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Case Study

Oregon's Restoration Economy: How investing in natural assets benefits communities and the regional economy

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Abstract

For nearly twenty years in the western United States, billions of dollars have been spent to recover anadromous salmon species listed under the federal Endangered Species Act. Broad support and participation from the private and public sectors is needed to address the limiting factors to salmon viability, especially the improvement of stream and watershed health. However, in today's fiscal and political climate it is more important than ever to demonstrate the multiple ways that conservation work benefits not just the environment but also our economy.

This paper examines the employment and economic impacts of watershed restoration expenditures made in Oregon from 2001 to 2010, making use of multipliers developed by the University of Oregon's Ecosystem Workforce Program. We retrieved data on salmon habitat restoration projects from a statewide database system, the Oregon Watershed Restoration Inventory, and grouped project activities according to the University of Oregon restoration employment and economic multiplier categories. To determine the total direct, indirect, and induced economic output and employment resulting from restoration investments, we multiplied the total project investment in each category of restoration work by the relevant multiplier. We then summed the total economic activity by project type to arrive at a total per county and the state.

We found that a total of US$411.4 million was invested in 6,740 watershed restoration projects throughout the state of Oregon from 2001 to 2010, resulting in the generation of between $752.4 million and $977.5 million in economic output and 4,628 to 6,483 jobs. The jobs created by restoration activities are located mostly in rural areas, in communities hard hit by the economic downturn. Restoration activities bring a range of employment opportunities for people in construction, engineering, natural resource sciences, and other fields. The job creation potential of restoration activities compared with investments in other sectors of the economy is favorable. Restoration also stimulates demand for the products and services of local businesses such as plant nurseries, heavy equipment companies, and rock and gravel companies. Unlike in other economic sectors, restoration jobs can't be outsourced to distant locations, so these dollars tend to stay in the local and state economy. Restoration investments also continue to accrue and pay out over time. Long-term improvements in habitat create enduring benefits, from enhanced recreational and fishing opportunities to the provision of critical ecosystem services.

These findings are good news to the people of Oregon and there is tremendous opportunity to extend and replicate this work to other regions. Being able to effectively communicate the interdependencies of ecosystems and economies is critical to addressing the immense challenges of the 21st century. As long as we continue to frame trade-offs in simplistic terms like jobs versus the

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environment, we will be relegated to making incremental change. Whether our aim is the recovery of wild salmon in the western United States or the abatement of greenhouse gas emissions; alternative models for economic development need to be redoubled. We have found that quantifying and presenting the economic benefits of watershed restoration reframes the conversation and opens doors to new alliances.

Keywords: Restoration, Habitat, Salmon, Economics, Jobs, United States

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1. INTRODUCTION

Watershed restoration is the practice of restoring degraded aquatic and terrestrial habitats to functional, self-sustaining conditions. More than one billion dollars is spent on river restoration each year (Bernhardt *et al.*, 2005) as restored watersheds provide an array of generation-spanning ecosystem services and benefits (MEA, 2005). However, measuring all ecological, health, cultural and economic impacts of restoration is difficult, costly and uncertain. As such, reported watershed restoration outcomes tend to be easily quantified, project implementation metrics such as the numbers of stream miles improved or acres treated. However, in today's fiscal climate it is more important than ever to demonstrate the multiple ways that conservation work benefits not just the environment but also our economy. Recently, Nielsen-Pincus and Moseley (2010) produced economic multipliers specific to watershed restoration in the state of Oregon, making it possible to estimate the economic activity stimulated by restoration investments.

This paper uses the multipliers from Nielsen-Pincus and Moseley (2010) to examine the employment and economic impacts of watershed restoration expenditures in Oregon, and to discuss the utility of these estimates in reaching conservation policy goals. Ecotrust[1], a nonprofit in Portland, Oregon, undertook this assessment in order to daylight the market benefits of salmon habitat restoration. Our mission is to inspire fresh thinking that creates economic opportunity, social equity and environmental wellbeing; and we assume that by quantifying restoration benefits we can build public support for, and improve public policies in favor of, watershed restoration.

Box 1. Facts and Figures

Location: USA; Pacific Northwest; Oregon State.

Ecosystems: River basins covering nine Level III ecoregions: Coast Range, Willamette Valley, Cascade Mountains, Eastern Cascades Slopes and Foothills, Columbia Plateau, Blue Mountains, Snake River Plain, Klamath Mountains, Northern Basin and Range Desert. Source: For more information, see Environmental Protection Agency, Western Ecology Division, Ecoregion Maps and GIS Resources: http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm (Accessed April 11, 2014).

Population: 3.9 million people in the state of Oregon, U.S..

Size of Restored Area: 2,314 miles of riparian habitat improved; 642 miles of in-stream habitat treated; 686,570 acres of uplands improved; 37,122 acres of wetlands improved; 2,043 stream miles reopened to access by anadromous species.

Budget: $411.4 million dollars invested in 6,740 watershed restoration projects.

Study Period/Duration: 2001-2010.

Partners: University of Oregon Ecosystem Workforce Program, Oregon Watershed Enhancement Board, U.S. Forest Service, National Oceanic and Atmospheric Administration Restoration Center.

Study Objectives: Quantify the market benefits of watershed restoration expenditures in order to build public support for habitat restoration.

1 www.ecotrust.org

2. BACKGROUND ON RESTORATION AND ECONOMICS

In order to restore ecosystems at a meaningful scale, conservationists and researchers must make the social and economic benefits of doing so more explicit (Knight *et al.*, 2006; Holl & Howarth, 2000). This is felt most keenly during adverse economic conditions when debates over shrinking public budgets devolve into zero-sum game arguments; namely, spending money on environmental protection or enhancement is a sacrifice to economic growth. Even though the need for ecosystem restoration is usually a consequence of economic activity, the resources provided to carry it out are influenced by current economic circumstances (Edwards & Abivardi, 1997). Nonetheless, a recent survey of over a thousand peer-reviewed restoration papers found that restoration practitioners are failing to draw links between ecological and socioeconomic benefits, underselling the evidence that restoration is a worthwhile investment for society (Aronson *et al.*, 2010).

2.1 ESTIMATING THE BENEFITS OF PROTECTED OR RESTORED HABITAT

As the majority of the goods and services provided by nature are not valued in the formal market economy, economists have created novel approaches to incorporate environmental benefits into economic analyses, such as the Total Economic Valuation (TEV) framework, see Pearce *et al.* (1989). TEV is comprised of both use values (direct, indirect and option) and non-use values (bequest and existence) that together constitute the total economic value of the natural resource or ecosystem in question. However, the majority of TEV studies address only one use value, such as air purification services, rather than providing a complete estimate for all use and non-use values. TEV studies utilize a variety of non-market valuation methods such as hedonic pricing, travel cost, contingent valuation, and experimental choice analyses. Robbins & Daniels (2012) provide an excellent overview of these methods in the context of restoration, and De Groot *et al.* (2013) conducted a synthesis cost-benefit analysis on a range of ecosystem restoration projects, finding that the majority of projects were not only profitable but were also high-yielding investments.

The contribution of such economic studies to the field of restoration is critical to furthering knowledge and uniting disciplines. However, it is important to recognize their limitations. TEV studies are long-term, expensive efforts that need to be carefully and correctly designed to produce relevant results. Even with adequate time and resources, such studies can be highly sensitive to key assumptions, biases, and inherent uncertainties; if improperly executed, results may be unreliable (Schultz *et al.*, 2012).

2.2 ESTIMATING THE ECONOMIC IMPACTS GENERATED BY HABITAT RESTORATION PROJECT EXPENDITURES

Recently, economic thinking about restoration has expanded to examine the short-term, market benefits that restoration expenditures stimulate in local communities (*e.g.* see Edwards *et al.* 2013). These types of analyses are identical to those undertaken to assess the economic impact of federal investments in construction projects, for example. As in traditional construction, restoration project expenditures are made as payments to contractors, payments for equipment and materials, and as wages to personnel managing and performing the restoration work. These businesses and employees in turn circulate that money throughout the economy as they supply their own business and labor needs, stimulating further economic activity. In economics this process is called the 'ripple' or 'multiplier effect', as the initial outlay of spending ripples and multiplies throughout various sectors of the economy related directly and indirectly to the project. Economists use input-output (I-O) modeling or the economic multipliers derived from I-O models to conduct these analyses; such models are the basis for the following case study. For more information on I-O models, see Annex A.

3. CASE STUDY: RESTORATION AND THE LOCAL ECONOMY IN OREGON

In the western United States, billions of dollars have been spent over recent decades to recover anadromous salmon species listed under the federal Endangered Species Act (ESA). Broad support and participation from the private and public sectors is necessary to address the limiting factors to salmon viability, especially the improvement of stream and watershed health. In Oregon, there is strong state-led support of watershed restoration. The state generates restoration funding from state lottery funds and sales of salmon license plates and pools this with federal allocations for salmon recovery.[2] The Oregon Watershed Enhancement Board (OWEB), a state agency, manages these funds and makes grants available to local watershed councils, tribes, soil and water conservation districts, and other groups for on-the-ground restoration projects. Most projects are designed to recover watershed processes like habitat connectivity and floodplain dynamics. Landowners and other private citizens, community organizations, interest groups, and all levels of government are involved in project organization, design and implementation.[3]

This paper examines the employment and economic impacts of watershed restoration expenditures made in Oregon over the ten year period of 2001–2010, using economic multipliers to determine the total direct, indirect, and induced impacts resulting from these investments.

2 For more information about Oregon lottery allocations, see http://www.oregonlottery.org/About/Lottery101/HowareFundsAllocated.aspx. Congress established the Pacific Coastal Salmon Recovery Fund (PCSRF) in 2000 to protect, restore, and conserve Pacific salmon and steelhead populations and their habitats. NOAA Fisheries manages the PCSRF program and provides funding to states and tribes to implement restoration projects in the Pacific Coast region — Washington, Oregon, California, Nevada, Idaho and Alaska; see http://www.westcoast.fisheries.noaa.gov/protected_species/salmon_steelhead/recovery_planning_and_implementation/pacific_coastal_salmon_recovery_fund.html (accessed December 30, 2013).

3 See http://www.oregon-plan.org/OPSW/Pages/about_us.aspx (accessed June 1, 2012).

3.1 METHODS

Project data were retrieved from the OWEB's Oregon Watershed Restoration Inventory (OWRI)[4], an extensive public database documenting watershed projects around the state. For the period of 1995-2009, the OWRI has descriptive information on 13,625 projects.

We queried the OWRI for watershed restoration projects that:

- were completed in Oregon during the ten year period of 2001–2010;
- included cash expenditures (excluding projects supported solely with in-kind contributions); and
- listed specific restoration activities, such as "riparian" or "fish passage", with associated total expenditure data.

A total of 6,740 watershed restoration projects were returned.[5] All project expenditures were converted to 2010 dollars using the Bureau of Economic Analysis's implicit price deflators for government consumption expenditures and gross investment. In-kind funding, while critical to restoration efforts, was not included in this analysis.

To determine the economic impacts of restoration investments, we used multipliers supplied by Nielsen-Pincus & Moseley (2010) who examined the employment and economic impacts of public investment in forest and watershed restoration in Oregon. Type I multipliers measure only the direct and indirect effects while Type II multipliers measure the direct, indirect and induced effects of the investment. For more information about economic and employment multipliers, see Annex A.

First, all project expenditures were totaled by the restoration activity categories used by OWRI and Nielsen-Pincus & Moseley (2010), described as follows:

- Fish Passage — removal of barriers to fish passage such as culverts and dams;
- In-stream — enhancement of stream habitat and function;
- Riparian — enhancement and restoration of native riparian vegetation;
- Road — inventory, construction, reparation, or decommission of roads;
- Upland — agricultural water management, juniper management, and noxious weed treatments;
- Urban — urban centered actions removing sources of watershed pollution;
- Wetland — restoration of wetland and estuarine habitat; and
- Combined — a diverse combination of some of the above project types.

Then, the associated multipliers (see Table 1) were applied to the totaled expenditures in each respective activity category. To determine the total direct, indirect and induced economic output and employment resulting from restoration investments, we multiplied project investments in each category of restoration work by the relevant multiplier. Where projects included multiple activities, the relevant multiplier was applied to the portion of total expenditures associated with that activity. Because multipliers for road and urban projects were not developed by Nielsen-Pincus and Moseley (2010), we used the "Combined" multiplier in these instances.

Table 1 details the economic multipliers and employment effects estimated by Nielsen-Pincus and Moseley (2010) stimulated per $1 million invested.[6] Jobs supported may be full-time, part-time, temporary, seasonal or permanent.

Table 1: Economic multipliers and employment effects.

	Economic multipliers		Employment effects per $1 million invested	
Restoration Activity	Type I	Type II	Direct + Indirect	Direct + Indirect + Induced
Fish passage	1.8	2.3	10.6	15.2
In-stream	1.7	2.2	10.5	14.7
Riparian	1.7	2.4	17.5	23.1
Upland	2	2.6	10.8	15
Wetland	1.8	2.4	12.5	17.6
Other/Combined	1.8	2.3	10.4	14.7

Source: Nielsen-Pincus & Moseley (2010).

We then summed the total economic activity by project to arrive at a state total. We also present the total economic activity results by county in Annex B.

3.2 RESULTS

The average number of activities undertaken per project was one, although some projects reported as many as five separate activities. The most popular types of restoration activities were road (24% of projects), riparian (24%) and upland work (21%). While fish passage restoration comprised only 16% of study projects, it constituted the greatest proportion of expenditures by project type (29% of total expenditures), followed by upland (24%) and road (15%) restoration. Urban restoration work was least common, occurring in only 0.2% of the study projects and constituting only 0.1% of total expenditures.

A total $411.4 million dollars was invested in 6,740 watershed restoration projects completed throughout the state of Oregon

4 Available online at: http://www.oregon.gov/OWEB/MONITOR/Pages/OWRI.aspx (accessed Sept. 9, 2011).

5 It should be noted that although the OWRI is the most comprehensive database documenting watershed restoration projects and likely includes the majority of restoration projects occurring in the state, it does not include all restoration projects and efforts. Furthermore, some projects recorded within OWRI did not make our cut due to missing data or project input error. Thus there were additional watershed restoration projects completed in Oregon during the same time period that our analysis did not include. This suggests that our findings likely underestimate the total employment and economic impacts of restoration projects in the state over this period.

6 Nielsen-Pincus and Moseley (2010) also estimated the employment impacts of restoration investments by contractor type, including labor-intensive (referenced above), equipment-intensive (watershed), equipment-intensive (forestry), and technical contracting, not shown here.

over the period 2001–2010.[7] We estimate that these expenditures contributed between $752.4 million and $977.5 million in economic output and supported 4,628 to 6,483 jobs, see Table 2.[8] Results are also presented by county. See Figure 1 and Annex B.

3.3 CONTEXT

The job creation potential of restoration activities compared with investments in other sectors of the economy is favorable. Figure 2 displays findings from the literature and compares two types of restoration project investments, labor-intensive projects and average projects (Nielsen-Pincus & Moseley, 2010), with estimates from investments made in transportation infrastructure, renewable energy, building retrofits, coal, and oil and natural gas (Heintz *et al.*, 2009a, 2009b). Restoration activities create more jobs per $1 million of investments than comparable green investments in renewable energy, building retrofits, and transportation infrastructure; more than twice the number of jobs as comparable investments in coal; and more than three times the number of jobs as comparable investments in oil or natural gas.

Table 2: Oregon restoration projects: Estimated economic impacts by project type, 2001-2010 (2010$).

Project Type	**Total expenditures (million $)**	**Estimated economic output (million $)**			**Estimated employment (jobs)**		
Combined	$14.4	$25.9	–	$33.0	149	–	211
Fish Passage	$117.4	$211.4	–	$270.1	1,245	–	1,785
Instream	$53.3	$90.6	–	$117.2	559	–	783
Riparian	$29.0	$49.3	–	$69.6	508	–	670
Road	$60.5	$108.8	–	$139.1	629	–	889
Upland	$100.8	$201.5	–	$262.0	1,088	–	1,512
Urban	$0.2	$0.4	–	$0.6	3	–	4
Wetland	$35.8	$64.4	–	$85.9	447	–	630
TOTAL	$411.4	$752.4	–	$977.5	4,628	–	6,483

Source: Authors' estimates using data from OWEB (2012) and Nielsen-Pincus & Moseley (2010).

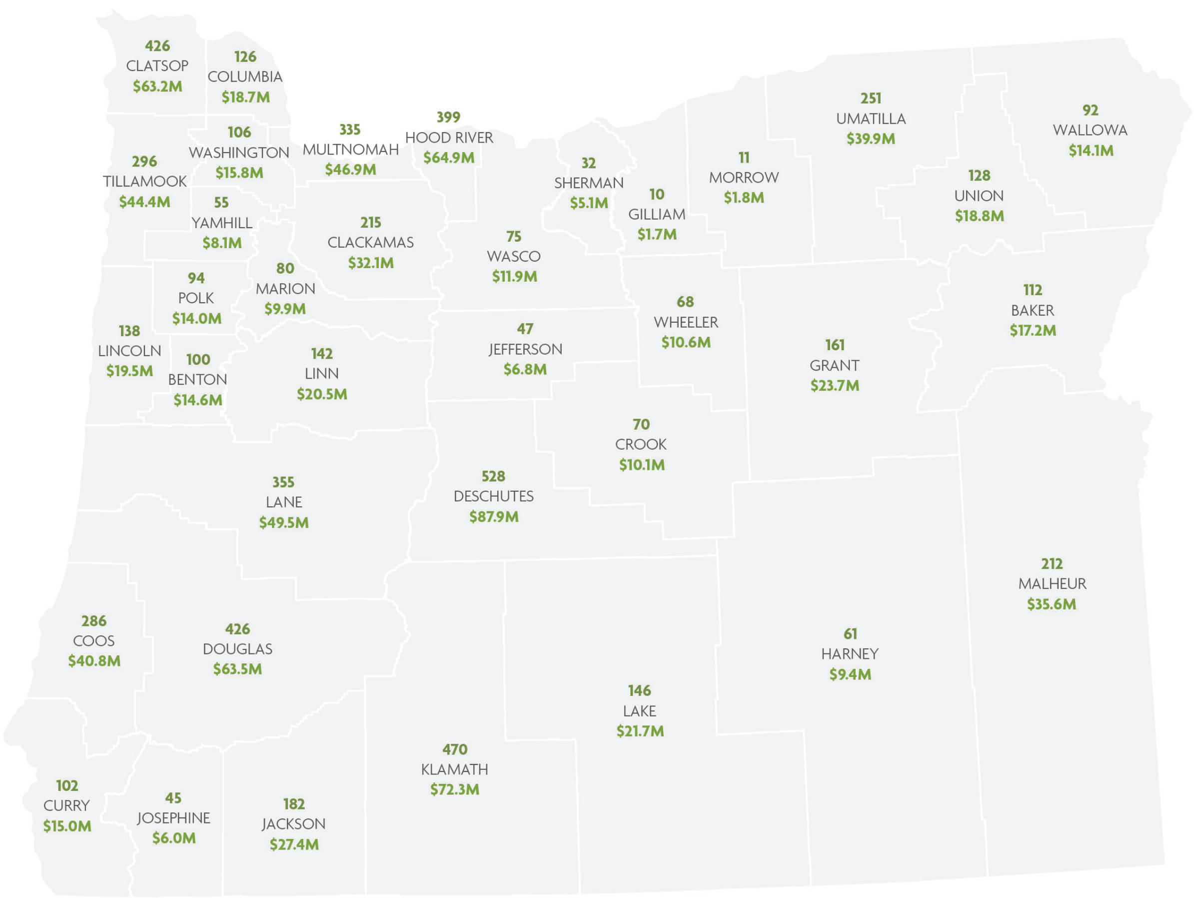

Figure 1: Oregon restoration projects by county.

Estimated employment (above county name) and economic output (below county name), 2001–2010. Source: Authors' estimates using data from OWEB (2012) and Nielsen-Pincus & Moseley (2010).

7 This total does not include in-kind funding, and therefore does not represent the total cost of completing the restoration projects, only the direct cash expenditures made.

8 The lower values in the range are calculated by using Type I multipliers, the higher values in the range are calculated by using Type II multipliers.

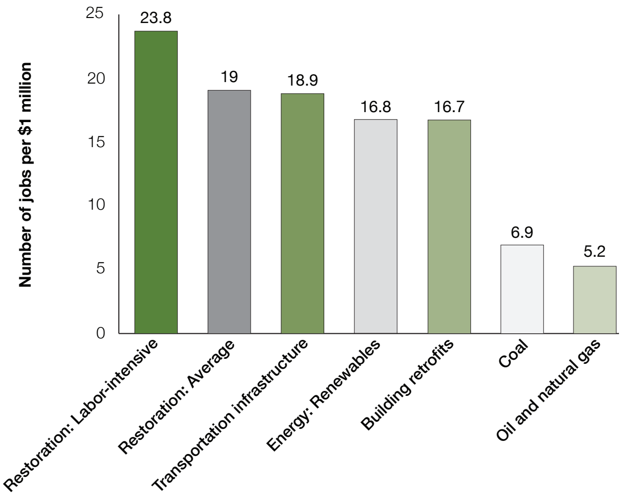

Figure 2: Number of jobs per $1 million of investment by sector.

Employment estimates obtained from three studies using economic input-output models to trace dollars through economies. Source: Nielsen-Pincus & Moseley (2010) and Heintz (2009a, 2009b).

The majority of watershed habitat restoration in Oregon occurs outside major urban areas, hence, the majority of associated jobs are likely located in rural counties and communities: places hard hit, generally speaking, by the 2008 economic downturn with recent unemployment rates in excess of both state and national averages (Beleiciks & Krumenauer, 2012; Young, 2013). Restoration activities bring a range of employment opportunities for those working in construction, project management, engineering, natural resource sciences, and other fields. Restoration also stimulates demand for the products and services of local businesses such as plant nurseries, heavy equipment companies, and rock and gravel companies. In addition, these dollars tend to stay in the local economy: Hibbard and Lurie (2006) found that approximately 80% of OWEB's restoration investments stay in the county where the project is located.

4. DISCUSSION: THE UTILITY OF ESTIMATING THE ECONOMIC IMPACT OF RESTORATION

There is a systemic lack of acknowledgement of the value of functional ecosystems within our market economy, which arguably contributes to flawed decision making (EFTEC, 2005; Hurd, 2009). Intuitively, in the face of shrinking public budgets and difficult decisions about the distribution of scarce resources, it is useful, if not essential, to make the economic case for restoration. This is especially salient to those of us in the conservation nonprofit sector. As practitioners, with our own limited resources, we wish to know what kinds of information and outreach strategies are effective in the pursuit of improved environmental and social welfare.

Ecotrust created a four-page brochure[9] to publicize the findings of this report. We defined the target audience as elected officials and government staff, especially those responsible for budget allocations of restoration funds. The information and brochure have been presented to local and national audiences at several non-academic conferences, in a national earned media campaign in collaboration with NOAA Restoration Center, via social media networks, and in numerous individual meetings with restoration stakeholders and public decision-makers. To date, the reception has been overwhelmingly positive, from across the country and the political spectrum.

Since release of the brochure, Ecotrust staff and researchers at the University of Oregon regularly receive inquiries as to the possibility of extending this type of analysis to other regions. We enthusiastically support continued research into and development of such economic tools, as organizations like ours are subsequent consumers and purveyors. Yet, we argue that there is an equally pressing, concomitant need to study the impact of this information on individuals and institutions.

While we have found that quantifying and communicating the economic gains of watershed restoration reframes the conversation with key stakeholders, it is not clear whether this translates into lasting, favorable outcomes, be those demonstrable changes in public opinion or other, more practical support in the form of greater private landowner participation in restoration projects; changed policies that recognize watershed restoration as an investment strategy in rural economies and green infrastructure; or increased federal or state budgets for restoration.

We recognize that establishing causality with respect to policy outcomes or behavioral change is a complicated endeavor. However, there is much to be explored in terms of changed perception or attitude. For example, are common economic impact metrics, such as number of jobs, more persuasive than intergenerational benefit claims because they avoid the associated pitfalls of temporal discounting? Or by providing data on the market benefits of environmental restoration, are perceived trade-offs diminished, thereby minimizing the psychological burden for decision-makers? Regardless, it is probably safe to assume that funding will continue to fall short of the amount needed for large-scale ecosystem restoration. Hence, we stand to increase our collective impact with an improved understanding of the influence of different economic arguments.

5. CONCLUSIONS

The act of restoring watershed health provides local jobs and bolsters regional economies. In our case study analysis, we estimated that $411.4 million in watershed restoration expenditures made over ten years in the state of Oregon generated up to $977.5 million in economic output and supported up to 6,483 jobs.

Beyond short-term market impacts, it is important to remember that a critical assessment of restoration's value would not be complete without considering its primary intended benefits to ecosystem health. Restoration

9 See http://www.ecotrust.org/wwri/downloads/WWRI_OR_brochure.pdf.

investments continue to accrue and pay out over time with long-term improvements in wildlife populations and aquatic and terrestrial habitat. And intact watersheds create enduring benefits, from enhanced fishing opportunities to the provision of critical ecosystem services, which are vital to the welfare of communities and cultures.

We believe that meaningfully characterizing and effectively communicating the interdependencies of ecosystems and economies is critical to addressing the immense environmental challenges of the 21st century. Whether our aim is the recovery of wild salmon in the western United States or the abatement of greenhouse gas emissions, alternative models of economic development that properly value for functioning ecosystems need to be expanded and strengthened. By applying common economic impact assessment techniques to environmental conservation activities, we are hopefully aiding in the transition to a more reliable prosperity. In addition to replicating these kinds of economic impact studies, there is much to gain from more rigorous exploration of how making the economic case for environmental wellbeing is an imperative for achieving modern environmental goals.

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ANNEX A: ECONOMIC MULTIPLIERS

Input-Output (I-O) models are quantitative economic models that represent the interdependencies between different sectors of regional economies using complex matrix operations. The matrices are comprised of regional and national accounts relating the production of commodities by industry and the use and distribution of commodities by intermediate and final users. The integrated economic data underlying the I-O accounts originate from a variety of sources regarding industry purchasing patterns, employment and earnings statistics, regional supply capacities, and more. The underlying data of an I-O model is specific to the timeframe in which the data was collected.

The key concepts underlying I-O models have been built upon by several economists over several decades. I-O models are the most comprehensive economic accounts at the level of the whole economy, and they are used in the calculation of important accounts of the economy such as measures of gross domestic product (GDP), and other national income and product accounts (NIPAs) by the U.S. Department of Commerce.

When a final-demand dollar enters the regional economy, some of it remains and is used to purchase other regional commodities, while a portion leaves the economy in the form of savings or to purchase commodities produced outside the region. To conduct an analysis of a change in final demand, the user inputs the expected change into the existing I-O model; the I-O model tracks the circulation of these dollars throughout the economic structure of the regional economy, running subsequent, iterative impact rounds until the initial dollars no longer remain in the economy, and then outputs the estimated final effects of the inputted change in final demand. In other words, the initial change in final demand is *multiplied* throughout the economic model to estimate the direct, indirect and induced output, income, and employment effects (explained further below). In this process, the I-O model effectively utilizes and creates economic multiplier(s) specific to the analysis. Once the economic multipliers specific to the analysis and the region are known, as in the case of this study, it is possible to conduct similar, though perhaps less comprehensive, analyses using only the economic multipliers and not the entire I-O model itself.

Economic multipliers measure the changes in economic activity or output resulting from an initial expenditure or investment. For example, a multiplier of 1.5 implies that $1.00 of direct expenditure on restoration generates an additional $0.50 in economic activity, resulting in a total economic impact of $1.50. Multipliers capture the ripple effects of economic activity; simply put, a direct change in one industry affects other industries. The multiplier effect includes direct, indirect, and induced economic activity. Direct effects are the most straightforward; they include the economic activities associated with the expenditure itself. Indirect effects account for the demands for services, supplies, equipment and other inputs produced by related industries to support the direct expenditures. Finally, induced effects capture the increased spending and economic activity that result when those employed in sectors linked directly and indirectly to the direct expenditures spend their income on goods and services. Employment multipliers measure the number of jobs created in the economy as a whole from each job created by the direct expenditures. Type I multipliers measure only the direct and indirect effects while Type II multipliers measure the direct, indirect and induced effects of the investment.

To derive the economic multipliers used in this study, Nielsen-Pincus and Moseley (2010) study used the I-O modeling software IMPLAN, U.S. Census Bureau payroll statistics, and OWRI data from completed Oregon forest and watershed restoration projects. The resulting multipliers, therefore, are appropriate for our analysis.

ANNEX B: RESULTS BY COUNTY

The 36 counties in Oregon varied considerably both in terms of total number of restoration projects completed, from 48 in Jefferson County to 746 in Lane County, and total expenditures, from $0.7 million in Gilliam County to $35.2 in Deschutes County. Discrepancies between total numbers of projects and project cost totals are largely due to the type of restoration activities undertaken. On average, a county completed 182 restoration projects and made average expenditures of $11.1 million dollars over the ten year period of 2001–2010.

Lane County had the largest number of projects (746) constituting 11% of total projects, followed by Douglas (527) and Clatsop (506) counties. Deschutes County had the largest cash expenditures ($35.2 million), constituting 9% of total restoration project cash expenditures, followed by Klamath ($29 million) and Douglas County ($27.9 million). Table 3 displays total restoration project numbers, expenditures, and the estimated economic impacts by county.

Table 3: Oregon restoration projects: Estimated economic impacts by county, 2001-2010 (2010$).

County	Number of projects	Total expenditures (million $)	Estimated economic output (million $)			Estimated employment (jobs)		
Baker	127	$7.0	$13.1	–	$17.2	81	–	112
Benton	190	$6.3	$11.2	–	$14.6	71	–	100
Clackamas	178	$13.9	$24.9	–	$32.1	151	–	215
Clatsop	506	$27.4	$49.0	–	$63.2	303	–	426
Columbia	198	$8.1	$14.5	–	$18.7	89	–	126
Coos	468	$17.6	$31.3	–	$40.8	204	–	286
Crook	119	$4.3	$7.7	–	$10.1	50	–	70
Curry	253	$6.5	$11.6	–	$15.0	72	–	102
Deschutes	65	$35.2	$67.7	–	$87.9	380	–	528
Douglas	527	$27.9	$49.2	–	$63.5	303	–	426
Gilliam	51	$0.7	$1.3	–	$1.7	7	–	10
Grant	209	$9.9	$18.2	–	$23.7	116	–	161
Harney	74	$3.8	$7.2	–	$9.4	43	–	61
Hood River	92	$26.2	$50.2	–	$64.9	284	–	399
Jackson	141	$11.9	$21.4	–	$27.4	128	–	182
Jefferson	48	$2.9	$5.2	–	$6.8	34	–	47
Josephine	179	$2.6	$4.6	–	$6.0	33	–	45
Klamath	93	$29.0	$55.0	–	$72.3	336	–	470
Lake	81	$9.0	$16.6	–	$21.7	104	–	146
Lane	746	$21.4	$37.8	–	$49.5	255	–	355
Lincoln	272	$8.5	$15.0	–	$19.5	99	–	138
Linn	199	$8.8	$15.8	–	$20.5	100	–	142
Malheur	191	$13.9	$27.3	–	$35.6	153	–	212
Marion	179	$4.2	$7.4	–	$9.9	59	–	80
Morrow	50	$0.7	$1.4	–	$1.8	8	–	11
Multnomah	65	$20.4	$35.8	–	$46.9	240	–	335
Polk	155	$6.0	$10.8	–	$14.0	67	–	94
Sherman	121	$2.0	$3.9	–	$5.1	23	–	32
Tillamook	324	$19.3	$34.5	–	$44.4	211	–	296
Umatilla	152	$16.6	$31.0	–	$39.9	178	–	251
Union	108	$7.8	$14.3	–	$18.8	92	–	128
Wallowa	95	$5.9	$10.9	–	$14.1	66	–	92
Wasco	96	$4.8	$9.2	–	$11.9	54	–	75
Washington	97	$6.8	$12.3	–	$15.8	75	–	106
Wheeler	112	$4.3	$8.2	–	$10.6	49	–	68
Yamhill	112	$3.5	$6.2	–	$8.1	39	–	55
Multi-county	67	$5.9	$10.5	–	$13.9	73	–	101
TOTAL	6,740	$411.4	$752.4	–	$977.5	4,628	–	6,483

Source: Authors' estimates using data from OWEB (2012) and Nielsen-Pincus & Moseley (2010).