April 12, 2007

MEMORANDUM

TO: Oregon Watershed Enhancement Board

FROM: Courtney Shaff, Effectiveness Monitoring Specialist
Greg Sieglitz, Monitoring and Reporting Manager

SUBJECT: Agenda Item G: Effectiveness Monitoring and CREP Report
May 15-16, 2007 OWEB Board Meeting

I. Introduction

This staff report provides an update to the Board regarding OWEB's Effectiveness Monitoring Program accomplishments from September 2006 to May 2007. This report also seeks Board authorization to use previously allocated capital funds to initiate effectiveness monitoring related to the Conservation Reserve Enhancement Program (CREP).

II. Background

OWEB initiated an Effectiveness Monitoring Program to evaluate the relative merits and accomplishments of projects funded under its jurisdiction. The Monitoring and Reporting Program has made significant progress on a number of fronts including the completion of Phase I of the evaluation of western juniper removal projects, completion of the first year of effectiveness monitoring to evaluate riparian livestock exclusion projects, progress in the development of effectiveness monitoring guidelines for irrigation efficiency and water management projects, and progress towards the effectiveness monitoring of dam removal projects.

III. The Big Picture

The investments made by the OWEB Board span most of the diverse watershed geographies, ecoregions, and habitats of Oregon. Projects are adapted to the diverse regions of the state and are designed to address local conditions and needs. Many OWEB funded restoration projects are designed to provide benefits to fish populations and habitats, while others are focused on water quality and quantity. Still others are designed to improve upland conditions or wetlands and provide habitat for terrestrial species.

Every OWEB grant has a requirement to conduct monitoring, which is reported to Regional Program Representatives and the Grant Program Manager after the project is completed. This monitoring is conducted on an annual basis for as long as 10 years. More recently, projects have generally been required to report only for three to five years. These reports provide valuable information about the construction, maintenance and overall implementation of the project. By design, these reports are characterized best as implementation monitoring reports; contractually they are known as “Status Reports” and their requirements are attached as an exhibit to all OWEB restoration grant agreements.

Most of these monitoring reports do not evaluate the overall effectiveness of a project, and because of their project-specific nature, are not capable of answering questions at a larger geographic scale. Additionally, project-specific effectiveness monitoring does not lend itself to the evaluation of the effects of multiple projects acting in concert to provide combined results in a watershed.

Effectiveness Monitoring can play a key role in demonstrating the accountability, success, and value of OWEB’s Measure 66 investments. It is important to define what we mean by effectiveness when evaluating success. For the purposes of OWEB’s Effectiveness Monitoring Program, staff have determined that the original objective of the project, as described by the applicant, is an important first tier in answering whether OWEB has been effective in pursuit of its mission.

Larger questions of effectiveness relate often to larger scales of response than a specific project area. A description of these larger scales is found below.

A. Project Level Effectiveness Monitoring

There is an important distinction between the question “was the project implemented in the manner, time, and budget as proposed” and “did the project achieve the larger objective it was designed to meet?” The former question is addressed during implementation monitoring and the latter only through more in-depth effectiveness monitoring.

Effectiveness monitoring should follow established protocols, be statistically valid, generate quantifiable data, and produce results, that when tested, are repeatable. Implementation monitoring generally does not have a threshold set this high.

OWEB, and the Governor’s Watershed Enhancement Board before it, has invested $21 million in monitoring grants (Attachment A).

B. Intensively Monitored Watersheds

Intensively Monitored Watersheds (IMWs), or intensive watershed-scale research and monitoring efforts, are being designed in the Pacific Northwest to answer questions that the typical project level effectiveness monitoring program cannot answer. These questions are often posed by policy makers, decision-makers, legislators, boards, and commissions in an effort to describe the relative success of programs or the likelihood of success from future investments.

Typical questions that IMWs are designed to answer often include (at the fifth and sixth field watershed scale):

- Does the collective effect of restoration and/or management actions result in an improved watershed condition or population parameter of interest?
- Why or why not?
- What are the causes of those responses?

- Are certain combinations of restoration and/or management actions more effective than others at delivering the intended responses?
- Does the implementation sequence of restoration and/or management actions affect the attainment of the objectives?

OWEB has been working with the Pacific Northwest Aquatic Monitoring Partnership (PNAMP), the Oregon Plan Monitoring Team, state and federal agencies, and local groups to establish the appropriate mix of IMWs in Oregon and throughout the Northwest (Attachment B). The OWEB Board has invested in the Hinkle Creek IMWs in southwest Oregon, the Palouse and Larson creeks in the Coos Basin, and a variety of tasks within IMWs such as salmon Life Cycle Monitoring Stations conducted by Oregon Department of Fish and Wildlife (ODFW) in various basins in the coast range.

The central and eastern regions of the state are under-represented by IMWs. OWEB has recently secured funding for IMWs specifically targeted to evaluate habitat improvement for salmon recovery within the mid-Columbia River Basin. The Middle Fork of the John Day River has an active group of tribal, state and federal agency, private, and local interests that have developed a study plan and design for this new IMWs. The Upper Middle Fork IMWs plan will utilize existing restoration and monitoring investments by the tribes, Bureau of Reclamation, Bonneville Power Administration, U.S. Forest Service, The Nature Conservancy, local groups, OWEB, and others as the foundation. Additional coordination and monitoring intensity will be supported with $400,000 provided by the National Marine Fisheries Service. OWEB has also received a grant request from a group spearheaded by Oregon State University (OSU) and the Oregon Department of Forestry to establish a new IMWs project in the Trask basin on the north coast.

C. High Level Indicators

High Level Indicators answer the most basic accountability questions. This is the largest scale for effectiveness monitoring in terms of both spatial area and the breadth of questions asked. Typical questions under High Level Indicators might include:

- How are the salmon doing this year in Oregon? In the Deschutes basin?
- Have restoration actions improved water quality conditions in Oregon? In the Owyhee basin?
- Are projects funded by OWEB preventing additional species from becoming listed under the Endangered Species Act?

High level indicators can be the same or parallel and complementary to performance measures, benchmarks, and large-scale trend reporting. They are complex and comprised of both project level and IMWs effectiveness monitoring efforts and data. The process of informing the answers to High Level Indicators through other types of effectiveness monitoring is often referred to as “rolling-up.”

OWEB staff is presently working with the Oregon Department of Forestry and the Oregon Plan Monitoring Team on High Level Indicators and strategies for the Oregon Forestry Program. An update to an inventory of ongoing monitoring programs within state natural resource agencies is underway to assist with the “rolling-up” process. It is not clear what level of commitment will be made to embarking upon additional High

Level Indicator evaluations nor is it clear what the relationship will be to ongoing monitoring programs. The inventory update will assist with this endeavor.

IV. Effectiveness Monitoring Program Activities

A. Western Juniper Removal Project Evaluation

In response to the results from Phase I of juniper removal evaluation and as a part of Phase II, OWEB, in coordination with CSR Natural Resources Consulting, is planning two Juniper Removal Workshops in June of 2007. These workshops will be open to OWEB staff, OWEB Regional Review Team members, soil and water conservation district (SWCD) staff, and watershed council staff.

One of the products of this workshop will be a manual to help landowners choose locations for juniper removal projects and provide them with guidelines to monitor those projects. In addition, CSR Natural Resources Consulting will begin evaluation of juniper removal projects in Lake, Harney, Grant, and Klamath counties.

B. Irrigation Efficiency/Water Management

In December 2006 OWEB met with the Water Resources Department, watershed councils, SWCDs, Department of Agriculture, Oregon Water Trust, Natural Resources Conservation District, OSU, and Deschutes River Conservancy to discuss how to evaluate irrigation efficiency and water management projects. Several next steps were identified at the meeting that staff have been working on, including:

Workshop Suggestions	OWEB Actions
Clearly define what OWEB means by irrigation efficiency.	Projects designed to improve water delivery efficiency, improve water quality, improve timing of delivery, and protect instream flow. • Projects reducing water loss in irrigation delivery, conversion of gravity diversions to pumps or infiltration galleries, and irrigation system improvements.
Clearly define OWEB's irrigation efficiency restoration and monitoring objectives.	Draft in progress
OWEB to decide where and when baseline data needs to be required and then follow through with that decision	
Find out what data already exists and does not need to be recreated.	Currently being done for the Malheur Basin.

C. Riparian Livestock Exclusion Monitoring

OWEB has continued to collaborate with the Washington State Salmon Recovery Funding Board (SRFB) on livestock exclusion monitoring. The report for the first year of monitoring was presented at the OWEB Biennial Conference in October 2006. OWEB has initiated the second year of a pilot project evaluating the effectiveness of livestock exclusion projects in riparian areas. A request for proposals to complete the second year of monitoring was posted in March 2007 and a contractor was hired in April 2007. The second year of monitoring will include additional coordination with the SRFB through the development of a joint report of the effectiveness of riparian livestock exclusion projects.

D. Dam Removal Monitoring

In September 2006, OWEB funded the removal of Sodom and Brownsville dams along the Calapooia River. Savage Rapids and Chiloquin dams in Southern Oregon also are scheduled for removal. This has placed OWEB in a unique position to support the evaluation of small dam removal projects in Oregon. OWEB staff have been working with researchers from OSU to develop an effectiveness monitoring plan for both Sodom and Brownsville dams. This monitoring plan will be presented to the Board in September.

E. Conservation Reserve Enhancement Program (CREP)

As a requirement of the Biological Opinion issued by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service, OWEB is responsible for reporting on the effectiveness of riparian buffers on local stream conditions. In 2001, staff contracted with AmeriCorp volunteers to evaluate riparian restoration projects, primarily the survival of riparian plantings, funded by OWEB and its predecessor, the Governor's Watershed Enhancement Board. The report concluded:

> *"The relative success of CREP riparian tree establishment projects over grant program projects is likely due to mandatory tree establishment and practice cost-share with landowners. Because grant projects do not provide money for maintenance, the CREP program may be more appropriate for eligible landowners interested in riparian buffers."*

Public interest in CREP has increased significantly and the number of stream miles treated has grown dramatically. Since 1999, nearly 2,000 miles of riparian buffers have been installed covering nearly 24,000 acres.

Staff have worked with the Oregon Department of Agriculture to develop a study proposal to determine the effectiveness of Oregon's CREP program (Attachment C). Specifically the proposal will test two hypotheses: the first is that there is a noticeable physical and biological response to CREP plantings, and second that the cumulative impact bonus in CREP is providing a biologically significant response.

Staff recommend that the Board approve the use of up to $175,000 of the $1.0 million in capital funds allocated by the Board for CREP cost share payments in January 2007 to fund the CREP effectiveness monitoring proposal. Staff will negotiate a final budget for site selection and field sampling within this allocation.

IV. Recommendation

Staff recommends that the Board reallocate up to $175,000 of the $1.0 million in capital funds allocated for CREP cost share payments in January 2007 to fund CREP effectiveness monitoring.

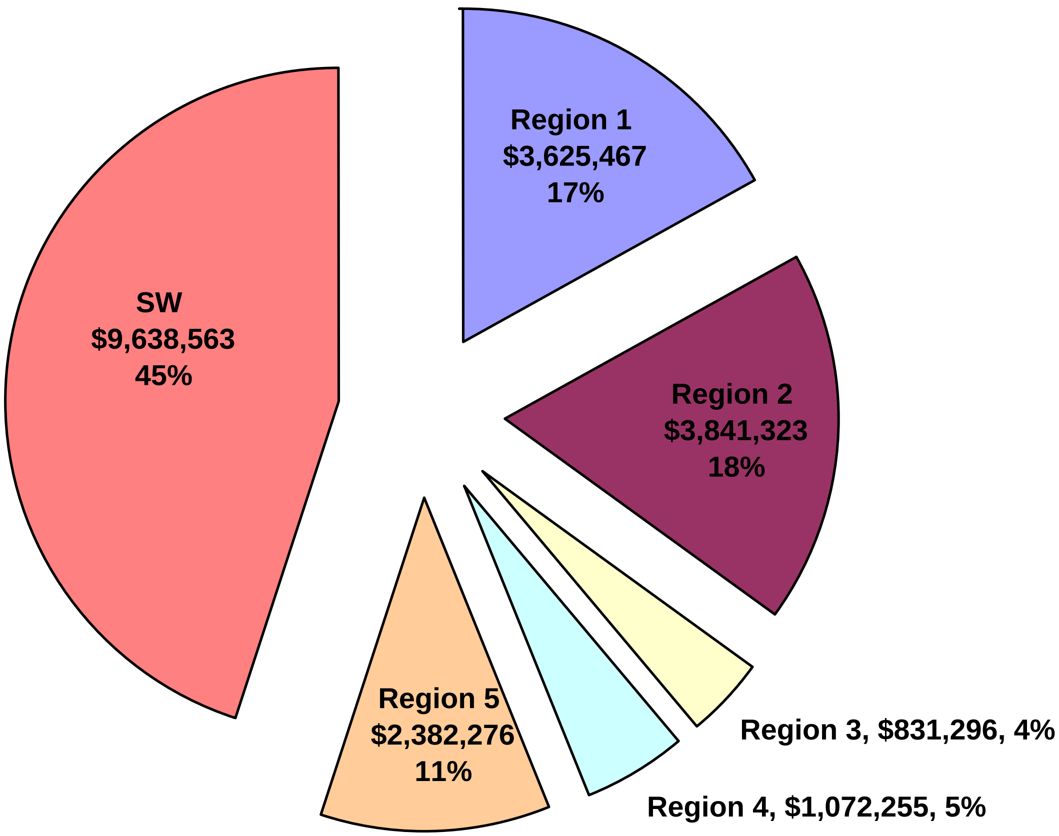
Attachments:

A. Monitoring Investments 1997-2007
B. Map of Intensively Monitored Watersheds in the Northwest
C. CREP Study Proposal

Attachment A

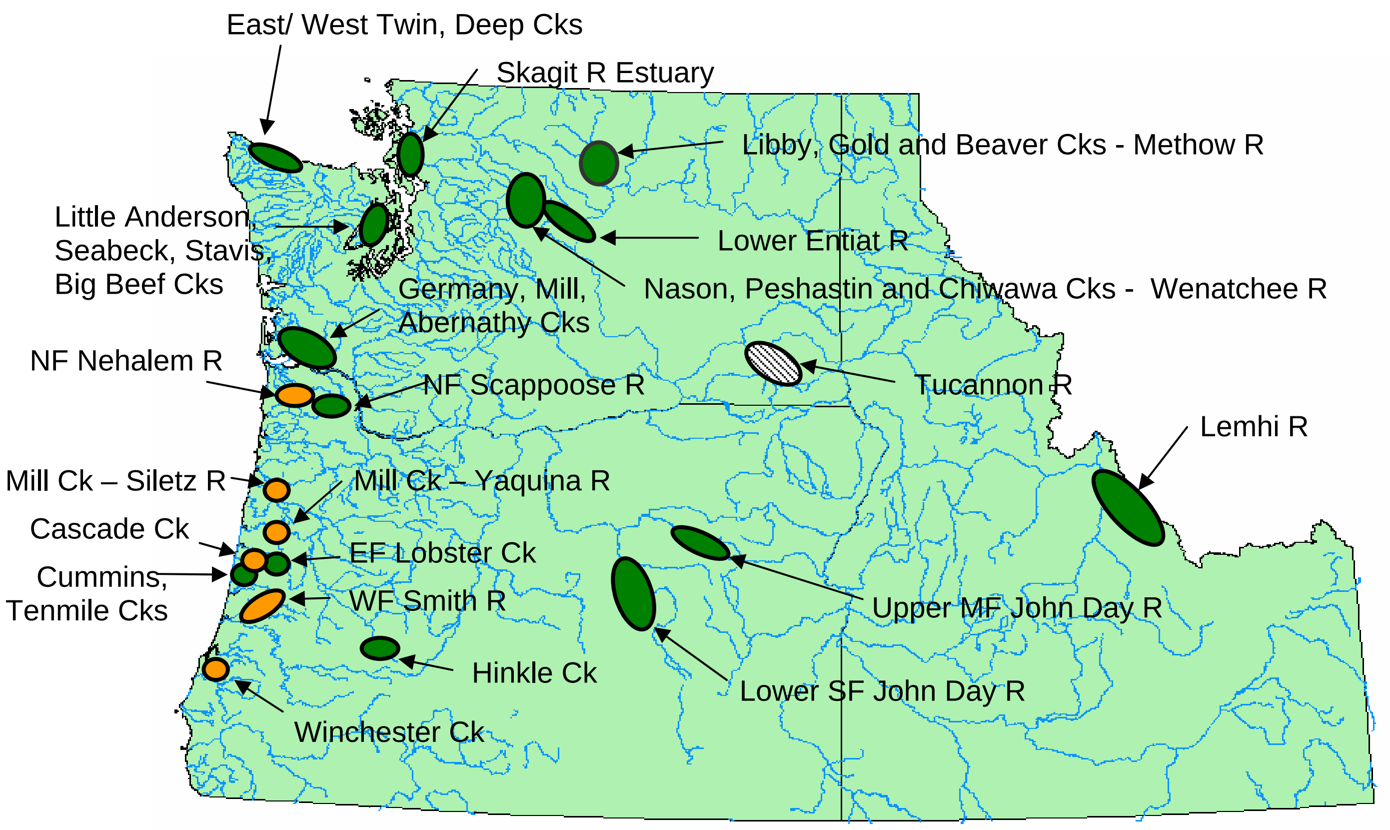
OWEB Monitoring Dollars Awarded by Region 1997 - March 2007

Total Dollars Awarded: $21,391,180



Data from OGMS. Accessed 12/1/06, 4/6/07

Attachment B



Intensively Monitored Watersheds in the Pacific Northwest

DRAFT

An ecological assessment of Oreogn's CREP cumulative impact incentive program

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Introduction

Riparian buffer strips perform important ecological services. For example, they absorb floodwaters during high flows, filter sediment and nutrient runoff from upland areas, regulate river water temperatures, and provide allochthonous nutrient inputs to rivers. In agricultural areas, riparian buffers are often highly degraded, if not absent entirely, and incapable of providing these important ecological services. The result is degraded streams that are eutrophic, have high sediment loads with wide channels and high water temperatures and are often unsuitable for fish and macroinvertebrates. The Pacific Northwest struggles with riparian management and it is especially important here because of the many species of endemic anadramous fish that are listed as threatened or endangered on the endangered species list.

Unbuffered riparian reaches have high sediment loads that change the substrate of the riverbed, making it unsuitable for salmonid fish to nest. In addition, in riparian areas without a vegetated buffer, stream temperatures are often too high for successful development of eggs and fry. Large woody debris (LWD) is also important in stream systems for creating small pools for fish to spawn in and to protect the young fry. Several methods for riparian restoration have been proposed (e.g. adding LWD, nutrient addition) but fencing riparian areas from agricultural disturbance seem to have the highest success rate for restoration. Riparian fencing can be coupled with native vegetation plantings or the vegetation can be allowed to restore naturally. Results from riparian fencing projects include decreased sediment loads in the stream, water temperatures, channel width, and increased LWD. All these results are thought to increase habitat suitability for anadromous fish. One limitation for many studies on riparian fencing is that the area fenced is small in size which limits inference about the success of riparian fencing for stream vertebrates and macroinvertebrates.

The Conservation Reserve Enhancement Program (CREP) is a federal program that pays rental fees to farmers on land along riparian areas that the farmer removes from production. The resulting area is fenced for restoration and conservation purposes. Despite the fact that CREP is a federal program, it is the responsibility of the individual states to see that the program is implemented and the money distributed. Oregon's CREP program is unique due to its cumulative impact incentive payment. This is a program in which a landowner (or group of landowners) can fence >50% of a 5 mile stream segment and receive a one time payment of four times the annual rental rate. This cumulative impact incentive program has generated controversy because of the lack of data to support paying such a large monetary incentive for restoration of longer stream sections.

Despite the enormous efforts of private, state and federal agencies to encourage riparian restoration, very little data exists that illustrates the effectiveness of such measures. Many of the studies conducted to date are on small fenced areas that were fenced many years ago. Evidence exists that these small riparian fencing projects are not large enough to effect any change on the stream reach in question. Parkyn et al. (2003) suggest that the width and length of riparian buffers need to be created in proportion to the size of river segment that is to be restored. For example, wider rivers need wider and longer buffers to effect any change on the river ecosystem. Wooster and DeBano (2006) concluded that wooded buffer length has a greater impact on stream macroinvetebrates than width of wooded buffers. Although, (Kondolf 1993) concluded that riparian buffers along one section of the stream will have little effect on overall stream recovery if cattle are allowed access to the stream in other sections.

The purpose of this study is to determine the effectiveness of Oregon's CREP program. Specifically we will select areas of cumulative impact buffers for an in depth assessment and determine their effectiveness compared to control (unbuffered) reaches and a series of shorter buffered areas whose total buffer area is equal to the total length of cumulative impact buffer. This comparison will allow us to assess whether cumulative impact buffered areas have a higher impact than shorter buffers.

Methods

Site selection will take place in June – August 2007. Data from the Farm Services Agency indicates that the majority of CREP buffers are located in Sherman and Wasco counties; therefore, site selection will focus on these counties in north central Oregon. We will determine, which stream reaches have been enrolled in the CREP program, when the restoration was initiated, and the length of the stream segment included. A subset of CREP areas will be selected that span a variety of ages since restoration. We will attempt to make sure stream buffers are as similar as possible (e.g. equal lengths and widths) and have similar land uses adjacent to the buffer and similar geology. At the selected streams we will attempt to obtain pre-restoration data from landowners, project managers, and aerial photos.

Objective: Evaluate cumulative impact program
The purpose of this objective is to collect data to provide a quantitative description of how stream quality differs among cumulative impact buffers, unbuffered areas, and smaller CREP buffers and to determine if cumulative impact buffers are meeting the criteria for the program. We will ask the question: Do cumulative impact buffers increase stream quality compared to 1) unbuffered controls and 2) smaller buffered areas? We will select 3 sets of sites, one set will be a recent addition to the CREP program, the second site will have buffers 3-4 years old and a third set will have buffers >5 years old. A set of sites includes 1) cumulative impact buffer, 2) series of smaller CREP buffers whose length sum to the length of the cumulative impact buffer and 3) an unbuffered control equal to the length of the cumulative impact buffer. We will choose areas that have similar geography and landscape context. We will sample the following measures: vegetation, shade, width-to-depth ratio, channel cross section, bank stability, stream temperature, macroinvertebrates, sediment, nutrients (nitrogen and phosphorous) and bacterial content. We will measure these variables using standard techniques described in the scientific literature so that results from this study can be compared to other investigations on riparian buffers. The PI and other qualified field assistants will collect the data for this objective. Data collection will occur from April – August 2008.

Vegetation: We will measure density and survival of CREP plants. In addition, we will measure percent cover of invasive plants with special focus on those plants on the noxious weed list.

We will collect soil cores from each of the sites at three distances from the stream edge: 0, 10 m, and 20 m. We will remove the top 2 cm of sol from the soil core and spread this soil over vermiculite in a greenhouse pot. The remainder of the soil from the soil core will be spread over vermiculite in a separate pot. Both samples will be allowed to germinate and seedlings identified. Separating the soil core in this way will allow us to determine recent deposition of seeds (in the top 2 cm) from long term seed bank deposition.

To determine potential for water dispersal of native and exotic plants, we will collect seeds from the stream and germinate them in the greenhouse. A variety of techniques for sampling water deposition of seeds will be tested during June – August 2007 with the assistance of a work study student from Eastern Oregon University. Data will be collected during the 2008 field season using the best technique tested during the 2007 field season.

Shade: We will calculate percent shade using a spherical densitometer at equally spaced points within the stream reach (Wooster and Debano 2006).

With-to-depth ratio and Channel cross section: At equally spaced points along the streams, we will measure stream width and depth using measuring tapes (Bauer and Burton 1993). We will also measure bankful height and measure the depth of undercut banks (Bauer and Burton 1993).

Bank stability: We will survey stream bank erosion and measure the length of any area of unstable or damaged stream bank (Pfankuch 1975, Bauer and Burton 1993).

Stream temperature: We will install temperature data loggers at equally spaced locations along the stream reach being investigated. We will set the temperature loggers to record water temperatures hourly. Before data analysis, we will "smooth" temperature by using a moving window average of water temperatures (e.g. 7 or 10 day moving window average).

Macroinvertebrates: We will sample macroinvertebrates using a D-net which is placed on the stream bottom and the upstream portion of the stream bed in front of the net is disturbed. Invertebrates that are disturbed from the substrate then flow into the net and are preserved in an alcohol solution until processing, identification and analysis.

Sediment: We will measure the percent of fine particles using the grid method. We will place a 20 X 30 cm grid over the stream sediment and count the number of grid intersections that have fine sediment (< 6 mm) beneath them.

Bacteria and nutrients: We will collect water samples at the downstream end of the study reaches. These samples will be analyzed for total dissolved reactive phosphorous, total nitrogen, nitrate nitrogen and bacterial content. We will send these samples to an accredited lab to perform the analysis.

Impact

A number of studies have investigated the impacts of riparian buffers. However, most studies focus on one issue related to buffered areas (e.g. nutrient run-off, sediment filtering, water temperature, etc.). Few studies have investigated a number of effects of riparian buffers on the streams. This will be among the first to do so. This study will allow us to draw conclusions about the community effects of buffers on streams, something that other studies cannot do due to their narrow focus. In addition, we will publish our findings in the scientific literature so that impacts of riparian buffers are disseminated to those studying them in other areas of the globe. It is important that impacts of stream buffers be investigated and the results published in the scientific literature so that we can learn about what methods work and which don't in order to improve stream buffers (Kondolf 1995).

The principle investigators on this grant have experience writing reports to agencies and scientific papers. The design of the proposal is such that it would be written up as a journal article for a peer-reviewed scientific journal. In addition, AMB and PLK have experience and success working with private landowners.

Literature Cited

Bauer, S.B. and T.A. Burton. 1993. Monitoring Protocols to Evaluate Water Quality Effects of Grazing Management on Western Rangeland Streams. U.S. Environmental Protection Agency, Washington, D.C.

Kondolf, G.M. 1993. Lag in stream channel adjustment to livestock exclosure, White Mountains, California. Restoration Ecology 1:226-230.

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Parkyn, S.M., R.J. Davies-Colley, N.J.Halliday, K.J.Costley, G.F. Crocker. 2003. Planted riparian buffer zones in New Zealand: do they live up to expectations? Restoration ecology 11:436-447.

Pfankuch, D.J. 1975. Stream reach inventory and channel stability evaluation. USDA Forest Service Report, Region 1, Missoula Montana, U.S.A.

Wooster, D.E. and S.J. DeBano. 2006. Effect of woody riparian patches in croplands on stream macroinvertebrates. Archiv für Hydrobiologie 165:241-268.

Attachment C

Budget – site selection

Salary:		
1 post-doctoral researcher (Anne M. Bartuszevige)	3 months@$3334	$10 002
+ 61% OPE		$ 6 102
Total Salary		**$16 104**
Travel:		
OSU motor pool vehicle (4X4 truck)	$450/mo*3mo	$1 350
Mileage	$0.34/mile*1500miles	$ 510
Food per diem (camp rate)	$25/day*10days	$ 250
Lodging/hotel	$75/night*10nights	$ 750
Total		**$2 860**
TOTAL DIRECT		**$18 964**
INDIRECT (10%)		**$ 1,896**
GRAND TOTAL		**$20,860**

This budget includes money used for site selection on CREP buffers in Wasco and Sherman counties. Initial site selection will use GIS layers of aerial photos of Wasco and Sherman counties, FSA data of locations of CREP buffers in Oregon, and land use and land cover maps. Final selection of sites will require field visits to assess the site for suitability and to obtain landowner permission. Money for an Oregon State University motor pool vehicle and money for food and lodging are requested for travel to potential field sites. Food per diem is requested at a lower rate because I anticipate shopping for low-cost food items that can be prepared easily instead of eating at restaurants. Shopping for food will be a lower cost than restaurant eating, so I will need only $25/day for food.

Attachment C

Budget – field sampling

Salary:		
1 post-doctoral researcher (Anne M. Bartuszevige)	9 months@$3334	$30 006
+ 61% OPE		$18 304
Plant field crew (10 weeks @ 40h/wk *$10/hr)		$ 4 000
+10% OPE		$ 400
Total		**$52 710**
Travel:		
OSU motor pool vehicle (4X4 truck)	$450/mo*4mo	$1 800
Mileage	$0.34/mile*3000miles	$1 020
Food per diem (camp rate)	$25/day*20days	$ 500
Lodging/hotel	$75/night*20nights	$1 500
Total		**$4 820**
Equipment:		
Hobos	$75/each*120	$9 000
Rebar	$300/120 pieces	$300
Batteries		$500
Tools (wire cutters, sledge hammer, etc)		$100
Plant sampling stuff		$1 000
Total		**$10 900**
Contract work:		
Invertebrate work	$575/site*120 sites	$69 000
Water quality (N,P, Bacteria)	$100/sample*36	$3 600
Total		**$87 600**
Subtotal		**$141 030**
INDIRECT (10%)		**$ 14 103**
TOTAL		**$155,133**
GRAND TOTAL (Site selection + Field sampling)		**$175,993**