forest landowners, forestland managers, federal, state, and local government agencies, and other affiliated groups that support the Cooperative by contributing an annual membership fee and in-kind support (e.g., study sites, labor, equipment, and materials) (Table 1). Contractual members contribute an annual fee negotiated on a case-by-case basis, but must be greater than $10,000 a year. An amount equal to 10% of the total annual fees is designated each year as a contingency fund to help cover fiscal emergencies (e.g., loss of a member) and to allow the initiation of short-term projects not included in the Five-Year Plan. Liaison members do not pay an annual fee; they advise the Cooperative and provide links to other research projects and research groups conducting environmental watershed research.

Members participate in the Cooperative through representation on the Advisory Committee. This committee advises the Cooperative Director on the activities, direction, size, and support of the program and identifies research problems, establishes priorities, and assists in planning, implementing, and evaluating studies.

Contractual members have voting rights on the Advisory Committee. Liaison members have a seat on the Advisory Committee and contribute to discussions, but have no voting rights. Specific responsibilities of the Director and members of the Cooperative are listed in Table 2. The Contractual members sign a General Memorandum of Agreement. Each Contractual member provides annual fees to the Cooperative through the OSU Forest Research Laboratory (Table 1). Members are also expected to provide in-kind support such as study sites, labor, equipment, and materials. The Advisory Committee annually reviews the Cooperative's organization, fees, and achievements.

Research

Planning

Activities of the Cooperative are guided by a strategic plan produced every five years to include 1) research projects for the five-year period; 2) plan of action including timetables for the initiation, progress, and completion of research projects; and 3) budgets and estimates of in-kind contributions for each project. The five-year plan is reviewed annually by the Advisory Committee to determine the need for mid-course modifications such as adding or deleting projects.

Each year the Advisory Committee developed modifications to the five-year plan as necessary using the following procedure:

- Names a five-year plan subcommittee composed of Advisory Committee members.
    - Subcommittee reviews the Cooperative's accomplishments over the past year and makes recommendations to the Advisory Committee on any operational or structural changes needed. This Committee also helps the Cooperative Director develop a revised five-year plan.
    - Subcommittee develops a list of specific research projects and prioritizes them for the next five years.
        - Using this list of projects and priorities, the Director and the five-year plan subcommittee develops alternative plans of action and budgets for consideration by the full Advisory Committee.
    - The Advisory Committee meets to make final decisions on modifications to the five-year plan.

Approach

A number of issues currently deserve study with regard to intensive forest management and environmental watershed research. In the long run the Cooperative intends to support a number of projects that will develop new knowledge at different temporal and spatial scales and in various geographic and geologic settings. Initially, the Cooperative is focusing on the Hinkle Creek Paired Watershed Study, a large project with water quality, fisheries, amphibian, and aquatic invertebrate components on a watershed scale. However, this project represents only one data point in the foothills of the southern Cascades. Thus, developing more than one of these projects would seem appropriate. While there is a long-term vision of multiple large and small projects across the Pacific Northwest, for now the Cooperative is championing Hinkle Creek, and will seek to replicate the project at other locations

Reports And Data

Results from Cooperative research projects are non-proprietary. Once data have been analyzed, interpreted, and reviewed, they become public information. All information is reported as quickly as possible. The Cooperative produces two types of formal reports:

- **Project reports – Information from Cooperative research projects published in newsletters, proceedings, scientific articles, extension bulletins, etc.**
- **Annual reports – Includes a membership list, recent accomplishments, overview of research projects, publications, and a summary of financial support.**

While contents and authorship of project reports are specified in the work plans, the Forest Research Laboratory will edit and report all results of WRC studies appropriately to the public. Preliminary results are communicated to Cooperative members through meetings and interim reports. Interim reports are provided to WRC members and scientific colleagues for review and comment. Because these interim reports contain preliminary data, their distribution

will be restricted.

Copies of WRC data sets are stored in a data bank maintained by the Director. A Cooperator may request data from installations on the Cooperator's own land, or from all installations included in the research project. When a Cooperator requests data collected from someone else's land, the origin of the data will be concealed. Non-WRC data loaned to the Cooperative will not be released without the Cooperator's permission.

Budget

Each installation will cost about $900,000 per year to fully implement for an initial 10-year time period (2004 dollars). We are seeking strong support and funding from the private industrial forestland owners in Oregon, a significant beneficiary of the Cooperative's science findings, as well as from county governments and state and federal agencies. It is unlikely that the industry, county governments, small woodland owners or state agencies can provide sufficient funds to achieve the full potential for this research program. Initiative funding from the Oregon Legislature or the U.S. Congress, such as that already secured for Hinkle Creek, would be invaluable to provide critical base support for the research program. The scientists are also seeking federal competitive research funds that could help support more basic science elements of the research.

Funding

WRC funds come from three main sources: (1) the Oregon State Legislature supports the Cooperative through funding of the Forest Research Laboratory at OSU; (2) contractual members contribute annual membership fees; and 3) outside grants and contracts. State funds are used for the Director's salary (0.25 FTE), office and laboratory space, incidental supplies, secretarial help, and other support staff. State funds may also support research technicians, graduate students, and other operating expenses. Annual membership fees are used for the salaries of other permanent and part-time employees, graduate students, supplies, equipment, and travel.

The Advisory Committee reviews the Cooperative's budget annually and sets the fee schedule. All annual fees will be subject to an indirect cost rate of 15%. This rate will remain in effect for four years. During the third year of the current General Memorandum of Agreement the rate will be reevaluated. Funding for Cooperative research can also be obtained via contracts, research grants, fellowships, scholarships, or gifts from individuals or philanthropic organizations.

Table 1. WRC Membership Categories and Fee Structure.

Contractual members (fees are variable)

Annual membership fees and in-kind support – Contractual members are made up of forestland owners, forestland managers, federal, state, and local government agencies or other groups affiliated with forestland management. Contractual members contribute individual annual fees or an equiva lent value of in-kind support that may be negotiated on a case-by-case but are greater than $10,000. Contractual members are expected to provide in-kind support as appropriate.

Acreage requirements and voting privileges – There are no acreage requirements for contractual members. Representatives have voting rights on the Advisory Committee.

Liaison Members (no fees)

Annual membership fees and in-kind support – Liaison members contribute no annual fees or in-kind support.

Acreage requirements and voting privileges – Representatives serve on the Advisory Committee, but have no voting rights.

Fee Payment

The Cooperators may change future annual membership fees at the annual meeting. Invoices for annual membership fees are issued on July 1 of each year. Payments are due as described in the relevant *Memorandum of Agreement* or *Participating Agreement*. All annual fees will be subject to an indirect cost rate of 15%. This rate will remain in effect for four years. During the third year of this agreement the rate will be reevaluated for possible change in the second four-year period.

Table 2. Responsibilities of the WRC.

The Cooperative Director:

Provides overall leadership and coordination for WRC activities.

1. Helps the Advisory Committee set research priorities.

2. Plans and designs studies that meet the needs of the Cooperators and conforms to the standards of scientific experimentation.

3. Prepares and obtains agreement on work plans that include: (a) clearly stated objectives; (b) procedures; (c) experimental design and statistical methods; (d) a budget listing sources of income and planned expenditures; and (e) responsibilities of participants including the establishment of experiments, data acquisition and analysis, and authorship of publications. Because subprojects involve the participation of a subset of the cooperators, subproject work plans must state the applicable policies for intellectual property rights and confidentiality.

4. Supervises the implementation of work plans to ensure that: (a) experiments are implemented as specified in the work plan; (b) experiments are appropriately maintained; (c) data are appropriately collected; (d) data are appropriately analyzed; and (e) data and/or results are disseminated to members in a timely fashion.

5. Manages and maintains the data sets derived from WRC studies.

6. Leads the analysis and interpretation of research results.

7. Publishes and distributes the results of Cooperative research projects and provides the technical guidance needed to translate the research findings into practice.

8. Prepares an annual report summarizing the accomplishments of the Cooperative.

9. Prepares and administers the annual operating budget of the Cooperative and hires and supervises the personnel needed to carry out research projects.

10. Schedules and moderates annual meetings of the Advisory Committee including approving annual budgets, presenting annual reports, and reviewing research projects.

11. Seeks research funding from non-WRC sources as appropriate.

Each Contractual Member of the Cooperative:

1. Provides a representative on the Advisory Committee.

2. Provides financial and in-kind support.

3. Fulfills the responsibilities outlined in the approved work plans including installing and maintaining study sites and collecting data.

4. Provides guidance on program direction and emphasis, level of support, compatibility with other research programs, technical questions, and other general issues.

Table 3. Approach to research.

1. Research is defined on a project basis.

    a. Major projects are projects that: (1) require a substantial amount of financial and/or in-kind resources; and (2) are mostly financed by annual membership fees or grants.

    b. Subprojects are projects that: (1) require a substantial amount of financial and/or in-kind resources; and (2) are mostly financed by contracts or additional project-specific contributions from a subset of the members. These subprojects may be specific, short-term projects conducted by individual scientists or graduate students, or projects carried out by one or more of the Cooperative members.

2. The Director must approve all Cooperative research projects. In addition, for major projects and subprojects, at least two-thirds of the voting members of the Advisory Committee must approve the work plan.

3. For each project, the responsibilities of each member will be described in the work plan. Participation by one member might entail establishing and maintaining a study plot, whereas another member might simply provide expertise.

4. Work plans for major projects and subprojects will include: (a) clearly stated objectives; (b) procedures; (c) experimental design and statistical methods; (d) a budget listing both sources of income and planned expenditures; (e) responsibilities of participants including the establishment of experiments, data acquisition and analysis, and authorship of publications. In addition, because subprojects will involve the participation of only a subset of the cooperators, subproject work plans must also clearly state the applicable policies for intellectual property rights and confidentiality.

5. Researchers from non-member organizations may be invited to participate in, and perhaps direct, particular projects.

6. Because the intent of the Cooperative is to complement research by other organizations in the region and to minimize duplication, research projects will be initiated only after consultation with and review by researchers having expertise in the area of interest.

Termination Of Participation

A Cooperator may cease or restrict participation in the Cooperative including, without limitation, the right to stop transmittal of funds and to halt further use of study sites and

other logistical support, provided notice is given in writing at least 60 days in advance. The Forest Research Laboratory (FRL) may cease or restrict its participation in the Cooperative if adequate financial and logistical support from Cooperators is not forthcoming or if it is in the best interest of the FRL, provided notice is given in writing at least 60 days prior to such action.