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Issue Brief No. 18

August 2016

Preliminary Estimates of the Economic Effects of Stream Restoration on the Big Wood River Valley, Idaho

by

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SUMMARY

Several organizations in the Big Wood River (BWR) valley of south-central Idaho have proposed the Big Wood River Watershed Restoration Project (BWRWRP), a large-scale effort to restore the river channel to more naturally functioning conditions and enhance habitat with the objectives of improving the fishery, reducing flood risk, and enhancing other ecosystem services provided by the river. This report outlines a general framework for valuing economic effects of river restoration, provides preliminary estimates of the economic benefit and impact of the BWRWRP, and suggests areas for future research to refine the preliminary estimates and expand to additional ecosystem services.

Three types of economic effects of the BWRWRP are modeled based on existing data: economic benefit to anglers of an improved recreational fishery, near-term economic impact to Blaine County of restoration treatment construction, and long-term economic impact to Blaine County of increased use of the improved BWR fishery.

The cost of the BWRWRP is expected to be about $15 million. Using a benefits transfer method, the economic benefit to anglers of the improved BWR fishery is estimated to be between $3.1 and $22.1 million over 20 years. The near-term economic impact to Blaine County of restoration treatment construction is estimated to be $1.6 million in value added annually for five years. The long-term economic impact to Blaine County of increased use of the recreational fishery is estimated to grow to $1.3 million in value added annually over 15 years as the fishery improves.

The estimates of the economic effects of an improved BWR recreational fishery developed here are sensitive to assumptions about the use and benefit of the current fishery, enhancement of the fishery after restoration, and anglers' responses to an improved fishery. Original research focusing on BWR anglers would improve the accuracy of these preliminary estimates.

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ACKNOWLEDGEMENTS

The authors thank the members of the Big Wood River Watershed Restoration Project (BWRWRP) working group for their assistance in project development:

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The authors also thank Drs. R. Garth Taylor and Philip Watson, Department of Agricultural Economics and Rural Sociology, University of Idaho, for their counsel and assistance with analysis.

Section 1. Background

The purpose of this report is to describe a framework for measuring the economic effects of restoring the Big Wood River (BWR) in south central Idaho, and to provide preliminary estimates of the economic benefits and impacts of an improved recreational fishery. The BWR flows 137 miles from its headwaters near Galena Summit in the Boulder Mountains to its confluence with the Little Wood River near Gooding, Idaho to become the Malad River. This analysis of the economic effects of stream restoration focuses on the 40-mile, free-flowing upper stretch of the BWR from the confluence of the main BWR and its North Fork to the impoundment at Magic Reservoir southwest of Bellevue, Idaho.

The upper BWR valley is located entirely in Blaine County, Idaho, population 21,269 (U.S. Census Bureau 2015). The primary population centers of the BWR valley and Blaine County are Hailey (pop. 7,961), Ketchum (2,703), Bellevue (2,457), and Sun Valley (1,392). These communities account for about 97% of economic output of Blaine County (IMPLAN 2013). The BWR valley economy is dominated by businesses associated with tourism-based and resort communities: real estate, restaurants, hotels and motels, architectural and engineering services, and landscaping and horticultural services (IMPLAN 2013). In addition, St. Luke's Hospital, south of Ketchum, and education employment are important to the economy of the valley.

Historically, the BWR supported a high-quality rainbow trout (*Salmo gairdneri*) fishery and was recognized as one of the premier wild trout streams in Idaho (Thurow 1987). However, since the 1940s, human-related activities associated with attempts to control flooding, development of floodplain areas, and road construction have extensively altered the BWR and its trout habitat (Thurow 1987, Biota 2016). Current concerns along the BWR are primarily related to unstable channel braiding, widening or enlargement, and bank erosion (Biota 2016). These conditions threaten public and private infrastructure, and have reduced the ecological and fisheries values of the river system.

Several organizations in the BWR valley have partnered to propose the Big Wood River Watershed Restoration Project (BWRWRP).[1] The project proposes a suite of river restoration treatments for the BWR, including: establishment of functional channel width, depth, profile, and alignment; hardened riffles or rock cross vanes to achieve grade control; wood revetment or rock revetment with bioengineering to achieve bank stabilization; and floodplain reconnection and re-establishment through excavation or fill (Biota 2016).

The objective of proposed treatments is to enhance ecological functions and habitat of the BWR system and to regain its historically vibrant fishery. Restoration of proper channel width and depth through floodplain creation and channel shaping will enable the river to maintain pools with complex cover components to benefit the fishery. Installation of large wood for bank stabilization and establishment of woody riparian vegetation along river banks will increase structural and overhead cover critical to the quality of the fishery. These treatments will collectively improve fluvial processes and help reestablish river conditions to attain historic peak densities of trout in the BWR. In addition to fishery enhancement, these restoration treatments will reduce flood hazard, reduce sedimentation, and reduce severe bank erosion (Biota 2016). The proposed BWRWRP project targets seven reaches within the 40-mile upper stretch of the BWR (**Figure 1**):

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[1] Project partners include Blaine County Recreation District, Sun Valley Institute for Resilience, The Nature Conservancy, Trout Unlimited, Will Miller, and Wood River Land Trust.

- Approximately 3,500 feet of river channel proximate to the Fox Creek Reference Reach Site (Reach 1);
- Approximately 6,000 feet of river channel proximate to the Training Channel Site (Reach 2);
- Approximately 8,000 feet of river channel proximate to the Highway 75 Reach Site (Reach 3);
- Approximately 7,000 feet of river channel upstream of the East Fork Big Wood River confluence (Reach 4);
- Approximately 27,000 feet of river channel upstream and adjacent to the Deer Creek confluence (Reach 5);
- Approximately 4,000 feet of river channel downstream of the Bullion Street Bridge in Hailey (Reach 6; and
- Approximately 22,000 feet of river channel located between Colorado Gulch and the Broadford Street Bridge in near Bellevue (Reach 7; Biota 2016).

Economic effects—both social welfare benefits and impacts to a regional economy—are considerations for making decisions about resource investments. The first section of this report outlines a general framework for valuing the economic effects of river restoration, including differences in measuring economic benefits and economic impacts. The next section provides preliminary estimates of the economic benefits and impacts of the proposed BWRWRP. Quantifying the economic effects of proposed actions may be useful for attracting funding from government and non-government entities. The estimated cost of the entire BWRWRP is $15 million but will depend on timing and scope of activities.[2] The accuracy of the estimated economic benefits and impacts is subject to assumptions about their timing, ecological response rates, recreation visitor behavior, and related factors. Hence, the findings of potential effects are tentative in nature. Finally, areas for future research and key considerations are outlined at the end of this report to assist project proponents in next steps.

[2] Personal communications, 20 April 2016, meeting in Ketchum, Idaho, and e-mail from Chad Chorney, Big Wood River Project Manager, Trout Unlimited, 22 June 2016.

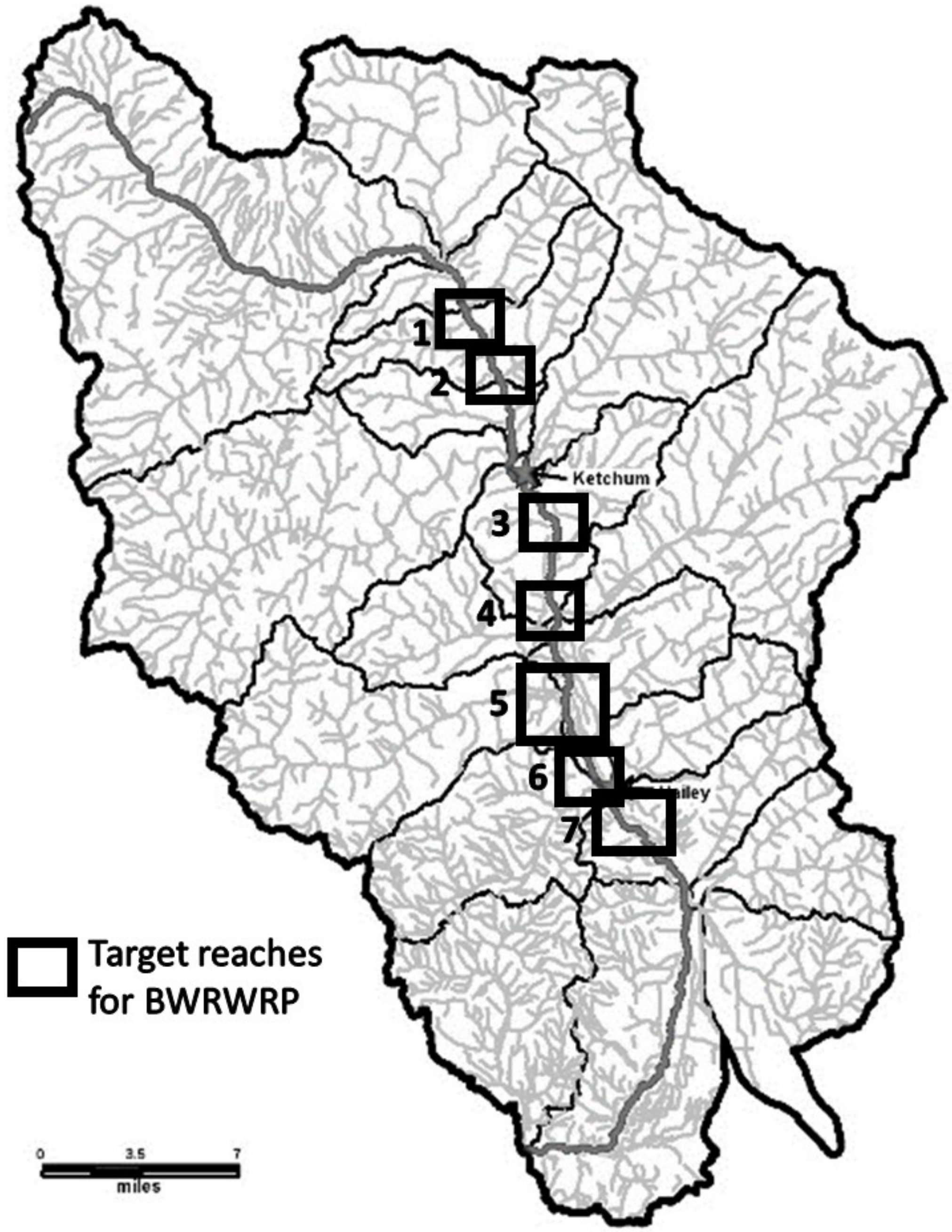

Figure 1. Big Wood River (BWR) watershed and target reaches for the Big Wood River Watershed Restoration Project (BWRWRP).
Adapted from Biota (2016).

Section 2. Measuring the Economic Effects of Ecosystem Services

The term "ecosystem services" is used to describe the outputs of natural systems from which humans may derive benefit (Wainger and Mazzotta 2011). River ecosystems, for example, incorporate numerous natural processes, structures, and functions that lead to the output of ecosystem services that people value—fishing, clean water, flood control, aesthetics (**Figure 2**; Brauman et al. 2007, Acuna et al. 2013). Ecosystem services are generally categorized as either regulating services (e.g., disturbance regulation such as flood control), provisioning services (e.g., goods such as food or timber), or cultural services (e.g., recreation opportunities such as fishing; Farber et al. 2006). For the purposes of this report, an ecosystem services framework provides a means to identify and assess management actions, such as river restoration treatments, that change ecosystem processes and outputs. Those processes and outputs can be analyzed for effects on economic activity.

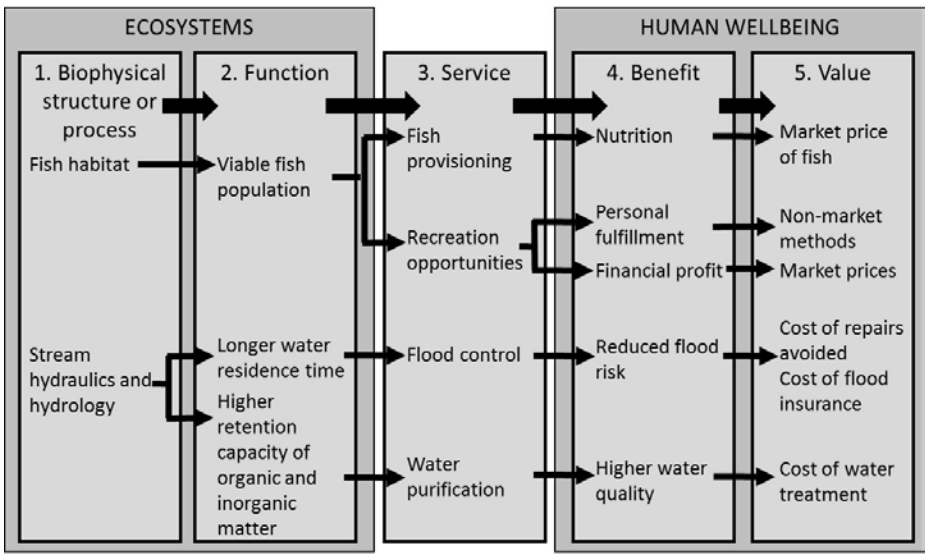

Figure 2. Examples of ecosystem services provided by a river.
Adapted from Acuna et al. (2013).

Three types of economic effects result from ecosystem restoration (**Figure 3**; Cullinane Thomas 2016). One type of economic effect is economic *benefit* to society resulting from positive changes in ecosystem services provided by a restored ecosystem. The other two types of effects are economic *impacts* on the regional economy—near-term impacts of restoration treatments themselves, and long-term impacts associated with improved ecosystem conditions (e.g., increases in recreational fishing).

Economic benefit and economic impact are often incorrectly used interchangeably (Burgan and Mules 2001, Watson et al. 2007). However, as used in this report, benefit and impact require distinctly different metrics for proper accounting.

Economic *benefit* is a broad measure of the gain in social welfare attributed to a particular action (Brown et al. 2007), where social welfare is the aggregate measure of what people are willing to give up (i.e., willing to pay) in exchange for something they value (Wainger and Mazzotta 2011). Economic benefits includes both “market benefits” that can be observed from market transactions (e.g., price of fish from a commercial fishery), as well as “non-market benefits” (e.g., the benefit associated with a day of recreational fishing) that are received without having to pay for them. Economic benefits are included in benefit-cost analyses that measure changes in social welfare as well as economic efficiency. Comparing benefits and costs of different projects or policies yields a measure of relative efficiency,

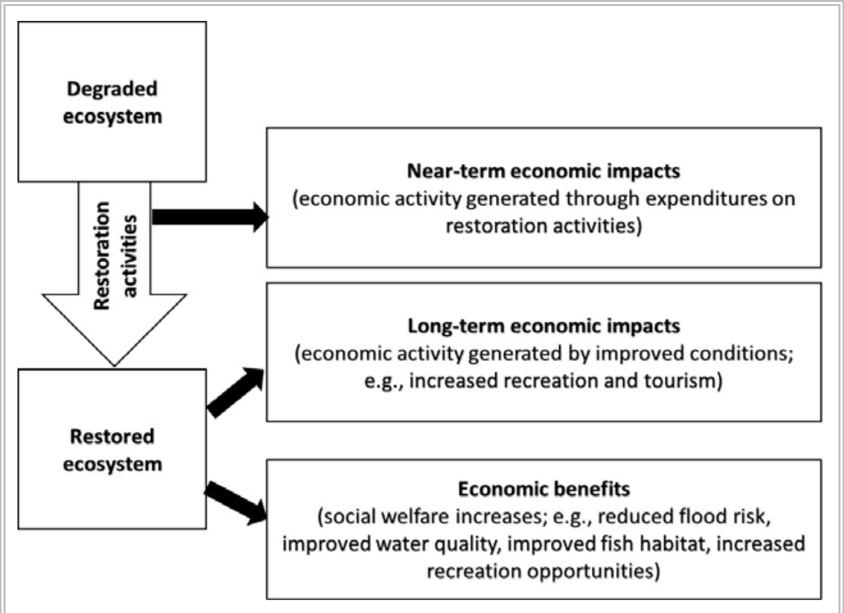

Figure 3. Economic effects of ecosystem restoration.
Adapted from Cullinane Thomas (2016).

including how those costs and benefits fall upon different groups. Benefit-cost analyses are widely used to assess public sector resource allocation decisions.

Economic *impact* is the net change to the economy of a region that can be attributed to an industry, event, or policy that would otherwise not have occurred (Watson et al. 2007). Attributable economic activity is based on the flow of dollars through a regional economy and can be measured in output, jobs, income, or value added.

Section 2.1. Measuring Economic Benefits

Economic benefits, which are the gains in social welfare attributed to a particular action, can be organized into two broad benefit categories: use benefits, derived by consumers from the direct or indirect use of a resource; and non-use, or passive use benefits, derived from simply knowing that a resource exists in a particular condition or is maintained for future generations (**Figure 4**; National Research Council 2005, Ninan 2014, Richardson et al. 2015).

Direct use benefits may be consumptive (e.g., hunting) or non-consumptive (e.g., bird watching). Indirect use benefits include ecosystem services that contribute to the quality of life for people. For example, natural water purification in a watershed contributes to the quality of

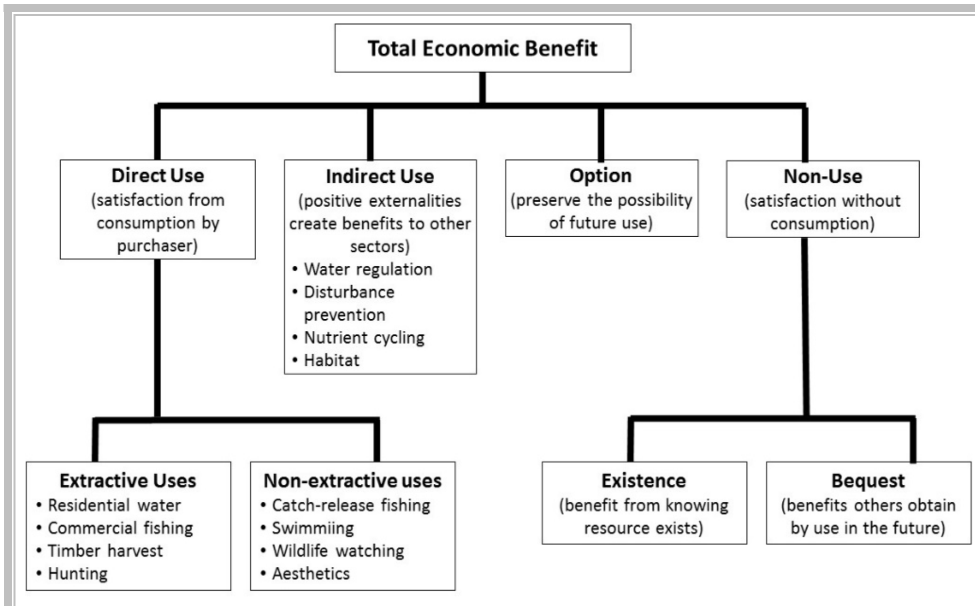

Figure 4. Total economic benefit framework.
Adapted from Marbek (2010).

streamflow that people drink, and natural pollination enhances yields of crops that people eat. Non-use benefits arise for ecosystem services that people value simply for their existence, which can be substantial but are difficult to quantify.

Ecosystem service benefits often are only partially or not at all reflected in market prices. Non-market valuation attempts to quantify these economic benefits in dollar terms. Activities such as recreational fishing provide an economic benefit to participants even if a person is fishing "for free" on public waters with free public access. Fishing has a benefit for which participants would, if they had to, pay more than just a fishing license fee. The fact that a recreational angler does not have to pay ‘‘what the market will bear’’ results in the angler retaining a consumer surplus, or net economic benefit, as extra income. Recreational fishing that is not priced at its market clearing price has value as an economic benefit (Loomis and Walsh 1997, Loomis 2000).

Over the last forty years, economists have developed and tested methodologies to measure economic benefits provided by ecosystem services (**Sidebar 1**). The value of market goods and services is rather simple and straightforward to determine—by observing prices of transactions between producers and consumers in the market. Methods for monetizing the benefits of non-market ecosystem services are more challenging (Champ et al. 2003). However, a large body of research now exists demonstrating the successful application of non-market methods to value ecosystem services such as recreation, water quality, water supply, flood prevention, scenic amenities, and the protection of fish and wildlife species (National Research Council 2005, Brown et al. 2007, President's Council of Advisors on Science and Technology 2011, Richardson et al. 2015).

Sidebar 1. Common methods for valuing the benefits of ecosystem services.
Revealed-preference approaches
Market methods: Values are directly obtained from what people must be willing to pay for the service in a market transaction. **Production approaches**: Values are assigned to service inputs based on contribution to marketed outputs (i.e., production function). **Travel cost method**: Values of site-based amenities are implied by the costs people incur to enjoy them. Service demand may require travel, which has costs that can reflect the implied value of the service. A recreation area can be valued at least by what visitors are willing to pay to travel to it, including the imputed value of their time. **Hedonic methods**: Value of a service is implied by what people will be willing to pay for the service through purchases in related markets, such as housing markets.
Stated-preference approaches
Contingent valuation: People are directly asked their willingness to pay or accept compensation for some change in an ecosystem service. Service demand is elicited by posing hypothetical scenarios that involve some valuation of alternatives.
Cost-based approaches
Replacement cost: Loss of a natural system service is evaluated in terms of what it would cost to replace that service with a man-made system. **Avoidance cost**: A service is valued on the basis of costs avoided, or of the extent to which it allows the avoidance of costly averting behavior, including mitigation.
Adapted from: Farber et al. (2006) and Schmidt et al. (2011).

Primary research to estimate the economic benefits of ecosystem services, particularly non-market services, can be expensive and time-consuming, which is why economists have developed a set of valuation methods called benefits transfer (Boyle and Bergstrom 1992, Champ et al. 2003, Loomis and Rosenberger 2006, Johnston et al. 2015, Richardson et al. 2015). Benefits transfer uses benefit estimates from one or more studies at sites where primary research was conducted (called a "study site") to estimate benefits at a different site of interest ("policy site"). Three benefits transfer methods are common: (1) unit value transfer, (2) benefits function transfer, and (3) meta-regression analysis function transfer (Richardson et al. 2015; see **Appendix A** for more detail on benefits transfer methods). For this analysis, we used the unit value transfer method where a single estimate of benefits from a study site is applied to the policy site. While benefits transfer has its limitations, it is often the only option available to value ecosystem services (Johnston et al. 2015, Richardson et al. 2015).

Section 2.2. Measuring Economic Impacts

As described earlier, an economic impact is the net change to the economy of a region that can be attributed to an industry, event, or policy that would otherwise not be there (Watson et al. 2007). The economic impacts of ecosystem restoration occur in two phases (**Figure 3**): the impact from spending on restoration treatments themselves, and the impact from increased consumer spending due to improved ecosystem conditions after restoration.

Economic impacts generally are measured using input-output (I/O) models, which describe and quantify the interdependencies between various sectors of producers and consumers that make up a regional economy (Miller and Blair 2009). A regional economy is a complex web of interacting consumers and producers in which goods or services produced by one sector of the economy become inputs to another sector, and goods or services produced by that sector can become inputs to yet other sectors (Cullinane Thomas 2016). Goods and services also flow in and out of the regional economy as imports and exports. A change in demand for a good or service generates a ripple effect throughout an economy as businesses purchase inputs from one another.

The magnitude of economic impacts are determined by expenditure patterns in a region and how expenditures circulate through the economy (**Figure 5**). For example, a river restoration contractor may spend money on labor and materials for restoration treatments, or an angler may spend money on hotels, food, and fishing supplies. However, not all the required labor, materials, or services to satisfy demand may be purchased within the region. Some money leaks out of the regional economy for labor, materials, or services sourced from outside the region. The money that remains in the region has economic impacts on the regional economy.

Economic impacts usually are described by four metrics—output, employment, labor income, and value added (see **Sidebar 2**). Economic impacts resulting directly from purchases of goods and services by consumers from producers in the region represent the *direct impacts* of spending within the economy. In order to provide those goods and services to consumers, producers must purchase goods and services from suppliers, who also must purchase inputs from other industries. These purchases are the *indirect impacts* of consumer spending. In addition, employees of producers and input suppliers directly affected by consumer spending use their income to purchase goods and services in the regional

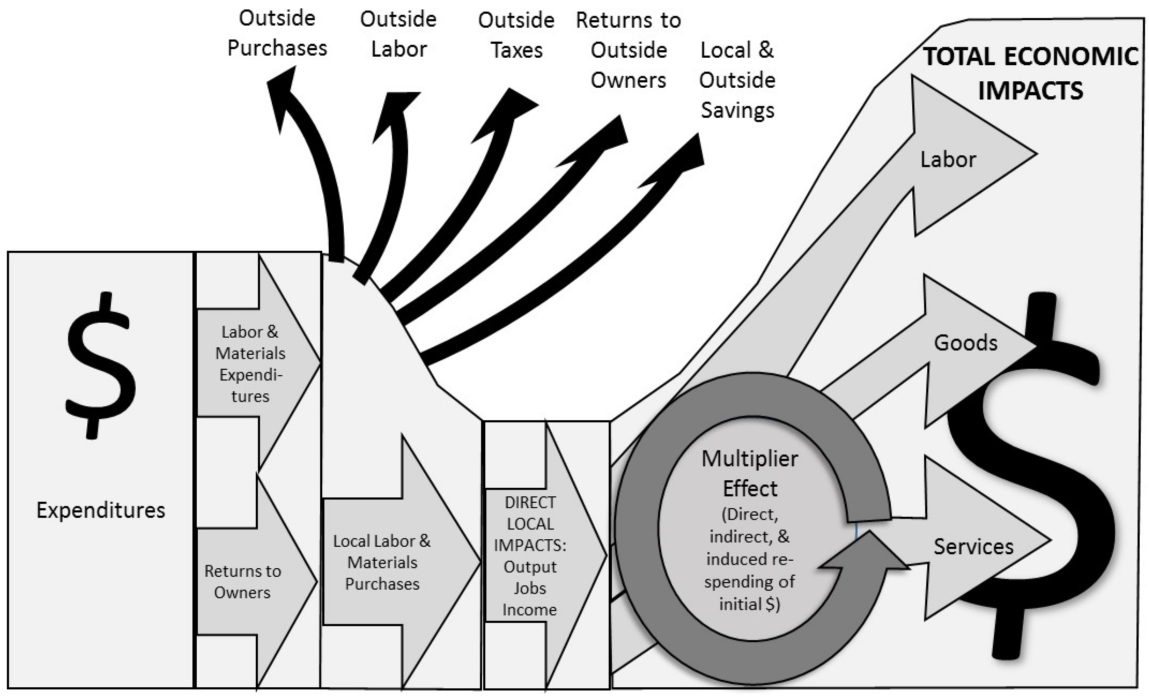

Figure 5. Measuring economic impacts on a regional economy.
Adapted from Northern Economics, Inc. (2013).

economy, generating *induced impacts*. Together indirect and induced impacts are called *secondary impacts*. The total economic impact of consumer spending is equal to the sum of direct and secondary impacts. I/O models capture these complex interactions between consumers and producers in an economy and describe the secondary impacts of spending through regional economic multipliers.

Sidebar 2. Measures of economic impact.

Four measures of impact are common in economic impact analysis (Cullinane Thomas 2016):

- <u>Output</u> is the value of industry production. It is the sum of all intermediate sales (business to business) and final demand (sales to consumers and exports).
- <u>Employment</u> is the change in the number of jobs generated in a region resulting from a change in regional output. Employment is expressed on an annual basis including both full and part time jobs.
- <u>Labor income</u> is employee wages and salaries, including payroll benefits, and income of sole proprietors.
- <u>Value added</u> is equal to the difference between the amount an industry sells a product for and the production cost of the product. Value added measures contribution to Gross Domestic Product (GDP), and is the preferred measure of economic impacts on a regional economy because it includes all sources of income to the region—labor income, profits and rents to businesses, and taxes on production that accrue to government units.

Section 3. Economic Effects of Improved Fishing from the BWRWRP

The proposed BWRWRP will affect the provision of numerous ecosystem services. For simplicity, our analysis models only the economic effects of improved recreational fishing. With time, resources, and data, the economic effects of other ecosystem service improvements due to the BWRWRP could be estimated, and are potentially significant.

Our conceptual model for estimating both the economic benefits and economic impacts of improved fishing due to the BWRWRP links ecosystem improvement with angler behavior (**Figure 6**). Central to the analysis are changes to ecosystem services provided by the BWR caused by restoration treatments designed to reduce stressors and improve existing river conditions, for instance by creating more shade for thermal protection leading to lower water temperatures. Those changes in ecosystem stressors and conditions result in changes in ecological outcomes, in our case improved habitat for fish, which leads to increases in the ecosystem service of recreational fishing. Although predicting angler response to a more productive fishery can be complex (Holland and Ditton 1992, Johnston et al. 2010, Arlinghaus et al. 2013), in general, anglers respond to improved fishing conditions by spending more time fishing (Hunt 2005, Fenichel et al. 2013, Cooke et al. 2016). We used an increase in days of fishing (fishing-days) by anglers as the measure of improved recreational fishing on the BWR.

Our model accounts for the change in economic benefits to anglers, the near-term economic impacts of spending on restoration treatments, and the long-term economic impacts of improved recreational fishing. Each effect is addressed in sections below.

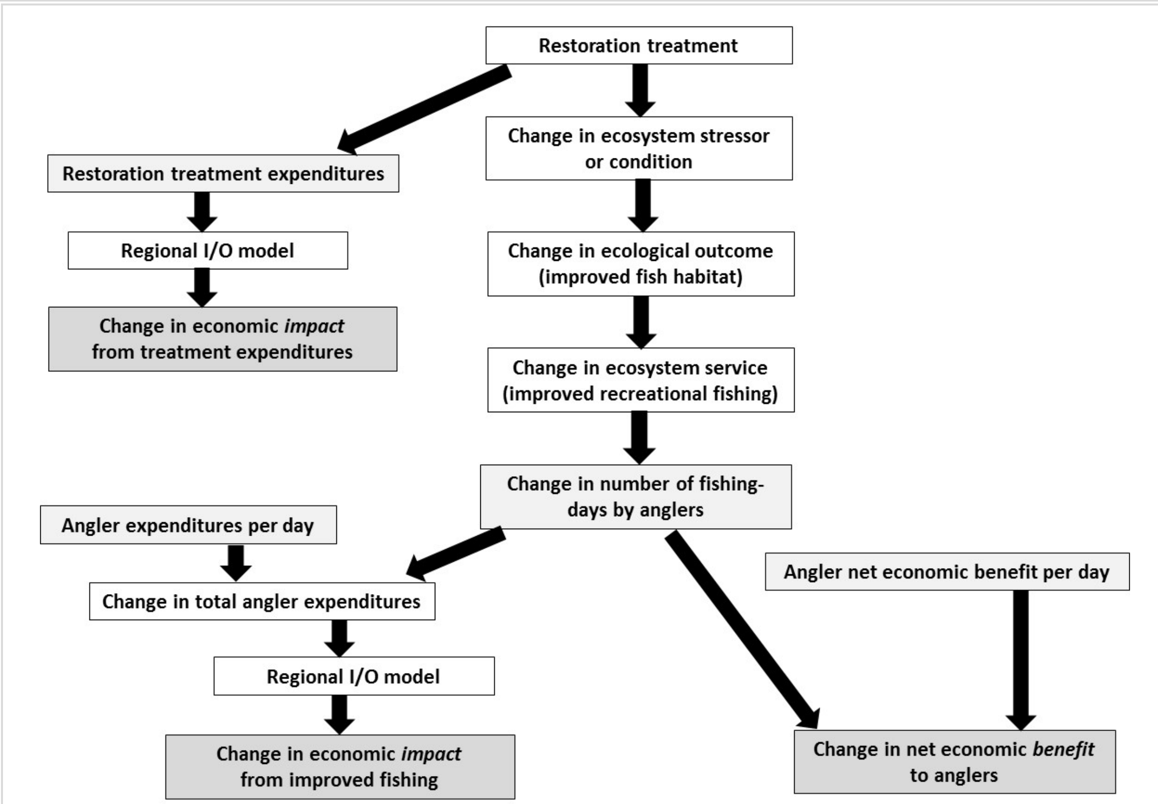

Figure 6. Overview of linkages between river restoration treatments that improve fishing conditions and resulting economic effects.
Adapted from: Loomis (2006) and Wainger and Mazzotta (2011).

Section 3.1. Estimating the Number of Fishing-Days

For modeling economic effects, an improving BWR fishery results in an increasing number of fishing-days. To estimate the increase, we established a baseline number of fishing-days under current conditions, and then estimate how that number will be affected as the BWR fishery improves.

According to IDFG angler surveys (Grunder et al. 2008, IDFG 2011), between 2003 and 2011 the estimated number of angler trips to BWR dropped from 28,706 to 25,539, or an average yearly compound rate of -1.5%. Extrapolating forward to the base year of 2016 (Year 0), and assuming a statewide average of 1.3 fishing-days per trip (IDFG 2011), we estimated the number of fishing-days to BWR in 2016 to be 31,316.

It is unknown how long it will take for habitat enhancement to improve the BWR fishery, how much the fishery will improve, nor how anglers will respond to the improved fishery. Each of these factors could affect the timing and amount of economic effects. However, for modeling purposes we assumed: (1) the fishery will not get worse in the future if nothing is done; (2) as restoration treatments are implemented and effectiveness realized, the fishery will improve over a 15-year period; (3) fishing-days will increase at the same rate as fishery improvement over the 15-year period; (4) fishing-days will reach a maximum of 1.5 times the base year, or 46,974, at Year 15; and (5) fishing-days will remain at their maximum for at least another five years, Years 16-20 (**Figure 7**).

For economic impact estimation we also needed to know the number of fishing-days to BWR by anglers from outside Blaine County. Economic impact measures new money brought into a region from outside the region, in our case into Blaine County. No data exist that provide county-of-residence for anglers to BWR. The 2011 IDFG angler survey (IDFG 2011) estimated that about 30% of anglers statewide come from out of state, so we used that figure and assumed another 50% of anglers come to

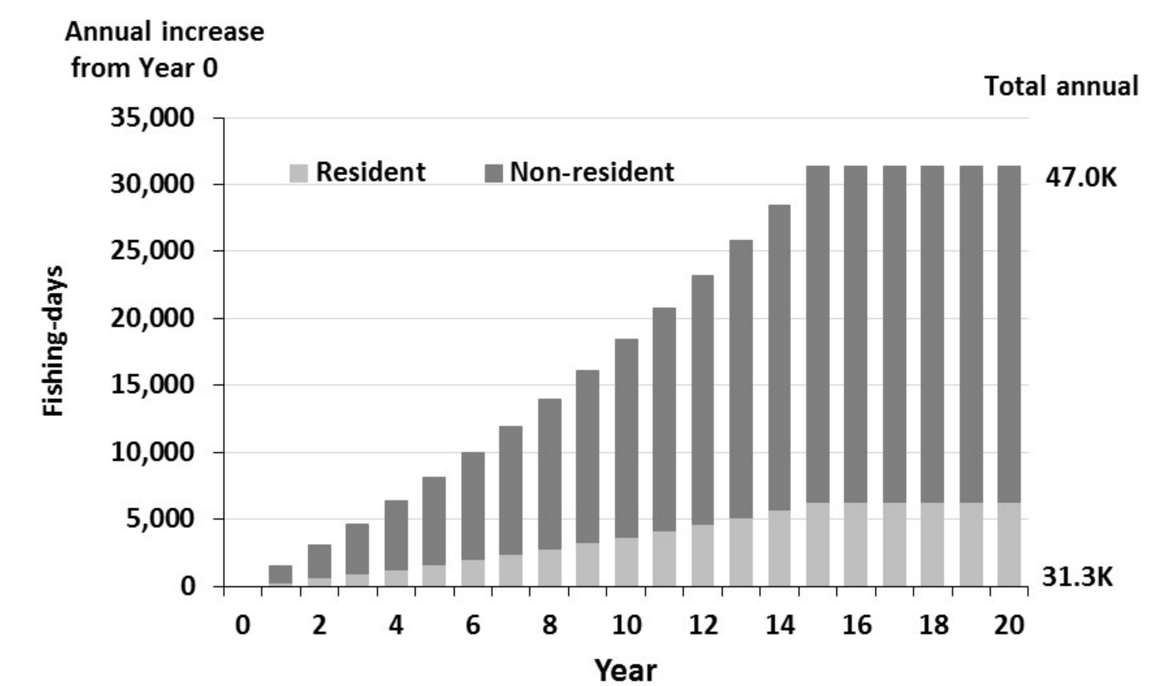

Figure 7. Estimated increase in BWR fishing-days due to the BWRWRP.
Note: See **Appendix C, Table C-1** for detail of numeric values.

BWR from within Idaho but outside of Blaine County. In total, we assumed 80% of fishing-days to BWR are made by anglers who do not live in Blaine County. We held this proportion constant throughout our modeling of economic impact (**Figure 7**). In our base year (Year 0), we estimated that 25,053 (80%) of the 31,316 fishing-days are by non-residents of Blaine County.

Section 3.2. Economic Benefit to Anglers from the BWRWRP

The two inputs necessary to model the economic benefit to anglers from the BWRWRP are the expected increase in number of fishing-days due to fishery improvement and the net economic benefit per day of those fishing-days. No studies of economic benefit to anglers have been conducted on the BWR; therefore, we used a benefits transfer method, specifically a unit value transfer, to estimate the benefit.

A lower and upper bound estimate of net economic benefit per fishing-day are used. For the lower bound, $34 per fishing-day (2016 dollars) was used based on a recent study of net economic benefit to rainbow trout fishing anglers on rivers in central Idaho using the travel cost method (McKean et al. 2016). While the BWR may have unique qualities and characteristics that make it more valuable to anglers, $34 per fishing-day is a reasonable lower bound based on the type of fishing and location in Idaho. For the upper bound, $113 per fishing-day (2016 dollars) was used, which is based on the average net economic benefit for a day of fishing on the Henry's Fork of the Snake River in southeastern Idaho, as determined by a study of anglers using travel cost and contingent valuation methodologies (Loomis 2005). The Henry's Fork is a world-renowned fishery, and BWR is comparable in habitat productivity and potential fish growth (Thurow 1987).

The annual net economic benefit from the improved fishery is equal to the per fishing-day value (low estimate, $34; high estimate, $113) multiplied by the difference in fishing-days between the year being valued and Year 0. Because annual net economic benefit from the improved BWR fishery is occurring in the future, we accounted for the time value of money by discounting future benefits to the present. Much has been written about an appropriate discount rate in relation to sustainable development and natural resource projects (e.g., Nas 1996, Khan and Greene 2013, Moore et al. 2013). Rather than choose one discount rate, we report a range of values, using no discounting (0%), 3%, and 6%. Based on our assumptions and inputs, the estimate of the net economic benefit over 20 years from improved recreational fishing on the BWR due to the BWRWRP is between $3.1 million and $22.1 million (**Table 1** and **Figure 8**). Although we ended our benefit analysis after 20 years, the net benefits should continue into the future at between $0.5 and $1.8 million annually (Year 20 amount), all else being equal.

Table 1. Net economic benefit to anglers from improved fishing, 20-year total.

	No discounting (0%)	Net Present Value 3%	Net Present Value 6%
Low estimate ($34/fishing-day)	$6.7 million	$4.5 million	$3.1 million
High estimate ($113/fishing-day)	$22.1 million	$15.0 million	$10.5 million

Note: See **Appendix C, Table C-2** for detail of numeric values.

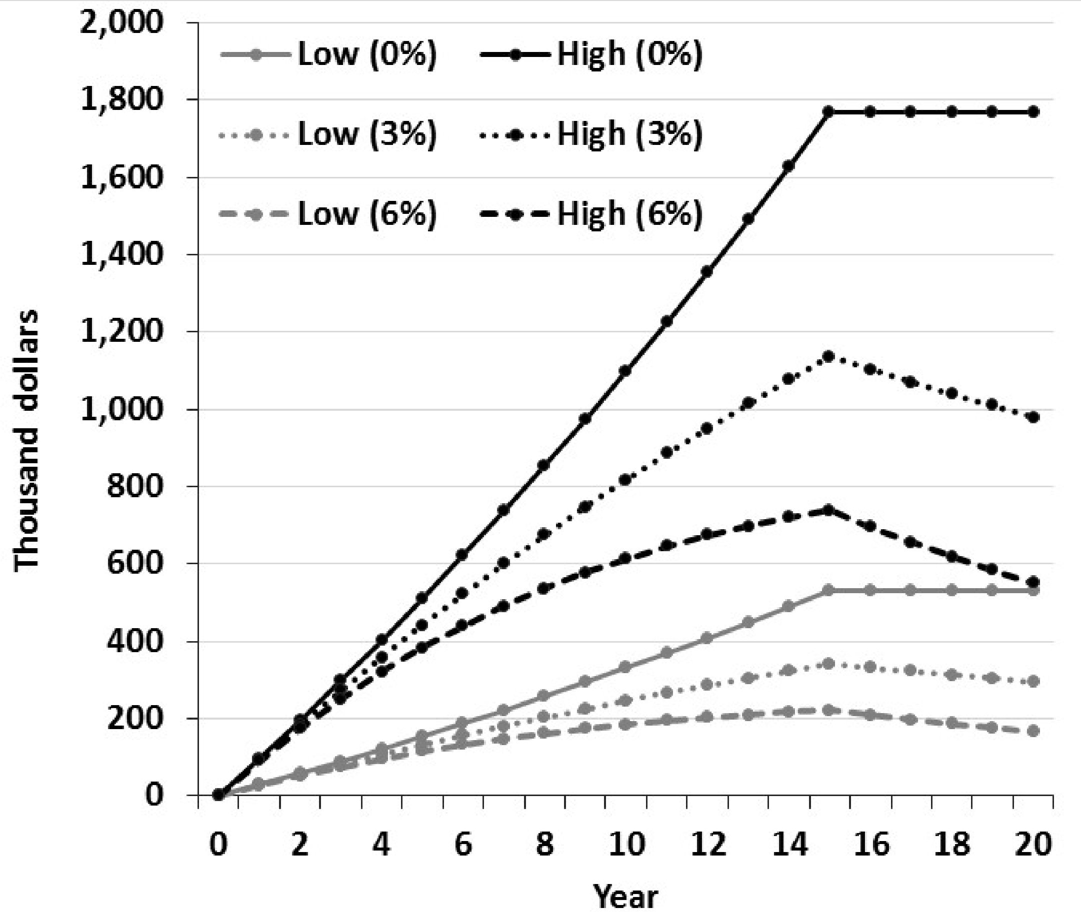

Figure 8. Increase in annual net economic benefit to anglers from improved fishing.
Note: See **Appendix C, Table C-2** for detail of numeric values.

Section 3.3. Near-Term Economic Impacts of the BWRWRP

The near-term economic impacts of the BWRWRP result from spending on restoration treatments themselves, including construction jobs and the subsequent spending of income on local goods and services. Because expenditures accrue to different types of businesses that have different impacts on the regional economy, it is necessary to know how spending is spread among business categories represented in the I/O model. For example, the economic impacts of a dollar spent on construction using heavy equipment may differ from impacts of a dollar spent on engineering services. It is also necessary to know how much of the project expenditures will occur in the region of interest, i.e., Blaine County, versus expenditures outside the region. For example, many construction expenditures will likely occur locally near restoration sites, but payments for engineering services may go to firms outside the county.

We used IMPLAN (2013) as the regional I/O model for economic impacts. IMPLAN categorizes all producers and consumers in the economy into 538 sectors. Restoration activities are accomplished by businesses from multiple sectors that must be apportioned to the various sectors to accurately model potential impacts on the regional economy. BWRWRP treatment activities may include environmental services for studies to determine which treatments are appropriate and monitor treatment results, engineering services to design treatments, construction services such as heavy equipment operations to implement treatments, support services for agriculture and forestry for vegetation planting in riparian areas, and administrative services to oversee the entire project.

Project expenditures are estimated to be $15 million and are likely to take place over 5 to 10 years.[3] For simplicity, we assumed the $15 million are constant (real) dollars (i.e., do not need to be adjusted for inflation) and will be spent evenly over the first five years of the project, i.e., $3 million per year. We assumed project expenditures will occur in four IMPLAN sectors in the proportions described in **Table 2**, and the proportions of expenditures reported in **Table 2** will occur in Blaine County. In sum, we modeled the impacts of $11.7 million of restoration activity expenditures in Blaine County.

Table 3 shows the economic impacts of restoration treatments based on our assumptions about the amount of spending, the distribution of spending among sectors, and the proportion of spending that occurs in Blaine County. These impact estimates also assume that all funding for the project represents new spending that otherwise would not have occurred in Blaine County. Including direct and secondary impacts, the annual change in output resulting from restoration treatments is estimated at $3.4 million for each of the five years of the project and supports 24 jobs for each of those five years. These jobs pay $1.4 million each year, which is part of an annual value added of $1.6 million. It is important to note that once restoration treatments are finished, the annual infusion of dollars that provides the near-term positive economic impacts to the region no longer exists.

Table 2. Distribution of $15 million BWRWRP expenditures at $3 million per year over five years, by sector and percent of spending in Blaine County, Idaho.

Expenditure sector (IMPLAN sector #)*	% spent by sector**	% spent in Blaine County***	Annual $ spent in Blaine County	Total $ over 5 years spent in Blaine County
Environmental and other technical consulting services (455)	12.5%	70%	$262,500	$1,312,500
Engineering and related services (449)	12.5%	70%	$262,500	$1,312,500
Construction of restoration treatments (58)	70%	80%	$1,680,000	$8,400,000
Administration (514)	5%	90%	$135,000	$675,000
Total	**100%**		**$2,340,000**	**$11,700,000**

*Full IMPLAN sector descriptions are provided in **Appendix B, Table B-1**.
**Estimated from averages in previous research (e.g., Bair 2000, Headwaters Economics 2014).
***Based on professional opinion.

[3] Personal communications, e-mail from Chad Chorney, Big Wood River Project Manager, Trout Unlimited, 22 June 2016.

Table 3. Economic impacts of BWR restoration treatments.				
Expenditure sector (IMPLAN sector #)*	**Output ($)**	**Employment (jobs)**	**Labor Income ($)**	**Value Added ($)**
Direct impact				
Environmental and other technical consulting services (455)	$262,500	1.4	$218,105	$207,430
Engineering and related services (449)	$262,500	2.0	$154,874	$141,890
Construction of restoration treatments (58)	$1,680,000	10.3	$552,781	$608,257
Administration (514)	$135,000	1.7	$97,405	$99,651
Total direct impact	**$2,340,000**	**15.4**	**$1,023,164**	**$1,057,228**
Secondary impact	$1,090,994	9.0	$349,935	$583,331
Total impact	**$3,430,994**	**24.3**	**$1,373,089**	**$1,640,559**

*Full IMPLAN sector descriptions are provided in **Appendix B, Table B-1**.

Section 3.4. Long-Term Economic Impacts of the BWRWRP

The long-term economic impacts of the BWRWRP modeled here are a result of an increased number of fishing-days after river restoration by anglers who are not residents of Blaine County. As described earlier, fishing-days to BWR are assumed to increase 1.5 times from 31,316 to 46,974 over 15 years at a constant rate, fishing-days remain at the maximum for at least five years, and 80% of fishing-days are assumed to be by non-residents of Blaine County (**Figure 7**).

The 2011 IDFG angler survey (IDFG 2011) provides data on total spending by anglers whose trip destination was the BWR. For some spending categories (groceries, restaurants, fishing supplies, equipment) results are divided between before the fishing trip and during the fishing trip. For other categories (transportation, guides/outfitters, motels, campgrounds, access fees), only total expenditures are provided. We excluded all before trip spending from our estimates of angler spending in Blaine County assuming it occurred in another county closer to the angler's residence. We used the Consumer Price Index to inflate the 2011 IDFG spending values to 2016 (Year 0; **Table 4**).

Table 4. Estimate of angler spending in Blaine County for trips to BWR by non-residents of county, 2016 (Year 0)

Expenditure category	**Average spending per fishing-day on trip to Blaine County**	**% of spending in Blaine County**	**Average spending per fishing-day in Blaine County**	**Total non-resident angler spending in Blaine County**
Groceries	$23.60	95%	$22.42	$561,582
Restaurants	$37.52	95%	$35.64	$892,915
Fishing supplies	$22.39	75%	$16.79	$420,616
Equipment	$7.63	25%	$1.91	$47,796
Transportation	$102.19	25%	$25.55	$640,009
Guides/outfitters	$30.05	95%	$28.55	$715,210
Motels	$37.27	95%	$35.41	$887,065
Campgrounds	$3.12	95%	$2.96	$74,272
Access fees	$0.55	95%	$0.52	$12,993
Total	**$264.31**		**$169.74**	**$4,252,458**

Although the 2011 IDFG data provide a good estimate of how much anglers spent on their trips to Blaine County, there is no information about how much of the trip spending occurred in Blaine County. We assumed varying proportions of trip spending occurred in Blaine County based on the type of expenditure (**Table 4**). For example, non-residents are likely to have incurred much of their transportation expense (e.g., airline ticket) outside the county; therefore, we assumed only 25% of non-resident transportation expenditures occur in Blaine County for local transportation (e.g., rental vehicles and gasoline). Based on these assumptions, an estimated $4.3 million is spent by non-resident anglers on fishing trips to BWR in 2016 (Year 0; **Table 4**).

The increase in total annual non-resident angler spending is computed by multiplying the annual increase in non-resident fishing-days from the base year by the average spent by non-resident anglers per fishing-day in Blaine County. **Figure 9** shows the increase in total non-resident angler spending attributable to the improved BWR fishery. The estimated annual increase in spending in Blaine County ranges from $116,500 in Year 1 to $2.1 million in Years 15-20.

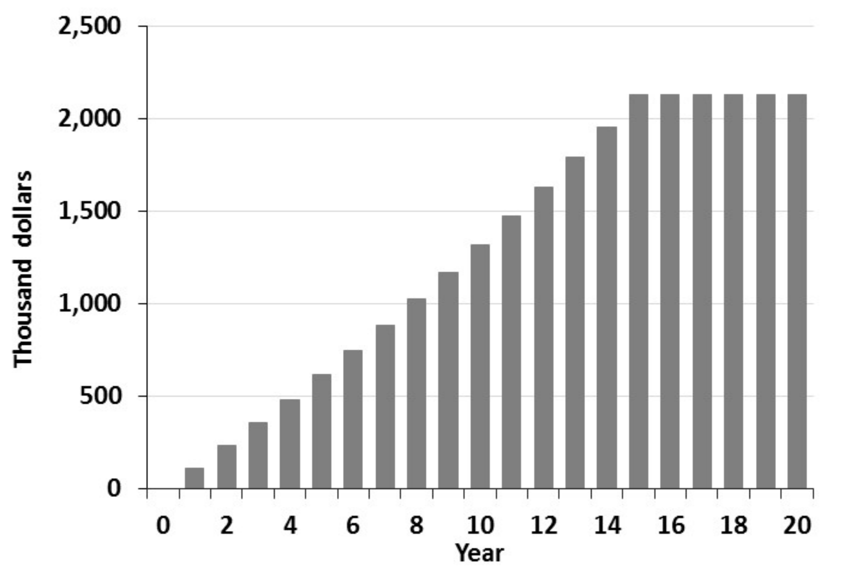

Figure 9. Estimated increase in annual non-resident angler spending in Blaine County attributable to the BWRWRP.
Note: See **Appendix C, Table C-3** for detail of numeric values.

We used IMPLAN to estimate the 2016 (Year 0) economic impacts of BWR recreational fishing based on the spending reported in **Table 4**. Including secondary impacts, we estimated BWR fishing generates $4.5 million in output and supports 56 jobs (**Table 5**). Those jobs pay $1.7 million in labor income, which is part of total value added to Blaine County of $2.5 million.

Figure 10 summarizes the annual increase in total economic impact to Blaine County of the improved BWR fishery due to the BWRWRP based on angler spending estimates in **Figure 9**. Detailed tables by economic sector and year are in **Appendix C, Tables C-4 to C-7**. Based on assumptions about the increase in the number of fishing-days by anglers who are not residents of Blaine County, the amount spent by those anglers, and the distribution of their spending among economic sectors, increased output ranges from $122,600 in Year 1 to $2.2 million in Years 15-20. Jobs added to Blaine County range from 1.5 in Year 1 to 27.9 by Year 15, and annual value added to Blaine County ranges from $68,800 in Year 1 to $1.25 million in Years 15-20. It should be noted that the economy of Blaine County will change over the next 20 years with changes in technologies, industries, and communities affecting relationships between economic sectors in the IMPLAN model. Therefore, results from impact

Table 5. Current economic impacts (2016, Year 0).				
Sector (IMPLAN sector #)*	**Output**	**Jobs**	**Labor income**	**Value added**
Direct impact				
Groceries (400)	$156,681	2.1	$83,328	$108,753
Restaurants (501)	$892,915	17.6	$407,538	$454,978
Fishing supplies (404)	$174,976	2.6	$94,037	$121,137
Equipment (404)	$19,883	0.3	$10,686	$13,765
Transportation (402)	$69,121	1.1	$27,000	$38,630
Guides/outfitters (496)	$715,210	10.2	$305,869	$414,441
Motels (499)	$887,065	9.5	$330,534	$511,593
Campgrounds (500)	$74,272	0.8	$43,493	$52,787
Access Fees (496)	$12,993	0.2	$5,557	$7,529
Total direct impact	**$3,003,117**	**44.4**	**$1,308,041**	**$1,723,612**
Secondary impact	$1,473,044	11.4	$419,097	$788,906
Total impact	**$4,476,161**	**55.8**	**$1,727,137**	**$2,512,518**
*Full IMPLAN sector descriptions are provided in **Appendix B, Table B-2**.				

modeling are less reliable as they get further into the future due to static modeling of a dynamic regional economy.

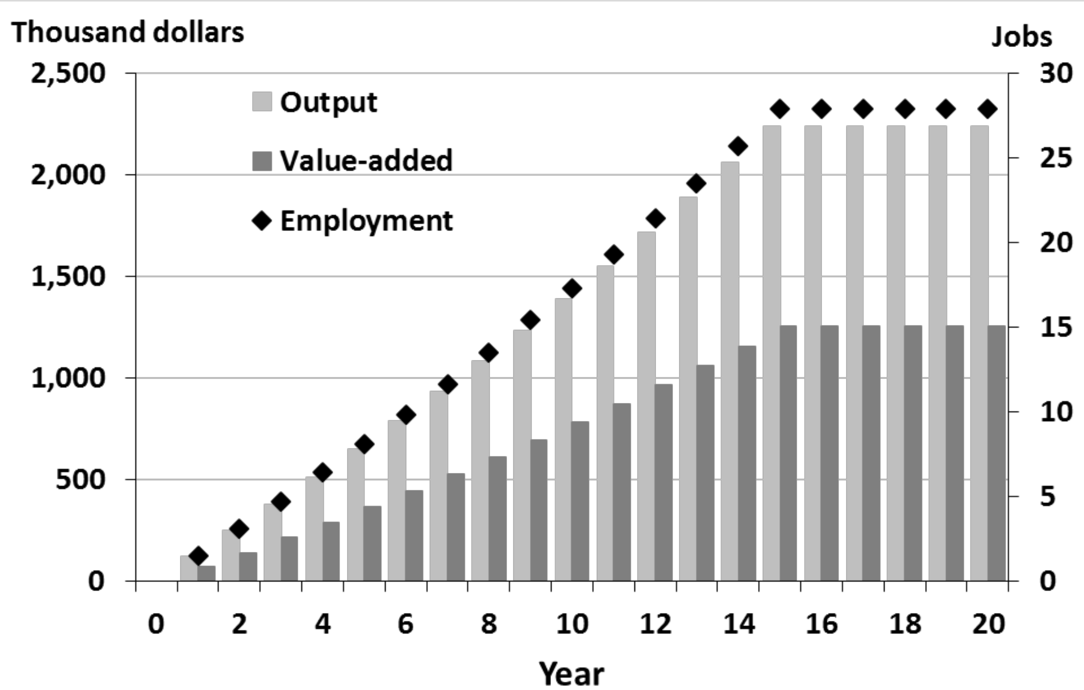

Figure 10. Increase in total economic impact due to improved fishery from the BWRWRP, by year.
Note: See **Appendix C, Tables C-4 to C-7** for detail of numeric values.

Section 4. Conclusions

One objective of the proposed BWRWRP is to improve the BWR recreational fishery—an important ecosystem service provided by the BWR. Using the methods, models, and assumptions outlined in this report, and limited data available, our preliminary estimate of the net economic benefit from improved recreational fishing is between \$3.1 million and \$22.1 million over the next 20 years. We estimated the implementation/construction phase of restoration will result in \$1.6 million annually for five years in value-added economic impact to Blaine County. We estimated the impact of increased non-resident angler spending due to improved fishing on the BWR will range from almost \$69,000 in value added to Blaine County in Year 1 to almost \$1.3 million in Years 15-20. These economic effects are a consequence of spending \$15 million on the BWRWRP.

Do the economic benefits and impacts indicate that the BWRWRP is a good investment of public or private resources? Under traditional public sector benefit-cost analysis criteria, benefits of a project should at least outweigh costs (Nas 1996). In our model, only under the high estimate of per fishing-day benefit with no discounting do the benefits of recreational fishing outweigh the entire project costs. However, the recreational fishing benefit from the BWRWRP is likely to continue beyond the 20-year timeframe modeled here and adds to the benefit total. Project funders will have to determine what timeframe and benefit-cost ratio are appropriate given their priorities, costs of capital, time value of money, risk tolerance, etc. In addition, the economic benefit computed here—for recreational fishing—is a nonmarket benefit so it is not captured through market-based mechanisms. Our estimate of economic benefit also looks at only one result of the BWRWRP—improved recreational fishing. Other project outcomes include changes to other ecosystem services such as reduced flood risk, improved water quality, and increased aesthetic appeal. The benefits of these ecosystem services also need to be weighed against project costs.

There are no commonly accepted criteria for determining whether a given level of economic impact—output, jobs, labor income, or value added—for a given level of expenditure is an appropriate use of resources (Burgan and Mules 2001). Under our estimates, the near-term impact on Blaine County from restoration treatment construction is significant during implementation; however, the impact ceases to exist after restoration work is complete. The long-term impact to Blaine County from increased angler spending starts small but grows as the fishery improves and likely continues beyond the 20-year timeframe modeled here.

Section 5. Future Research

This report provides a framework for modeling the economic effects of the proposed BWRWRP and provides preliminary estimates of the effects from one outcome of the project—improved recreational fishing. Avenues for further research are many. Our estimates of economic effects are based on many assumptions and dated or scant data that could be improved with additional research.

Our estimate of economic benefit could be improved with primary research into current baseline conditions of the BWR fishery and predictions of future conditions. We do not have a study that estimates net economic benefit for BWR anglers. A survey of anglers that gathers data for modeling net economic benefit through the travel cost and/or contingent valuation methods would improve the accuracy of our preliminary estimates. Primary research also could assist in more accurately predicting how the BWR will respond to restoration, both in terms of fish production and how anglers respond to the improved fishery.

If primary studies are not possible, a more sophisticated benefits transfer model could be developed either through further adjustments to policy site values based on ecological and social differences from study sites, development of a benefits transfer function, or a meta-analysis (see **Appendix A**). A geospatial component could be added using software such as InVEST (Sharp et al. 2015).

Our estimates of near-term economic impacts from restoration treatment construction could be improved by having more detail about the amount and timing of project expenditures, detail on which economic sectors spending will occur in, and how much spending will take place in Blaine County versus outside the county. Our estimates of long-term economic impacts of an improved fishery could be enhanced through a survey of BWR anglers to understand more about the characteristics of their trips, how many visit from outside Blaine County, expenditure amounts and patterns, and likely changes in fishing behavior in response to an improved BWR fishery.

We only estimated the benefit of the BWRWRP to anglers for fishing. The project will provide benefits from other ecosystem services including reduced flood risk, better water quality, and improved aesthetics. Such benefits could be measured through primary studies using well-established market and non-market valuation methods (see **Sidebar 1**).

Beyond the current BWRWRP and the river corridor itself, other restoration projects are being or could be undertaken in the BWR watershed. These projects will produce their own sets of ecosystem services that could be assessed both for their economic benefits and impacts.

Benefits and impacts have historically been used as metrics to justify investments of public dollars in publicly-funded projects. Proponents of the BWRWRP hope to attract private capital, including through impact investors who seek positive financial return and environmental good from their investments (see **Appendix D**). This raises questions: Are benefits and impacts as investment decision criteria viewed the same by private investors as they are by public sector funders? Do impact investors measure social or environmental good by economic benefit, economic impact, neither, or both? How do impact investors make tradeoffs between the good they are doing and financial return? Research to understand more about impact investors and their decision making is needed (Keohane 2013).

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Appendix A. Benefits Transfer Methods

Benefits transfer generally uses one of three methods: (1) unit value transfer, (2) benefits function transfer, and (3) meta-regression analysis function transfer (Johnston et al. 2015, Richardson et al. 2015). Unit value transfer takes one of three approaches. One approach is to identify a single study in the literature that best matches the characteristics of the policy site and transfer this single estimate of benefits from the study site to the policy site. A second approach is to apply an average value from several studies to the policy site of interest. A third approach is to apply an administratively approved value, such as the USDA Forest Service Resources Planning Act values for recreation (Richardson et al. 2015).

The benefits function transfer method uses a demand or willingness-to-pay function for benefits transfer. The demand or willingness-to-pay equation from a study site with similar quantity or quality of ecosystem services and socioeconomic characteristics of the population is transferred to the policy site. Equations can be tailored if characteristics differ between the policy and study sites.

The meta-regression analysis function transfer approach systematically accounts for differences in results and explanatory variables in relevant, methodologically sound studies valuing a particular ecosystem service in order to estimate a willingness-to-pay function for the service. Regression models use willingness-to-pay per unit as a dependent variable and, at a minimum, study site characteristics, methodological attributes, and socioeconomic variables as independent variables (Alvarez and Asci 2014, Richardson et al. 2015).

Results from primary ecosystem services valuation studies also have been assembled into databases that can be used for benefits transfer studies. For example, the Environmental Valuation Reference Inventory (EVRI) provides a worldwide database of ecosystem services valuation studies (EVRI 2016). In the U.S., the Benefit Transfer and Use Estimating Model Toolkit (Loomis et al. 2008) and the Recreation Use Values Database (Rosenberger 2010) focus on primary studies of economic benefits of outdoor and wildlife-related recreation that can be used for benefits transfer.

In addition, spatial mapping tools are increasingly being used for ecosystem service benefit valuations. Using spatially detailed data and geographic information system (GIS) tools, researchers demonstrate how ecosystem service demand, reliability, or complementary inputs vary across regions (Wainger and Mazzotta 2011). Software packages such as InVEST (Integrated Valuation of Environmental Services and Tradeoffs; Sharp et al. 2015) and ARIES (Artificial Intelligence for Ecosystem Services; Villa et al. 2014) are examples of programs that generate spatially-explicit, GIS-based estimates of ecosystem service flows.

Appendix B. IMPLAN Sector Assignment

IMPLAN categorizes the U.S. economy in 538 sectors based on the North American Industry Classification System (NAICS). **Table B-1** describes the IMPLAN sectors we used for classifying expenditures for restoration treatments. **Table B-2** describes the IMPLAN sectors we used for classifying angler expenditures.

Table B-1. IMPLAN sectors used to classify restoration treatment expenditures.

Category name used in Table 3 and Table 4	IMPLAN sector #	IMPLAN sector name	NAICS codes (2012)
Environmental and other technical consulting services	455	Environmental and other technical consulting services	54162-9
Engineering and related services	449	Architectural, engineering, and related services	5413
Construction of restoration treatments	58	Construction of other new nonresidential structures	23*
Administration	514	Grantmaking, giving, and social advocacy organizations	8132-3

Table B-2. IMPLAN sectors used to classify angler expenditures.

Category name used in Tables 7 and Appendix C	IMPLAN sector #	IMPLAN sector name	NAICS codes (2012)
Groceries	400	Retail - Food and beverage stores	445
Restaurants	501	Full-service restaurants	722511
Fishing supplies	404	Retail - Sporting goods, hobby, musical instrument and book stores	451
Equipment	404	Retail - Sporting goods, hobby, musical instrument and book stores	451
Transportation	402	Retail - Gasoline stores	447
Guides/outfitters	496	Other amusement and recreation industries	71391-3, 71399
Motels	499	Hotels and motels, including casino hotels	72111-2
Campgrounds	500	Other accommodations	72119, 7212-3
Access Fees	496	Other amusement and recreation industries	71391-3, 71399

Appendix C. Detailed Tables of Numeric Values

Table C-1. Estimate of increase in BWR fishing-days due to the BWRWP.

Year	Number of fishing-days to BWR	Increase in fishing-days from Year 0	Increase in fishing-days from Year 0 by non-residents of Blaine County (80% of total increase)
0	31,316		
1	32,174	858	686
2	33,055	1,740	1,392
3	33,961	2,645	2,116
4	34,892	3,576	2,861
5	35,848	4,532	3,625
6	36,830	5,514	4,411
7	37,839	6,523	5,219
8	38,876	7,560	6,048
9	39,941	8,625	6,900
10	41,035	9,719	7,776
11	42,160	10,844	8,675
12	43,315	11,999	9,599
13	44,502	13,186	10,549
14	45,721	14,405	11,524
15	46,974	15,658	12,526
16-20	46,974	15,658	12,526
Total	**853,306**	**195,673**	**156,539**

Table C-2. Increase in annual net economic benefit to anglers from improved fishing.

	Annual net benefit (no discounting)		Net present value (NPV) (3% discount)		Net present value (NPV) (6% discount)	
Year	Low estimate	High estimate	Low estimate	High estimate	Low estimate	High estimate
1	$29,172	$96,959	$28,322	$94,135	$27,521	$91,470
2	$59,143	$196,574	$55,748	$185,290	$52,637	$174,950
3	$89,936	$298,919	$82,304	$273,553	$75,512	$250,978
4	$121,572	$404,067	$108,015	$359,009	$96,297	$320,059
5	$154,075	$512,097	$132,907	$441,740	$115,134	$382,669
6	$187,469	$623,087	$157,002	$521,826	$132,158	$439,252
7	$221,778	$737,118	$180,326	$599,345	$147,495	$490,226
8	$257,026	$854,274	$202,899	$674,372	$161,262	$535,982
9	$293,241	$974,639	$224,745	$746,980	$173,569	$576,887
10	$330,448	$1,098,303	$245,884	$817,240	$184,520	$613,286
11	$368,674	$1,225,354	$266,338	$885,222	$194,213	$645,501
12	$407,947	$1,355,887	$286,126	$950,992	$202,737	$673,834
13	$448,297	$1,489,997	$305,269	$1,014,615	$210,179	$698,569
14	$489,752	$1,627,781	$323,784	$1,076,155	$216,618	$719,969
15	$532,343	$1,769,340	$341,691	$1,135,672	$222,128	$738,284
16	$532,343	$1,769,340	$331,739	$1,102,594	$209,555	$696,494
17	$532,343	$1,769,340	$322,077	$1,070,480	$197,693	$657,070
18	$532,343	$1,769,340	$312,696	$1,039,301	$186,503	$619,877
19	$532,343	$1,769,340	$303,588	$1,009,030	$175,946	$584,790
20	$532,343	$1,769,340	$294,746	$979,641	$165,987	$551,689
Total	**$6,652,593**	**$22,111,096**	**$4,506,205**	**$14,977,189**	**$3,147,666**	**$10,461,837**

Table C-3. Annual increase in expenditures by non-resident anglers attributable to the BWRWRP.

	Year							
Expenditure category	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Groceries	$15,387	$31,196	$47,438	$64,125	$81,269	$98,883	$116,979	$135,572
Restaurants	$24,466	$49,602	$75,426	$101,959	$129,218	$157,224	$185,997	$215,559
Fishing supplies	$11,525	$23,365	$35,530	$48,029	$60,869	$74,062	$87,616	$101,541
Equipment	$1,310	$2,655	$4,037	$5,458	$6,917	$8,416	$9,956	$11,538
Transportation	$17,536	$35,553	$54,063	$73,080	$92,619	$112,692	$133,316	$154,505
Guides/outfitters	$19,597	$39,730	$60,415	$81,667	$103,501	$125,934	$148,981	$172,659
Motels	$24,305	$49,277	$74,932	$101,290	$128,371	$156,194	$184,779	$214,147
Campgrounds	$2,035	$4,126	$6,274	$8,481	$10,748	$13,078	$15,471	$17,930
Access Fees	$356	$722	$1,098	$1,484	$1,880	$2,288	$2,707	$3,137
Total	**$116,516**	**$236,225**	**$359,213**	**$485,572**	**$615,392**	**$748,770**	**$885,802**	**$1,026,589**

	Year							
Expenditure category	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16-20**
Groceries	$154,674	$174,299	$194,462	$215,177	$236,460	$258,326	$280,791	$280,791
Restaurants	$245,931	$277,135	$309,194	$342,132	$375,972	$410,739	$446,458	$446,458
Fishing supplies	$115,848	$130,547	$145,649	$161,164	$177,105	$193,482	$210,308	$210,308
Equipment	$13,164	$14,835	$16,551	$18,314	$20,125	$21,986	$23,898	$23,898
Transportation	$176,274	$198,640	$221,619	$245,227	$269,483	$294,402	$320,005	$320,005
Guides/outfitters	$196,987	$221,980	$247,659	$274,042	$301,147	$328,995	$357,605	$357,605
Motels	$244,320	$275,319	$307,168	$339,890	$373,508	$408,047	$443,533	$443,533
Campgrounds	$20,456	$23,052	$25,718	$28,458	$31,273	$34,165	$37,136	$37,136
Access Fees	$3,579	$4,033	$4,499	$4,978	$5,471	$5,977	$6,497	$6,497
Total	**$1,171,233**	**$1,319,840**	**$1,472,520**	**$1,629,382**	**$1,790,543**	**$1,956,119**	**$2,126,232**	**$2,126,232**

Table C-4. Increase in output in Blaine County due to improved fishery from the BWRWRP.

	Year									
Sector (IMPLAN #)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Direct impact										
Groceries (400)	$4,293	$8,704	$13,235	$17,891	$22,674	$27,588	$32,637	$37,825	$43,154	$48,629
Restaurants (501)	$24,466	$49,602	$75,426	$101,959	$129,218	$157,224	$185,997	$215,559	$245,931	$277,135
Fishing supplies (404)	$4,794	$9,720	$14,781	$19,980	$25,322	$30,810	$36,448	$42,241	$48,193	$54,308
Equipment (404)	$545	$1,105	$1,680	$2,270	$2,877	$3,501	$4,142	$4,800	$5,476	$6,171
Transportation (402)	$1,894	$3,840	$5,839	$7,893	$10,003	$12,171	$14,398	$16,687	$19,038	$21,453
Guides/outfitters (496)	$19,597	$39,730	$60,415	$81,667	$103,501	$125,934	$148,981	$172,659	$196,987	$221,981
Motels (499)	$24,305	$49,277	$74,932	$101,291	$128,371	$156,194	$184,779	$214,147	$244,320	$275,319
Campgrounds (500)	$2,035	$4,126	$6,274	$8,481	$10,748	$13,078	$15,471	$17,930	$20,456	$23,052
Access Fees (496)	$356	$722	$1,098	$1,484	$1,880	$2,288	$2,707	$3,137	$3,579	$4,033
Total direct impact	**$82,285**	**$166,824**	**$253,679**	**$342,914**	**$434,594**	**$528,787**	**$625,560**	**$724,984**	**$827,133**	**$932,081**
Secondary impact	$40,361	$81,828	$124,431	$168,201	$213,171	$259,373	$306,840	$355,609	$405,713	$457,190
Total impact	**$122,645**	**$248,651**	**$378,110**	**$511,115**	**$647,765**	**$788,159**	**$932,400**	**$1,080,593**	**$1,232,846**	**$1,389,271**

(continued)

Table C-4. continued.

Sector (IMPLAN #)	Year 11	12	13	14	15	16-20
Direct impact						
Groceries (400)	$54,255	$60,034	$65,972	$72,073	$78,341	$78,341
Restaurants (501)	$309,194	$342,132	$375,971	$410,739	$446,458	$446,458
Fishing supplies (404)	$60,590	$67,044	$73,676	$80,489	$87,488	$87,488
Equipment (404)	$6,885	$7,618	$8,372	$9,146	$9,942	$9,942
Transportation (402)	$23,935	$26,485	$29,104	$31,795	$34,561	$34,561
Guides/outfitters (496)	$247,659	$274,042	$301,147	$328,995	$357,606	$357,606
Motels (499)	$307,168	$339,890	$373,508	$408,048	$443,533	$443,533
Campgrounds (500)	$25,719	$28,458	$31,273	$34,165	$37,136	$37,136
Access Fees (496)	$4,499	$4,978	$5,471	$5,977	$6,497	$6,497
Total direct impact	**$1,039,904**	**$1,150,682**	**$1,264,495**	**$1,381,426**	**$1,501,561**	**$1,501,561**
Secondary impact	$510,078	$564,415	$620,241	$677,596	$736,523	$736,523
Total impact	**$1,549,982**	**$1,715,097**	**$1,884,735**	**$2,059,022**	**$2,238,084**	**$2,238,084**

Table C-5. Increase in employment (jobs) in Blaine County due to improved fishery from the BWRWRP.

	Year						
Sector (IMPLAN #)	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Direct impact							
Groceries (400)	0.1	0.1	0.2	0.2	0.3	0.4	0.4
Restaurants (501)	0.5	1.0	1.5	2.0	2.5	3.1	3.7
Fishing supplies (404)	0.1	0.1	0.2	0.3	0.4	0.5	0.5
Equipment (404)	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Transportation (402)	0.0	0.1	0.1	0.1	0.2	0.2	0.2
Guides/outfitters (496)	0.3	0.6	0.9	1.2	1.5	1.8	2.1
Motels (499)	0.3	0.5	0.8	1.1	1.4	1.7	2.0
Campgrounds (500)	0.0	0.0	0.1	0.1	0.1	0.1	0.2
Access Fees (496)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total direct impact	**1.2**	**2.5**	**3.7**	**5.1**	**6.4**	**7.8**	**9.2**
Secondary impact	0.3	0.6	1.0	1.3	1.7	2.0	2.4
Total impact	**1.5**	**3.1**	**4.7**	**6.4**	**8.1**	**9.8**	**11.6**

(continued)

Table C-5. continued.

	Year								
Sector (IMPLAN #)	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16-20**
Direct impact									
Groceries (400)	0.5	0.6	0.7	0.7	0.8	0.9	1.0	1.1	1.1
Restaurants (501)	4.2	4.8	5.5	6.1	6.7	7.4	8.1	8.8	8.8
Fishing supplies (404)	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.3
Equipment (404)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Transportation (402)	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6
Guides/outfitters (496)	2.5	2.8	3.2	3.5	3.9	4.3	4.7	5.1	5.1
Motels (499)	2.3	2.6	2.9	3.3	3.6	4.0	4.4	4.7	4.7
Campgrounds (500)	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4
Access Fees (496)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total direct impact	10.7	12.2	13.8	15.4	17.0	18.7	20.4	22.2	22.2
Secondary impact	2.8	3.1	3.5	4.0	4.4	4.8	5.3	5.7	5.7
Total impact	13.5	15.4	17.3	19.3	21.4	23.5	25.7	27.9	27.9

Table C-6. Increase in labor income in Blaine County due to improved fishery from the BWRWRP.

	Year									
Sector (IMPLAN #)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Direct impact										
Groceries (400)	$2,283	$4,629	$7,039	$9,515	$12,059	$14,672	$17,357	$20,116	$22,950	$25,862
Restaurants (501)	$11,166	$22,639	$34,425	$46,535	$58,977	$71,759	$84,892	$98,384	$112,246	$126,488
Fishing supplies (404)	$2,577	$5,224	$7,943	$10,738	$13,608	$16,558	$19,588	$22,701	$25,900	$29,186
Equipment (404)	$293	$594	$903	$1,220	$1,546	$1,882	$2,226	$2,580	$2,943	$3,317
Transportation (402)	$740	$1,500	$2,281	$3,083	$3,907	$4,754	$5,624	$6,518	$7,436	$8,380
Guides/outfitters (496)	$8,381	$16,991	$25,837	$34,926	$44,264	$53,857	$63,714	$73,840	$84,244	$94,933
Motels (499)	$9,057	$18,361	$27,921	$37,742	$47,833	$58,200	$68,851	$79,794	$91,037	$102,588
Campgrounds (500)	$1,192	$2,416	$3,674	$4,966	$6,294	$7,658	$9,060	$10,500	$11,979	$13,499
Access Fees (496)	$152	$309	$469	$634	$804	$978	$1,157	$1,341	$1,530	$1,725
Total direct impact	**$35,840**	**$72,662**	**$110,493**	**$149,360**	**$189,292**	**$230,319**	**$272,469**	**$315,775**	**$360,267**	**$405,978**
Secondary impact	$11,483	$23,281	$35,402	$47,855	$60,649	$73,794	$87,299	$101,174	$115,430	$130,076
Total impact	**$47,323**	**$95,943**	**$145,895**	**$197,215**	**$249,942**	**$304,113**	**$359,769**	**$416,949**	**$475,697**	**$536,054**

(continued)

Table C-6. continued.

	Year					
Sector (IMPLAN #)	**11**	**12**	**13**	**14**	**15**	**16-20**
Direct impact						
Groceries (400)	$28,854	$31,928	$35,086	$38,330	$41,664	$41,664
Restaurants (501)	$141,120	$156,153	$171,598	$187,466	$203,769	$203,769
Fishing supplies (404)	$32,563	$36,031	$39,595	$43,257	$47,018	$47,018
Equipment (404)	$3,700	$4,094	$4,499	$4,915	$5,343	$5,343
Transportation (402)	$9,349	$10,345	$11,369	$12,420	$13,500	$13,500
Guides/outfitters (496)	$105,915	$117,197	$128,789	$140,699	$152,935	$152,935
Motels (499)	$114,456	$126,648	$139,175	$152,045	$165,267	$165,267
Campgrounds (500)	$15,061	$16,665	$18,313	$20,007	$21,747	$21,747
Access Fees (496)	$1,924	$2,129	$2,340	$2,556	$2,778	$2,778
Total direct impact	**$452,942**	**$501,192**	**$550,765**	**$601,695**	**$654,021**	**$654,021**
Secondary impact	$145,123	$160,582	$176,465	$192,783	$209,549	$209,549
Total impact	**$598,064**	**$661,774**	**$727,230**	**$794,479**	**$863,570**	**$863,570**

Table C-7. Increase in value added in Blaine County due to improved fishery from the BWRWRP.

	Year									
Sector (IMPLAN #)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Direct impact										
Groceries (400)	$2,980	$6,041	$9,187	$12,418	$15,738	$19,149	$22,654	$26,254	$29,953	$33,754
Restaurants (501)	$12,466	$25,274	$38,433	$51,952	$65,842	$80,112	$94,774	$109,837	$125,312	$141,212
Fishing supplies (404)	$3,319	$6,729	$10,233	$13,832	$17,530	$21,330	$25,233	$29,244	$33,364	$37,597
Equipment (404)	$377	$765	$1,163	$1,572	$1,992	$2,424	$2,867	$3,323	$3,791	$4,272
Transportation (402)	$1,058	$2,146	$3,263	$4,411	$5,590	$6,802	$8,047	$9,326	$10,640	$11,990
Guides/outfitters (496)	$11,356	$23,022	$35,009	$47,323	$59,976	$72,974	$86,330	$100,050	$114,147	$128,631
Motels (499)	$14,017	$28,419	$43,215	$58,417	$74,035	$90,081	$106,567	$123,504	$140,905	$158,784
Campgrounds (500)	$1,446	$2,932	$4,459	$6,027	$7,639	$9,295	$10,996	$12,743	$14,539	$16,383
Access Fees (496)	$206	$418	$636	$860	$1,090	$1,326	$1,568	$1,818	$2,074	$2,337
Total direct impact	**$47,226**	**$95,747**	**$145,597**	**$196,813**	**$249,432**	**$303,492**	**$359,034**	**$416,098**	**$474,726**	**$534,960**
Secondary impact	$21,616	$43,824	$66,640	$90,082	$114,166	$138,910	$164,332	$190,450	$217,284	$244,854
Total impact	**$68,842**	**$139,571**	**$212,237**	**$286,895**	**$363,598**	**$442,402**	**$523,366**	**$606,549**	**$692,010**	**$779,813**
(continued)										

Table C-7. continued.

	Year					
Sector (IMPLAN #)	**11**	**12**	**13**	**14**	**15**	**16-20**
Direct impact						
Groceries (400)	$37,658	$41,670	$45,792	$50,026	$54,376	$54,376
Restaurants (501)	$157,548	$174,331	$191,573	$209,289	$227,489	$227,489
Fishing supplies (404)	$41,947	$46,415	$51,006	$55,723	$60,568	$60,568
Equipment (404)	$4,767	$5,274	$5,796	$6,332	$6,883	$6,883
Transportation (402)	$13,376	$14,801	$16,265	$17,769	$19,315	$19,315
Guides/outfitters (496)	$143,511	$158,798	$174,505	$190,642	$207,221	$207,221
Motels (499)	$177,152	$196,023	$215,412	$235,331	$255,797	$255,797
Campgrounds (500)	$18,279	$20,226	$22,226	$24,282	$26,393	$26,393
Access Fees (496)	$2,607	$2,885	$3,170	$3,463	$3,765	$3,765
Total direct impact	**$596,844**	**$660,423**	**$725,745**	**$792,857**	**$861,807**	**$861,807**
Secondary impact	$273,178	$302,279	$332,177	$362,895	$394,454	$394,454
Total impact	**$870,022**	**$962,703**	**$1,057,922**	**$1,155,751**	**$1,256,261**	**$1,256,261**

Appendix D. Impact Investing

Proponents of the BWRWRP hope to attract private capital for funding restoration work through "impact investing," which is the action of investing capital in projects, businesses, or investment funds that generate social or environmental good and a financial return to the investor (**Figure D-1**; Monitor Institute 2009, Hochstadter and Scheck 2015). The requirement of a return on principal is what makes impact investing distinct from philanthropy or grant funding, and contributes to its appeal as a financial investment sector (O'Donohoe et al 2010, Saltuk 2011). Impact investing can be important to government in achieving public objectives because it enables limited public resources to be leveraged with larger sums of private capital to address social and environmental problems (Thornley et al. 2011).

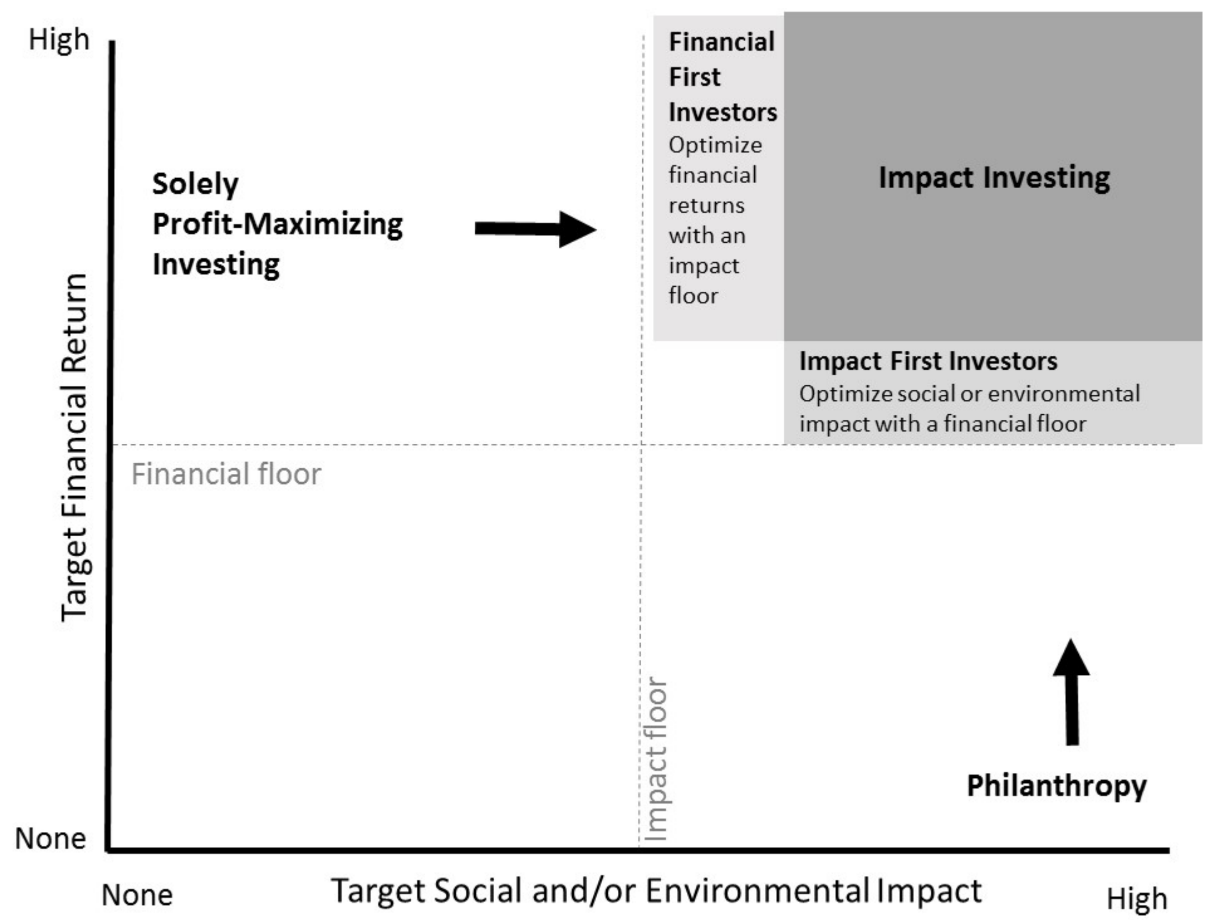

Figure D-1. Impact investors seek both financial return and social and/or environmental impact. Adapted from Monitor Institute (2009).