Regional Economic Analysis of the Four Lower Snake River Dams

A review of the 2002 Lower Snake Feasibility Report/Environmental Impact Statement Economic Appendix (I)

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About Earth Economics

Earth Economics is a non-profit located in Tacoma, Washington, dedicated to researching and applying the economic solutions of tomorrow, today. Earth Economics provides robust, science-based, ecologically sound economic analysis, policy recommendations and tools to positively transform regional, national and international economics, and asset accounting systems. Earth Economics has extensively studied the economic benefits of outdoor recreation in Washington State, producing reports at the state, county, city, and agency level.

INTRODUCTION

This report estimates the number of jobs that will be provided by outdoor recreation spending in the six southeast Washington counties along the LSR as a result of dam breaching. In January 2015, Earth Economics released a report entitled *Economic Analysis of Outdoor Recreation in Washington State*, one of the most comprehensive studies of its kind in the state. This economic contribution analysis follows the same methodologies to analyze the regional economic effect of increased outdoor recreation spending.

The Earth Economics statewide report found that the six southeast Washington counties along the LSR (Asotin, Columbia, Franklin, Garfield, Walla Walla, and Whitman) were among the lowest performers for total expenditures in outdoor recreation. A free-flowing LSR will attract visitors from across the country. These visitors will increase spending and foster the growth of income, jobs, and tax revenue. While local users may not spend much to visit the river, long-distance participants will likely dine at local restaurants and bars, stay in campgrounds or hotels, and buy from local shops. This analysis finds that a free-flowing LSR will significantly boost the economic activity within these six counties, which in turn will boost incomes, create jobs, and generate local, state, and federal taxes. A free-flowing LSR can be a vessel for economic development through outdoor recreation tourism.

ECONOMIC CONTRIBUTIONS AND IMPACTS

The terms economic contribution analysis and economic impact analysis, though often used synonymously, are in fact distinctly different measures of economic effects. Both address economic activity as defined by an economy's structure (sectors present and their interface), the spatial boundaries of an economy, and the producers and consumers acting within the economic framework. For policy and business purposes, researchers define regional economies at different scales (city, county, multi-county, state, and national) and in terms of market and non-market measures of well-being.

Economic contributions describe the aggregate economic activity within a given boundary that is generated by initial consumer expenditures as measured through market transactions. **Economic impact**, on the other hand, refers to new money generated within a boundary either by 1) improving the economic interactivity of sectors (i.e. increasing the multipliers) or 2) attracting increased spending from consumers outside of the regional economy. Thus, economic impact describes the "injection" of new money into markets, while economic contribution describes the "circulation" of existing money. The analysis presented here does not differentiate between new money and local resident spending and should thus be considered an economic contribution analysis.

Economic contribution analyses recognize that there are substitutes for consumers within every possible geographic region of analysis. In this case, a consumer could spend their recreation budget on outdoor recreation either locally or elsewhere or, alternatively, on movies, bars, or other activities. These decisions translate into different types of economic activity and consumer satisfaction. Since each regional economy has its own unique structure, it also has its own "multiplier," or ratio of economic activity resulting from an initial expenditure. The higher the multiplier, the more money that recirculates within the local economy. Usually, the larger the geographic area, the more likely it is that the economic structure will be comprised of diverse sectors, suppliers, and wage earners. Economic activity can be measured in terms of jobs, spending, salaries, tax collections, and industries' economic contribution.

This analysis used local data on economic and industry relationships to predict revenue flows to existing businesses (direct contributions), effects on related industries from which purchases are made (indirect contributions), and effects from expenditures made through the affected household incomes and salaries (induced contributions). Local economic models were derived using IMPLAN data from the U.S Bureau of Labor Statistics (BLS), the U.S. Bureau of Economic Analysis (BEA), the U.S Census Bureau and other sources.

METHODOLOGIES

Breaching the dams and allowing a free-flowing LSR will increase outdoor recreational activities such as fishing, camping, hiking, and birdwatching. The increase in opportunities for these activities will in turn influence consumer spending in many economic sectors and associated supply chains. Food, beverage, fuel, and retail expenditures can, and usually do, accompany a recreational visit. The spending per visit depends on factors such as participant origin, park location, park amenities, and type of recreational activity. In this analysis, these factors were captured through peer-reviewed literature, expert validation, and GIS modeling.

The methodology for conducting an economic contribution analysis of the Lower Snake River requires data and assumptions on 1) participant activities, 2) participant expenditures, and 3) participants' origins. The steps for conducting this analysis were as follows: 1) identify participant activities from the original surveys related to a free-flowing LSR, 2) use peer reviewed literature to create expenditure profiles for the different participant activities and calculate total expenditures per participant category, 3) allocate expenditures to counties, and 4) conduct an economic contribution analysis using IMPLAN, an economic input-output modeling software. The economic output was modeled at the county level, and GIS analysis was used to allocate the effects to legislative districts. The following sections outline these steps in greater detail.

PARTICIPANT ACTIVITIES AND ACTIVITY DAYS

The original studies of LSR recreation grouped users into the eight different participant activities seen in Table 11 below. These eight participant categories are later grouped into two categories: "General Recreation" (non-angling), and "Angling".

Activity days were estimated using a previous Earth Economics analysis[i] which reviewed the findings of the recreational analysis presented in the FR/EIS and Dr. John Loomis' original report[ii] to the NWW. The original survey sought to identify the type and number of recreation users that would visit a free-flowing Lower Snake River and included participants in Washington, Idaho, Oregon, Montana, and California. Survey recipients were asked whether they would "Definitely Visit", "Probably Visit", "Probably Not Visit", or "Definitely Not Visit" a free-flowing Lower Snake River.

Assuming that all responses of "Definitely Visit" or "Probably Visit" would in fact result in a visit, Earth Economics concluded that visitation would be the greatest during the first four years. After the initial four-year period, distance is expected to be a discouraging factor for Californian visitors, thus it was assumed that respondents indicating they would "probably visit" would not in fact visit. Visitation from the other surveyed states (Washington, Idaho, Oregon, and Montana) was expected to remain consistent through years one to 100.

The FR/EIS assumes that there will be constraining capacity issues with general recreation in the first 20 years after dam breaching that will limit the availability of recreational opportunities. The expected

general recreation restraints for years one, five, and ten are presented in the table below. By year 20, recreational opportunities should be fully available without constraints. Constraints to fishing were not calculated due to lack of fisheries data.

TABLE 1. RECREATION ACTIVITIES ASSOCIATED WITH A FREE-FLOWING RIVER AND CARRYING CAPACITY CONSTRAINTS

Activity	Year 1	Year 5	Year 10	Year 20-100
Jet Boating, Jet Skiing	20%	50%	70%	100%
Raft/Kayak/Canoe	30%	50%	80%	100%
Swimming	20%	40%	100%	100%
Picnic/Primitive Camping	80%	100%	100%	100%
Developed Camping	60%	90%	100%	100%
Hike and Mountain Bike	80%	100%	100%	100%
Hunting	50%	80%	100%	100%
Angling	X	X	X	X

VISITOR EXPENDITURES

With the participant activities identified, we then formed expenditure profiles for each category using information gleaned from industry studies on national forest visitor spending,[iii] state park visitor spending,[iv] and national park visitor spending.[v] The expenditure profiles estimate the dollar amount spent per person per day in each economic sector from lodging to miscellaneous retail. With the expenditure profiles defined, spending in each economic sector was then multiplied by visitors for each activity, yielding values for total annual expenditures associated with each activity group. The total expenditure profiles were then summed across all activities. The table below shows the average expenditures, visitation and total expenditures for each activity in Year 1.

TABLE 2. ACTIVITY EXPENDITURES

Activity	Per-Person Per-Day Expenditures	Year 1 Visitation	Total Expenditures
Jet Boating, Jet Skiing	$86	213,320	$18,435,879
Raft/Kayak/Canoe	$76	1,035,728	$78,932,634
Swimming	$20	679,257	$13,546,222
Picnic/Primitive Camping	$7	167,400	$1,171,800
Developed Camping	$22	219,294	$4,872,158
Hike and Mountain Bike	$45	5,434,062	$243,096,142
Hunting	$69	561,371	$38,838,154
Fishing	$137	744,594	$102,207,216
Total	**$55.34 (Average)**	**9,055,025**	**$501,100,203**

Allocation to County and Legislative Districts

This analysis tracks only the economic activity within the six counties surrounding the LSR in southeast Washington and does not track expenditures made outside of the region. Many out-of-state visitors will purchase equipment and groceries in preparation for their trip, but these expenditures were not tracked in this study. Total expenditures for each visitor type were obtained by multiplying visitor days by appropriate expenditure rates.

Visitor days and expenditures were distributed to counties and legislative districts using a GIS tool called the "Huff Model". The Huff Model models distribution based on population density and the distance of population centers (census tracts) to sites of interest. General recreation activity days were allocated to a combined point data set of Washington Department of Fish and Wildlife and Recreation and Conservation Office boat launches that were within a quarter mile of the LSR. Fishing distribution was derived from 1-day fishing licenses issued in WA and distributed based on Washington Department of Fish and Wildlife and Recreation and Conservation Office boat launches that were within a quarter mile of the LSR.

IMPLAN Analysis

After the expenditure profiles for each activity category were calculated and allocated to county and legislative districts, the next step was to map the visitor expenditures to IMPLAN industry sectors. Impact Analysis for Planning (IMPLAN) is an economic modeling software used to estimate economic contributions and impacts. It uses annually updated input/output models to describe the inter-sectoral economic relationships of a given geography. IMPLAN models receive consumer expenditures per economic sector per geographic area as an input.

IMPLAN V3.1 includes 440 industry sectors based on the Bureau of Economic Analysis' latest Benchmark Input-Output Study. All expenditures were mapped to one of the 440 IMPLAN sectors, resulting in expenditures being made in a 1 of 14 IMPLAN economic sectors. Although each recreation activity has a different expenditure profile associated with it, the table below shows the expected average expenditures across all activities made in each economic sector.

TABLE 3. AVERAGE EXPENDITURE PROFILE FOR ALL ACTIVITIES IN YEAR 1

IMPLAN Industry Sector	Per-Person Per-Day Expenditures	Total Expenditures
Hotels and motels, including casino hotels	$6.29	$69,869,095
Other accommodations	$1.36	$11,184,591
Food services and drinking places	$6.60	$74,482,087
Retail - Food and beverage	$9.17	$83,824,598
Retail - Gasoline stations	$19.17	$140,007,498
Scenic and sightseeing transportation and support activities for transportation	$0.39	$5,591,676
Transit and ground passenger transportation	$0.79	$3,017,626
Other amusement and recreation industries	$1.75	$19,011,523
Other Federal Government enterprises	$2.61	$20,149,806
Other state and local government enterprises	$2.17	$14,220,355
Retail - Miscellaneous	$2.93	$38,435,032
General and consumer goods rental except video tapes and discs	$1.61	$19,462,750
Seafood product preparation and packaging	$0.0009	$3,372
Soft drink and ice manufacturing	$0.50	$1,840,196
Total	**$55.34**	$501,100,203

In this analysis, expenditures were summed for all activities by IMPLAN sector at the county level (legislative district-level data and models were not available). As an example, expenditures on gasoline, whether for boats, automobiles, or off-highway vehicles, were summed into one sector. Input-output models may show that only a portion of expenditures on gasoline stay in Washington State, since most crude oil is delivered from outside the state.[vi] Because most of this spending immediately leaves the state, it does not have the chance to circulate around the economy to generate additional economic activity.

Input-output models also calculate multipliers for a given region (county, multi-county, or state). Multipliers show how initial expenditures generate additional economic activity as the initial money is re-spent by other businesses and workers. For example, a county that has boat producers, boat repair shops, and boat retailers is poised to capture more of the expenditures on boat-related goods and services because many of the inputs and suppliers come from within the region. Generally, though not always, the more diverse a county- or state-level economy, the less it must import in order to provide recreational goods and services.

VISITATION, EXPENDITURES, AND CONTRIBUTIONS

This section of the report will detail the results of the contribution analysis. All results are based on the expected visitation as shown by the survey results.

VISITATION BY COUNTY

For the four years following dam breaching, the LSR study area will likely receive over nine million participant days. Visitation will then decrease to an estimated 4.6 million, but continue to steadily rise

over the following 95 years. The table below shows visitation estimates by county for the first 20 years of the 100-year planning period.

TABLE 4. EXPECTED VISITATION TO A FREE-FLOWING LOWER SNAKE RIVER

	Totals*	Asotin	Columbia	Franklin	Garfield	Walla Walla	Whitman
Year 1	9,055,025	2,059,982	442,002	2,693,033	493,369	925,733	2,440,906
Year 5	4,602,198	1,085,250	219,527	1,325,235	267,840	465,928	1,238,418
Year 10	6,289,805	1,454,670	303,844	1,843,626	353,315	640,193	1,694,157
Year 20	6,599,938	1,522,559	319,339	1,938,892	369,023	672,218	1,777,908

*Visitation estimates derived from surveys conducted for the 2002 FR/EIS

EXPENDITURES BY COUNTY

Table 12 below shows the estimated expenditures made in each county. Expected expenditures represent the estimates for one year and not the summation of a range of years.

TABLE 5. EXPECTED EXPENDITURES AS A RESULT OF RECREATION FROM A FREE-FLOWING LOWER SNAKE RIVER (VALUES IN MILLIONS, 2015 USD)

Year	Total	Asotin	Columbia	Franklin	Garfield	Walla Walla	Whitman
Year 1	$501.1	$120.4	$23.6	$141.8	$30.1	$50.5	$134.7
Year 5	$291.6	$74.5	$13.1	$77.4	$19.5	$28.8	$78.1
Year 10	$347.9	$86.8	$16.0	$94.7	$22.4	$34.7	$93.4
Year 20	$373.1	$92.4	$17.2	$102.5	$23.7	$37.3	$100.2

ECONOMIC EFFECTS

All economic activity triggered by the initial expenditures was captured by region-specific economic IMPLAN models[1] that estimate how expenditures will "ripple" through the economy. The economic contribution analysis estimates the portion of expenditures that register as sales retained within the region (direct contributions). Some money also leaves the regional economy when an expenditure is made (leakages), and these funds are not counted as an economic contribution. Intermediate sales made from industry to industry purchases within the supply chain are also counted in this analysis (indirect contribution). In addition, the contribution analysis includes the purchases made with the salaries and wages of those employed in the supply chain (induced contribution). The total economic contribution is a summation of the direct, indirect, and induced economic contributions.

The spending associated with recreation along a free-flowing LSR will generate substantial economic activity throughout the region, with the greatest economic activity occurring in the first four years. In Year 1, recreation expenditures will total $501 million. These expenditures will provide $288 million in direct economic contributions after leakages, $48 million in supply chain activity to produce outdoor recreation goods (i.e. indirect contribution), and $48 million in household wages that will stimulate further economic activity (induced contribution). Thus, in Year 1, economic contributions throughout

[1] In this analysis, the region is defined as the six counties surrounding the Lower Snake River in Washington (Asotin, Columbia, Franklin, Garfield, Walla Walla, and Whitman).

the region should total $384 million (See Table 14). Economic activity is seen nearly 150 different industry sectors, from lodging and restaurants to insurance carriers and grain farming. This shows that recreation dollars have a large effect on the region. For the full contribution analysis results, see Appendix B.

TABLE 6. ECONOMIC CONTRIBUTION OF RECREATION DIRECT EXPENDITURES (VALUES IN MILLIONS, 2015 USD)

	Totals	Asotin	Columbia	Franklin	Garfield	Walla Walla	Whitman
Year 1	$383.8	$111.3	$13.3	$109.2	$16.4	$44.0	$84.0
Year 5	$203.1	$50.0	$7.3	$60.1	$10.5	$24.5	$47.7
Year 10	$244.5	$59.3	$8.9	$73.3	$12.1	$29.7	$57.5
Year 20	$263.0	$63.5	$9.7	$79.2	$12.8	$32.1	$61.8

Year 1 spending will also contribute to over 4,000 full- and part-time jobs.[2] These jobs estimates encompass only outdoor recreation-related jobs supported within the county, although other jobs may be supported in other industries, in neighboring counties or within the region.

TABLE 7. JOBS SUPPORTED BY RECREATION EXPENDITURES

	Total	Asotin	Columbia	Franklin	Garfield	Walla Walla	Whitman
Year 1	4161	1104	181	1177	219	529	951
Year 5	2380	663	99	640	135	294	526
Year 10	2876	788	121	785	157	357	640
Year 20	3098	843	131	849	168	385	691

Outdoor recreation along the LSR will largely support jobs in restaurants, local shops, recreation providers, and hotels. Additionally, both induced and indirect jobs will stem from these initial expenditures. Indirect jobs occur further along the supply chain, such as when restaurants purchase local produce, thus supporting jobs for local producers. Induced jobs are generated when outdoor recreation-related employees spend their wages within the economy.

Economic contribution and job estimates were also assigned to legislative districts. The LSR is surrounded by two legislative districts: 9 and 16. Legislative District 9 contains Adams, Asotin, Franklin, Garfield, and Whitman County, and Legislative District 16 contains Columbia and Walla Walla County.[3] The tables below show the economic contribution and jobs supported by outdoor recreation consumer expenditures within the two legislative districts.

[2] It is expected that a high proportion of total outdoor recreation jobs are part-time jobs. For example, the U.S. Forest Service and National Parks Service hire many seasonal workers in the summer who are students the rest of the year.

[3] Legislative District 9 also contains a portion of Spokane County, while Legislative District 16 is partially in Benton County.

TABLE 8. ECONOMIC CONTRIBUTION FROM RECREATION EXPENDITURES BY LEGISLATIVE DISTRICT (VALUES IN MILLIONS, 2015 USD)

	Total	LD 9	LD 16
Year 1	$383.8	$323.9	$59.9
Year 5	$203.1	$169.8	$33.3
Year 10	$244.5	$204.1	$40.5
Year 20	$263.0	$219.4	$43.6

TABLE 9. JOBS SUPPORTED BY RECREATION EXPENDITURES BY LEGISLATIVE DISTRICT

	Total	LD 9	LD 16
Year 1	4304	3574	730
Year 5	2380	1976	404
Year 10	2876	2384	492
Year 20	3098	2567	531

CONCLUSIONS AND ADDITIONAL RESEARCH

Indeed, there will be increased economic activity within the counties and legislative districts surrounding the LSR in southeast Washington. The large influx of visitors in Year 1 will have expenditures of $500 million and will generate nearly $400 million in economic contribution. This economic contribution will support and generate jobs, tax revenue, and boost incomes. The economic models clearly show that this economic activity will contribute to nearly 150 industry sectors, many of which are not directly related to the recreation industry.

What is not captured by this analysis are the up-river and down-river economic effects of a free-flowing river. This report does not capture economic effects that would occur in upriver communities, such as the city of Lewiston, ID. Lewiston's population grew at a slower rate than the rest of Idaho according to the 2010 Census (1.8% compared to 4.3%). A free-flowing LSR would increase tourism in Lewiston, making it a more attractive city to live in as incomes grow.

Additionally, the 2002 FR/EIS did not consider the economic effects of lost recreational value due to the potential loss of salmon species should system improvements fail to provide sufficient Snake River Chinook returns. These lost benefits were not considered in the 2002 FR/EIS economic analysis because it was assumed that Alternative 3 would increase salmon runs. However, given the failure of these improvements to restore runs, this must now be taken as a serious potential economic loss. Should a greater number of salmon return to spawn upstream, Idaho would likely have increased opportunities for recreational fishing.

Down-river, the effects may be even greater. Wildlife viewing generated the most consumer expenditures in Washington State in 2014.[vii] Whale watching, centered on the Southern Resident Killer Whales, provides an immense value to the state through wildlife viewing opportunities. The Southern Residents rely on salmon for food. While it may be difficult to predict the mortality of these whales over time if wild and hatchery Snake Chinook fall below current levels, the killer whales' diminishing numbers will certainly have an impact on viewership and economic benefits that are now running at about $60 million per year in Washington.[viii] Given the status of the Snake River stocks outlined in the Salmon Update/Reevaluation White Paper[ix], a crashing population of wild/natural/hatchery Chinook could lead to starvation given that 70-80% of the Southern Residents' diet is Chinook. It should also be noted that the birth of nine calves would require at least 30,000 more Chinook per year that, under the current system, must come from commercial or sport fisheries.

Endnotes

[i] Briceno, T., Mojica, J., 2015. Review of the Lower Snake River Juvenile Salmon Migration Feasibility Report/ Environmental Impact Statement. Section I3-49 through I3-81 of the Economic Appendix (I). Earth Economics, Tacoma, WA.

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[vi] Department of Commerce. 2013. Petroleum Supply and Use in Washington State: An overview of recent developments in the petroleum market. http://www.commerce.wa.gov/documents/petroleum-whitepaper-7-15-2013.pdf

[vii] Briceno, T., Schundler, G. 2015. Economic Analysis of Outdoor Recreation in Washington State. Earth Economics, Tacoma, WA.

[viii] Grace, S., 2015. Southern Resident Killer Whale Chinook Salmon Initiative. Available at: http://srkwcsi.org/fact-sheets/

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