



Ecosystem Workforce Program

BRIEFING PAPER # 14

Economic Impact and Job Creation from Forest and Watershed Restoration: A Preliminary Assessment

Cassandra Moseley and Max Nielsen-Pincus Winter 2009

Investments in ecological restoration play a large role in public and private natural resource management with projects ranging from stream habitat enhancements and fish passage to irrigation canal improvements, riparian reforestation, road decommissioning, hazardous fuels reduction, forest thinning, and wildlife habitat enhancement. These restoration activities have considerable economic impact and job creation potential. Unlike other sectors of the economy, such as transportation infrastructure, there has been little research to quantify the economic potential of these activities. In this briefing paper, we link forest and watershed restoration activities to economic industries and provide a preliminary assessment of the potential economic and employment impacts for these activities.¹

Approach

To calculate the economic impact and job-creation potential of forest and watershed restoration activities, we used published research and the U.S. Bureau of Economic Analysis Regional Input-Output Modeling System (RIMS) in a two-step analysis. First, we categorized common forest and watershed restoration project types by the dominant economic activity involved in the project. Second, we use RIMS economic and employment multipliers for Oregon to estimate economic and employment impacts.

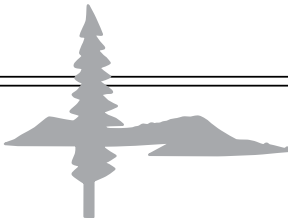
Findings

We find that forest and watershed restoration activities can create considerable economic activity and jobs (Table 1). Specifically, our data suggest that, in Oregon, forest and watershed restoration projects could:

1. Create or retain 20 jobs and generate over \$2.3 million in total economic activity performing equipment-intensive activities such as river and road restoration, per \$1 million invested.
2. Create or retain approximately 13 jobs and generate approximately \$2.2 million in total economic activity performing mechanical forest restoration projects such as hazardous fuels reduction, per \$1 million invested.

Table 1. Economic and Employment Multipliers by Restoration Categories

Restoration Category	Economic Industry	RIMS Economic Output Multiplier	RIMS Employment/ \$1 M Investment
Labor-Intensive Riparian and Upland Restoration	Forestry and Agricultural Support Services	2.11	28.8
Equipment-Intensive Aquatic and Road Restoration	Construction, Air Transportation ⁴	2.32, 3.93	20.0, 12.5
Forest Restoration	Logging	2.17	13.4
Water Conservation	Water, Sewage and Other Systems	1.85	12.59



Institute for a Sustainable Environment

5247 University of Oregon

Eugene, OR 97403-5247

T (541) 346-4545 F (541) 346-2040

ewp@uoregon.edu http://ewp.uoregon.edu

3. Create or retain nearly 29 jobs and generate over \$2.1 million in total economic activity performing labor intensive such as tree planting and manual thinning activities, per \$1 million invested.

Forest and watershed restoration projects are diverse and include a variety of labor-intensive and equipment-intensive activities that range from riparian planting and noxious weed treatments to mechanical forest thinning and stream channel reconstruction, respectively. We have categorized some common restoration activities according to the dominant type of work employed in each activity (Table 2). Each of these activities creates long-term improvements in ecosystems and economic activity in important sectors of the economy. The North American economy is classified into economic sectors by the North American Industrial Classification System (NAICS), which classifies over 1,000 defined industries. We have aligned the dominant restoration categories with dominant economic industries and the specific restoration activities with specific detailed industries as defined by NAICS (Table 3).

Economic and employment multipliers, in the context of forest and watershed restoration, represent the voyage of an investment in restoration through the economy. An economic output multiplier measures the degree to which economic activity in one economic sector creates additional economic activity in other sectors of an economy, while an employment multiplier measures the same with respect to employment. For example, every dollar invested in forest and watershed restoration travels through the economy in several ways. Restoration project managers hire consultants, contractors, and employees to design, implement, and maintain projects. Consultants and contractors hire field crews, rent or purchase equipment, and buy goods and services needed to implement projects. Employees spend wages on goods and services to support their livelihoods. We obtained US Bureau of Economic Analysis RIMS multipliers for Oregon for these dominant industries to represent a prelimi-

nary assessment of economic impact from forest and watershed restoration activities (Table 2).²

The RIMS data show that labor-intensive work has the highest job creation potential (nearly 50 to 100% greater than other restoration categories) at nearly 29 jobs per million dollars investment in that type of work compared to 13 to 20 jobs for forest restoration, water conservation, and equipment-intensive restoration projects.³ Labor-intensive jobs, however, tend to be lower pay and lower quality. In contrast, equipment-intensive activities tend to create greater total economic activity due to higher wages and greater integration with other economic industries. For example, using a helicopter crew to place large logs in inaccessible streams has job creation potential similar to forest restoration and water conservation, but the total economic activity generated by utilizing helicopters is nearly double that of other restoration activities due to the amount of support infrastructure needed to maintain and operate a helicopter operation. Similarly, mechanical forest restoration that results in the removal of material that is subsequently processed adds additional jobs and economic activity. In general, investments in restoration activities tend to double their value in economic output as those investments ripple through the economy.

Limitations and Assumptions

This analysis is based on several assumptions. First, we assume that each restoration activity is dominated by one economic activity (e.g., excavator work or tree planting). From experience, we know this assumption does not always hold true. For example, an equipment-intensive fish passage project (e.g., construction of a fish ladder or removal of a culvert) may include a substantial amount of labor-intensive work as part of the project (e.g., tree planting to restore areas disturbed by the construction component of the project). To the extent that this assumption is not biased towards any one restoration category, the impact of this assumption should be

Table 2. Restoration Activities by Category

Restoration Category	Restoration Activities
Labor-Intensive Riparian and Upland Restoration	Native planting and seeding, noxious weed treatment, fencing, rangeland restoration, manual fire hazard reduction and juniper management, trail maintenance
Equipment-Intensive Aquatic & Road Restoration	Log and boulder placements, instream structure construction, streambank stabilization, floodplain connectivity and channel reconfiguration, fish passage and screening, wetland mitigation and restoration, tide gate and small dam removal, road decommissioning and maintenance, culvert replacement and removal
Forest Restoration	Mechanized riparian and upland vegetation management, voluntary tree retention, mechanized fire hazard reduction, small diameter and biomass utilization
Water Conservation	Canal piping and lining, irrigation efficiency, delivery system improvements

minimal. Second, the job creation potential of each industry represented in the RIMS data is based on both full and part-time employment in each industry at a given time in the year. By definition, therefore, RIMS data may over-estimate full time equivalency in a given industry. At the same time, RIMS data may under-estimate jobs if the data are collected during a low time in highly seasonal work (e.g., aquatic restoration projects may be regulated by fish and wildlife agencies to minimize impacts to fish during important times of the year). Third, we assume that the RIMS economic industries reasonably represent the economics of restoration work. These assumptions are largely untested and it is unclear what their impacts might be. Over the course of the next year, the Ecosystem Workforce Program will continue an empirical investigation to test these assumptions. Until that project is completed, the

conclusions presented in this briefing paper should be viewed as preliminary estimates of the economic impacts of watershed restoration.

Next Steps

The Ecosystem Workforce Program is embarking on an empirical investigation of the economics of forest and watershed restoration activities in Oregon. We are working with the Oregon Watershed Enhancement Board and the Pacific Northwest Research Station of the United States Forest Service to quantify and profile the economic impacts of watershed restoration on the state and local economies. We will develop new robust models of the relationship between a variety of restoration activities and economic activity to continue to understand the importance of the restoration economy to rural communities and states like Oregon.

Table 3. Restoration Activities by Economic Industry

Dominant Restoration Category	Dominant Economic Industry	Specific Restoration Activities	Specific Detailed Industries	NAICS Code	Industry Definition
Labor-Intensive Riparian and Upland Restoration	Support Activities for Forestry and Agriculture	Reforestation	Support Activities for Forestry	115310	Businesses engaged in reforestation and forestry services as well as other forest protection and activities related to timber production
		Native Plant Restoration	Soil, preparation, planting, and cultivating	115112	Businesses engaged in weed control services, site preparation, transplanting, and seeding
		Fencing	All Other Specialty Trade Contractors	238990	Businesses engaged in a variety of activities including fencing
		Road Decommissioning and Mitigation	Highway, Street, and Bridge Construction	237310	Businesses engaged in the construction, rehabilitation, and repair of roads and road related structures
		Engineered Aquatic Habitat Restoration	Other Heavy and Civil Engineering Construction	237990	Businesses engaged in water resource projects and open space improvements as well as other activities heavy equipment and engineering projects (not including road or structure construction)
Equipment-Intensive Aquatic and Road Restoration	Construction	Stream Habitat Restoration	Site Preparation Contractors	238910	Businesses engaged in excavating, grading, demolition, and other heavy equipment operation
		Fish Ladder Construction	Poured Concrete Foundation and Structure Contractors	238110	Businesses engaged in pouring and finishing of structural concrete
		Helicopter Large Woody Debris Placement	Non-scheduled Charter Freight Air Transport	481212	Businesses engaged in providing air transportation of cargo with no regular routes or schedules including helicopter freight carriers
Forest Restoration	Logging	Forest Thinning and Fuels Reduction	Logging	113310	Businesses engaged in cutting timber, cutting and transporting timber, and field chipping
Water Conservation	Water, Sewage, and Other Systems	Irrigation Efficiency	Water Supply and Irrigation Systems	237110	Businesses engaged in operating and maintaining water supply systems including pumping stations, aqueducts, and other distribution systems irrigation and other uses

Endnotes

- ¹ Over the coming year, the Ecosystem Workforce Program will be building more robust models of economic impacts models of a range of forest and watershed restoration activities, funded by the Oregon Watershed Enhancement Board and USDA Forest Service.
- ² The US Bureau of Economic Analysis Regional Input-Output Modeling System allows users to construct a region based on an aggregation of US counties. The Oregon model is built upon 1997 national account data from the US Economic Census and updated with 2006 regional economic data. RIMS economic industries are based on the North American Industry Classification System at the 4-digit level for the industries referenced in Table 2. For more information on RIMS, please go to URL: <http://www.bea.gov/regional/rims/>
- ³ The reasonableness of these RIMS data are supported by research from other areas, which demonstrate job creation potential between 11 and 21 jobs per million dollars of restoration investment depending on the type of activity. See Baker, M. 2004. Socioeconomic Characteristics of the Natural Resources Restoration System in Humboldt County, California. Forest Community Research. Taylorsville, CA. (finding that approximately 300 jobs were created in Humboldt County, CA in 2002 as a result of a \$14.5 million investment in aquatic, riparian, and road restoration). See also Hjerpe, E.E., and Y.-S. Kim. 2008. Economic Impacts of Southwestern National Forests Fuels Reductions. *Journal of Forestry*. 106:311-316 (finding that a near \$41 million investment fuels reduction in New Mexico created nearly 500 jobs).
- ⁴ Air Transportation reflects large woody debris placement projects where logs are transported and placed in a stream by a helicopter crew.

For more information:

This study is a preliminary effort in a larger program of research at the Ecosystem Workforce Program on the economic impacts of forest and watershed restoration on local communities in Oregon. Please contact the Ecosystem Workforce Program at ewp@uoregon.edu for more information.

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