College of Natural Resources Policy Analysis Group
Jay O'Laughlin, Director
P.O. Box 441134, University of Idaho, Moscow, ID 83844-1134
Phone: 208-885-5776 e-mail: jayo@uidaho.edu
FAX: 208-885-6226 website: http://www.cnr.uidaho.edu/pag

University of Idaho
College of Natural Resources
Experiment Station
Steven B. Daley Laursen, Director

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Economic Impact of Salmon and Steelhead Fishing in Idaho: Review of the Idaho Rivers United Report

by
Jay O'Laughlin, Professor and Director
College of Natural Resources Policy Analysis Group
University of Idaho, Moscow

SUMMARY

A recent report concluded that "the benefit of a restored salmon and steelhead fishery to Idaho's economy could reach $544 million annually" (Idaho Rivers United, February 2005). This estimate is too high. Using the report's methods and data, the recent contribution of salmon and steelhead fishing is an estimated $253 million per year. More than doubling this for "restored" fisheries is not justifiable. The restoration goal is fish return levels of the 1950s. The report did not mention that the goal was exceeded in 2001-2004 with mixed stocks of hatchery and wild salmon and steelhead, but did document 155,000 steelhead and 125,000 salmon angling trips per year recently. To meet anglers' expectations, the report recognized the need to maintain steelhead hatchery production, but proposed that the level of wild spring/summer chinook salmon returns in the 1950s (86,000 fish) would be enough to help generate a $544 million impact. Recent experience makes that assumption implausible. In 2001, 186,000 returning chinook salmon generated 125,000 angling trips. The report assumed that 86,000 salmon would generate 271,000 angling trips because more stream and river miles would be open to fishing than were recently. The economic value of a recreational fishery depends on the quality of the angling experience, which depends in part on the quantity of fish available to anglers. The report did not address why more anglers would pursue fewer fish than are currently returning, simply because more area would be open to fishing. In addition, the report used angler expenditures that are too high, did not convert them into local income for impact analysis, and used too large a "multiplier" for indirect effects. Fishing is big business in Idaho, as anglers spend more than $300 million per year. To pursue recent salmon and steelhead runs anglers spent roughly $100 million in 2001, which could have had a total (direct plus indirect) impact of perhaps $50 million on household personal income throughout the state. Runs similar to those in 2001-2004 are more likely to sustain Idaho's economy than "restored" runs of fewer fish.

Introduction

According to a recent report, "When both direct and indirect impacts are considered, expenditures in fully restored salmon and steelhead fisheries in Idaho could reach $544 million annually"[1] The report was commissioned by Idaho Rivers United and written by consulting economist Dr. Don C. Reading.[2] It is referred to herein as the IRU report, or simply the report. The Pulp and Paperworkers Resource Council, a national grassroots organization of hourly employees in the forest products industry that has taken a position against dam breaching as a means for anadromous fish recovery,[3] asked the University of Idaho's College of Natural Resources Policy Analysis Group to review the report. We have a mission to "provide timely, scientific and objective data and analysis pertinent to such resource and land use questions which are of general interest to the people of Idaho."[4] Many Idahoans are interested in salmon recovery.

To structure this review, four questions about the analysis in the IRU report are posed: [1] Were appropriate data and methods used? [2] What does the $544 million estimate include? [3] How was it determined? [4] How does it compare to other studies? Replies are provided below. Then in section [5] conclusions are drawn. I acknowledge with thanks review comments made on an earlier draft by Philip S. Cook, Research Associate, College of Natural Resources Policy Analysis Group, University of Idaho; and Dr. M. Henry ("Hank") Robison, a specialist in regional economic impact analysis and principal of Economic Modeling Specialists, Inc., Moscow, ID.

[1] Were appropriate data and methods used?

Sales of goods and services to anglers provide a good starting point for regional economic impact analysis of recreational fishing. Data on angler expenditures are available from surveys conducted periodically by the Idaho Department of Fish and Game (IDFG) and the U.S. Fish and Wildlife Service (USFWS). These data are what anglers reported they purchased for fishing trips, including fishing tackle, boats, trucks, licenses, travel, gasoline, lodging, meals, and guide fees—the usual items enumerated in the travel cost method of estimating recreation benefits. Because recent data from these two agencies produce impact results that are in fairly close agreement (see section **4.A** below), the data have not been scrutinized herein.

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[1] Reading, D.C. (2005, February). "The Potential Economic Impact of Restored Salmon and Steelhead Fishing in Idaho." Report prepared for Idaho Rivers United by Ben Johnson Associates, Inc. <http://www.idahorivers.org/pdf/FishingEconReport.05.pdf>. Quotation on page 14.

[2] Dr. Reading's resume is online at <http://www.cses.washington.edu/db/pdf/readingcv.pdf>.

[3] "PPRC Position Paper on Dam Breaching and Flow Augmentation" <http://www.pprc.info/PositionPapers/dam_breaching.htm>.

[4] Idaho Code section 38-714.

Many economists recommend income that people derive from sales of goods and services as the appropriate measure of regional economic impact.[5] The IRU report used sales as the impact measure. Impact analysis also includes indirect or secondary "multiplier" effects generated by regional input-output models. Economists explain that "secondary impacts result as the income from direct spending works its way through the economy of some region."[6] Secondary impacts in the IRU report are determined by sales, not income from the sales.

Using sales rather than income overstates the impact effect on people in the region being analyzed. In a review of an earlier similar report on salmon-fishing impacts in Idaho, a group of independent economists provided an example illustrating the effect of the two approaches:

> Even from a local point of view the best measure of the benefit from a change in a set of river [management alternatives] is the change in local income. The economic impact of a river change includes spending and re-spending on inputs and can rise or fall whether or not local incomes rise. For example, when the price of fuel rises, truckers and guides must charge more. Their higher charges show up as an increase in the "impact" of port activity and the "impact" of steelhead fishing. But the actual incomes in these activities will remain about the same.[7]

Income is a more appropriate impact measure than sales because it more explicitly accounts for the dollars that "leak out" of the region being analyzed.[8] The problem with using sales, as in the example of rising fuel costs in the above quotation, is explained by two economists (one a professor at Northwestern University) who point out that using sales as an impact measure can be misleading:

> Business Output (also referred to as revenue or sales volume) is the broadest measure of economic activity, as it generates the largest numbers. It includes the full (gross) level of business revenue, which pays for costs of materials and costs of labor, as well as generating net business income (profits). This can be a misleading measure of economic development benefit, since it does not distinguish between a high value added activity (generating substantial local profit and income) and a low value added activity (generating relatively little local profit or income from the same level of sales).[9]

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[5] Dr. Hank Robison, personal communication, September 2, 2005.

[6] Hamilton, J.R., N.K. Whittlesey, M.H. Robison, and J. Ellis (1991). "Economic impacts, value added, and benefits in regional project analysis." *American Journal of Agricultural Economics* 73(2): 334-344 (underlining added for emphasis).

[7] Castle, E.N., J.R. Hamilton, K.C. Boire, D.D. Huppert, L.L. Peters, J.A. Richards, A.D. Scott, and P.C. Sorensen (1997). "Review of Local Economic Impact Studies." Independent Economic Analysis Board, Northwest Power and Conservation Council, Portland, OR <http://www.nwcouncil.org/library/ieab/ieab1997-1.htm>.

[8] Dr. Hank Robison, personal communication, September 2, 2005.

[9] Weisbrod, G., and B. Weisbrod (1997). "Measuring Impact of Projects and Programs." Economic Development Research Group. Boston, MA <http://www.edrgroup.com/pages/pdf/Econ-Impact-Primer.pdf>.

The half-billion dollar conclusion in the IRU report has attracted attention and the findings have been extended more widely: "Extrapolating that same increase [as in the Idaho study] to the 2001 fishing season impacts of Oregon and Washington would mean that salmon and steelhead sportfishing could bring in more than $5.5 billion per year to the Northwest."[10] In contrast, impact analysis of the recent situation by a group of independent economists produced conclusions that by comparison are remarkably understated:

> Recent, relatively bountiful run sizes have helped fuel the West Coast economy to the tune of about $142 million in personal income, according to a study conducted by a panel of eight independent economists at the request of the Northwest Power and Conservation Council. The estimation was based on recent years' harvest levels by commercial, recreational and tribal fishers and also attached a value to surplus hatchery fish. Of that total, about $109 million in income was generated in the states of Washington, Oregon and Idaho in each of the past several years.[11]

The enormous variance in these two estimates of economic impact from salmon and steelhead fishing in the region ($5.5 billion vs. $109 million) raises several questions, including why the measure of economic impact in the IRU report analysis is sales of goods and services to anglers when many economists recommend income as the appropriate measure of regional economic impact. Perhaps it is simply because studies that measure impact with sales result in much larger numbers than those using income. Impact analysis that uses sales rather than income is unlikely to stand up to rigorous peer scrutiny in the economics profession.[12]

[2] What does the $544 million estimate include?

Although the economic impact analysis approach in the IRU report is flawed, further scrutiny of the results may be useful. The report's future estimate of $544 million includes $196 million in out-of-pocket spending by salmon and steelhead (s&s)[13] anglers before and during the fishing trip. It also includes $348 million in indirect or secondary effects, which are "estimates of the total economic impact of angler spending in a community—calculated by applying standard economic multipliers to direct expenditures."[14] These "multipliers" result from detailed input-output models of economic activity using data on actual inter-industry transactions in the community or region being analyzed.

[10] Save Our Wild Salmon (2005). "Wild Salmon Stocks: A Sound Investment." SOS, Portland, OR <http://www.wildsalmon.org/library/idaho-study.cfm>.

[11] Columbia Basin Bulletin (July 15, 2005). "Economic Report Details Value of Fish Harvests to Northwest" <http://www.cbbulletin.com/Free/106865.aspx>. This article is a summary of the "Economic Effects" report by Radtke et al. (2005) cited at footnote 40 below.

[12] Dr. Hank Robison, personal communication, September 2, 2005.

[13] The phrase **salmon and steelhead** is used frequently herein and abbreviated as **s&s**.

[14] IRU report cited at footnote 1 above.

The analysis in the IRU report is not structured to show that some portion of the $544 million future estimate is represented by the contribution of existing s&s fishing effort, and some portion is from additional fishing effort if the IRU goal were met and historic runs were restored.[15] This raises two questions: [A] How much of the $544 million is represented by recent fishing effort? and [B] What assumptions is the additional fishing effort based on? Such assumptions include numbers of fish and fishing effort for them as well as the values assigned as the economic benefit from fishing. Replies to these related questions follow.

[2.A] How much of the $544 million is represented by recent fishing effort?

Using the same approach, data, and methods as those employed for developing the IRU report's $544 million "restored" scenario estimate, recent s&s fishing provided less than half of that impact (Table 1). The level of recent (2001-2003) fishing effort identified in the report is 155,000 steelhead trips in the 2002/2003 season and 125,000 salmon trips in 2001.[16] With angler expenditures of $326 per trip,[17] 280,000 trips result in sales of $91 million to anglers, plus what the report's approach generates as an additional $162 million from indirect "multiplier" effects,[18] for a total economic benefit of $253 million for recent s&s fishing effort (Table 1). When the same analytical approach is applied to historic (1959) fishing effort, the result is a $107 million total impact.

The estimated contributions of both the recent and historic scenarios (Table 1) have the same flaws as the $544 million "restored" scenario estimate, with one key exception. The recent and historic scenarios are based on Idaho Department of Fish and Game (IDFG) estimates of fishing effort. The "restored" scenario is based on several estimates that depart from recent and historic experience into the future, beginning with the number of returning fish expressed in the IRU restoration goals, the areas that would be open fishing, and assumptions about the number of future angling trips and the amount of money anglers would spend.

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[15] In other words, the IRU report did not conduct impact analysis "with" and "without" the "restored" scenario alternative. A group of economists identified this flaw in an earlier similar study. See "Review of Local Economic Impact Studies" by Castle et al. (1997) cited at footnote 7 above.

[16] These data apparently came from the Idaho Department of Fish and Game (IDFG), but in the IRU report the tabular data on page 15 for 2002/2003 and accompanying text are not consistent on that.

[17] Median of s&s angler expenditures per trip for 19 Idaho regions analyzed in the IRU report. This is used instead of the $428 weighted mean calculated from the report's conclusions (see explanation in section **3.B**).

[18] Calculated multiplier of 2.77 as used in the IRU report (total impact ÷ direct impact).

Table 1. Estimates of the contribution of salmon and steelhead (s&s) angler expenditures to the Idaho economy using data and methods in the Idaho Rivers United (IRU) report under three scenarios: historic (1959) returns (in constant 2005 dollars), recent (2001-2003) returns, and the future "restored" scenario in the IRU report.

	S&S Angling Trips per Year	Angler Expend-itures per S&S Trip	Direct S&S Angler Expenditures	Indirect "Multiplier" Effect[1/]	Total Economic Contribution of S&S Angling in Idaho per Year
Historic (1959)	256,000	$148[2/]	$38,480,000	$68,110,000	$106,590,000
Recent (2001-03)[3/]	280,000	$326[4/]	$91,280,000	$161,566,000	$252,846,000
"Restored" (IRU)	458,000	$428[5/]	$196,159,000	$348,087,000	$544,247,000

[1/] All scenarios use the same 2.77 multiplier calculated from the "restored" scenario analysis findings in the IRU report "The Potential Economic Impact of Restored Salmon and Steelhead Fishing in Idaho" cited at footnote 1 above and provided in the last row of the table (i.e., Total Economic Contribution of $544,247,000 ÷ Direct S&S Angler Expenditures of $196,159,000 = 2.77).

[2/] This estimate is based on the results of a U.S. Forest Service report (cited at footnote 49 below) on steelhead angler expenditures of $72 per 2-day trip in 1982 adjusted to 2005 with the Consumer Price Index. This assumes that s&s fishing techniques in 1959 were similar to those in 1982.

[3/] Idaho Department of Fish and Game data for the 2002/2003 steelhead and 2001 salmon seasons as presented in the IRU report.

[4/] Median angler expenditures in the 19 different Idaho regions analyzed in the IRU report.

[5/] A weighted mean calculated from the analysis and conclusions in the IRU report (Direct S&S Angler Expenditures ÷ S&S Angling Trips per Year).

[2.B] What assumptions is the additional fishing effort based on?

The main factor explaining why the $544 million estimate for the "restored" scenario is more than double the $253 million estimate for the "recent" scenario (Table 1) is the estimate of future fishing effort. The IRU report estimated 458,000 future trips for "restored" numbers of returning adult fish. This is 64% higher than recent effort. The level of recent effort was 280,000 trips for s&s fishing, a little more than the 256,000 trips reported for 1959 (Table 1). The IRU report assumed more angling effort in the future because there will be more people and that if s&s historic runs were "restored" there would be fishing in more areas of Idaho than in recent years.

As Table 2 indicates, the IRU report's goals for "restored" runs of returning fish would not provide any increase in numbers of returning steelhead or spring/summer chinook salmon beyond those that made their way back to Idaho in the 2001-2004 period.

Table 2. Angling trips per returning adult salmon and steelhead under different situations: historic data, recent data, and "restored" scenario of Idaho Rivers United (IRU).

	Steelhead	Spring/Summer Chinook Salmon	Fall Chinook Salmon	Total
Historic (1959) Returning Adults	80,000	86,000	14,000	180,000
Trips	173,000	81,000	2,000	256,000
Trips/Fish	2.2	0.9	0.1	1.4
Recent (2001-04) Returning Adults[1/]	220,000	186,000	14,000[2/]	420,000
Trips	155,000	125,000	-0-	280,000
Trips/Fish	0.7	0.7	not applicable	0.7
"Restored" (IRU) Returning Adults[3/]	188,000[4/]	86,000	14,000	241,000
Trips	177,000	271,000	10,000	458,000
Trips/Fish	1.1	3.1	0.7	1.9

[1/] Idaho Department of Fish and Game data in the IRU report (cited at footnote 1 above) for 2002/2003 steelhead and 2001 spring/summer chinook salmon seasons.

[2/] 2004 fall chinook salmon adult returns from "Recent Salmon Returns" by Save Our Wild Salmon (2005) cited at footnote 19 below.

[3/] According to data in "Recent Salmon Returns" by Save Our Wild Salmon (2005) cited at footnote 19 below, during the recent 2001-2004 period, the IRU report's "restored" goals were exceeded for steelhead (197,000 median; 203,000 mean) and spring/summer chinook salmon (92,000 median; 112,000 mean).

[4/] Sport catch goal of 94,000 (as in the IRU report) plus spawning escapement goal of 94,000.

The data summarized in Table 2 are discussed in the sub-sections below for steelhead, which are ocean-going rainbow trout (*Oncorhynchus mykiss*), the spring/summer run of chinook salmon (*O. tshawytscha*), and the fall run of chinook salmon (*O. tshawytscha*). The discussion includes data presented in the IRU report on angler trips, including the numbers of fish that anglers would be fishing for if historic runs in 1959 were "restored." Also provided is data on recent fish returns that are not included in the report.

Steelhead – For the "restored" estimate of fishing effort, the report increased the 155,000 steelhead trips in the 2002/2003 season by 14% to 177,000 trips. The reported rationale was 173,000 trips during the 1959 steelhead season, which included effort on Snake River tributaries that are not open to steelhead fishing today, such as the Lochsa and Selway Rivers in the Clearwater River drainage, and many rivers and streams in the Salmon River drainage.

Although the report stated that 80,000 steelhead returned in 1959, it did not mention that 222,000 returned during the 2002/2003 season.[19] The report identified the "restored" level to be 94,000 steelhead in the harvest or sport catch component, and for spawning escapement some unstated number. A reasonable assumption about wild fish escapement[20] would be the 47,000 reported from the 1959 season, when 33,000 steelhead were caught. Add to that the same number for hatchery escapement and the total "restored" goal is 188,000 returning steelhead.

The report stated that steelhead fishing goals "could not likely be supported entirely by the numbers of wild fish that were found in the 1950s. There would have to be a hatchery component, as there is today."[21] Adult steelhead returns in 2001-2004 ranged between 151,000 and 269,000 of which about three-fourths were hatchery fish.[22] Recent return averages (191,000 median; 203,000 mean) meet the 188,000 "restored" goal.

Spring/summer chinook salmon – According to the IDFG data presented in the IRU report there were 125,000 trips for spring/summer chinook in the 2001 salmon season, when less than 50 miles of streams and rivers were open to fishing and thus available to anglers. In 1959 there were 81,000 trips when more than 1,000 miles of streams and rivers were open to fishing. For the "restored" estimate, the report more than doubled the 125,000 salmon trips in 2001 to 271,000. Most of the new trips would be where no salmon fishing now occurs in the Salmon River drainage upstream from Riggins to Salmon, Stanley, and the Sawtooth area.[23]

The IRU report's "restored" goal for spring/summer chinook is 86,000 wild fish and no hatchery fish. The report stated that this is the same as the 1954-1959 average run into the Salmon River, and that this number of fish "could support the fishery identified in this study." The underlying assumption is that 86,000 wild fish would generate 271,000 trips.

This assumption is not consistent with existing data on numbers of returning salmon and angler effort (see Table 2). In 2001, 186,000 salmon returned (approximately 42,000 were wild

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[19] Save Our Wild Salmon (2005, April). "Recent Salmon Returns: A Missed Opportunity for Real Salmon Recovery" <http://www.wildsalmon.org/library_files/Recent-Salmon-Returns.pdf>. IDFG reported returns for the 2004/2005 season, which ended May 31, 2005, at 151,634. This is less than 172,487 the previous year but above the 10-year average of 122,482 <http://fishandgame.idaho.gov/cms/fish/steelhead/dam_count.cfm>. The original source for these data is <http://www.nwp.usace.army.mil/op/fishdata/ home.asp>, which identifies the 10-year average as 132,860.

[20] To restore anadromous salmonids, biologists support the idea of a "minimum sustainable escapement" which initially could be determined from historical data. National Research Council (1995). *Upstream: Salmon and Society in the Pacific Northwest*. National Academy Press, Washington, DC, pages 294-299.

[21] IRU report cited at footnote 1 above, page 16.

[22] "Recent Salmon Returns" by Save Our Wild Salmon (2005) cited at footnote 19 above.

[23] For the first time since 1978, a portion of the Upper Salmon River was opened on July 9, 2005, to a very limited salmon season <http://fishandgame.idaho.gov/apps/releases/view.cfm?NewsID=2707>.

fish) and there were 125,000 angler trips for them. In 1959 there were 86,000 returning wild fish and 81,000 trips. In 2001-2004 the number of returning adults ranged between 79,500 and 186,000 annually (92,000 median; 112,000 mean), with approximately 20-25% wild fish and the rest hatchery fish.[24] Further discussion of this key assumption in the IRU report about numbers of spring/summer chinook salmon and fishing effort for them continues in section **3.A** below.

Fall chinook salmon – Although the IRU report stated that "there isn't sufficient data on fall chinook to make the same comparisons as with spring and summer chinook and steelhead using trip numbers, trips/fish and catch" it included 10,000 trips for fall chinook, stating that "between 1957 and 1959 about 14,000 wild fall chinook returned to the Hells Canyon reach of the Snake."[25] The report did not say if this was an annual return, but one may assume so. In 1959 there were 2,000 trips for these fish. The report did not provide specific justification for increasing the number of trips by 8,000 for the same number of fish that were available in 1959. Nor did the report provide current return data. Beginning in 2001 returning adults exceeded 10,000 and in 2004 reached almost 15,000; most of these were hatchery fish.[26] If one is willing to accept the IRU report's 10,000 trips for 14,000 fish, then this would be approximately a $9 million benefit increase that was included in the IRU report's $544 million "restored" scenario benefit estimate but not in the recent return benefit estimate of $253 million developed in section **2.A** above.

[3] How was the $544 million determined?

According to the IRU report the total economic benefit of recreational fishing is some measure of [A] angling effort, which determines [B] direct purchases of fishing-related goods and services by anglers, and [C] indirect or secondary effects derived by applying "standard multipliers"to angler expenditures. The IRU report used [A] 458,000 2-day angler trips; [B] direct expenditures of $428 per trip, a calculated mean derived from the report by dividing total angler expenditures ($196 million) by the number of angler trips; and [C] a state-wide multiplier effect of 2.77 calculated from the report's results (total contribution divided by direct expenditures), and interpreted as follows: For every one dollar of direct angler expenditures for fishing-related items, including travel, there is $1.77 in indirect economic effects. Estimates for [A] and [B] are too large, which also makes [C] excessive even if the multiplier is correct.[27] The sum

[24] "Recent Salmon Returns" by Save Our Wild Salmon (2005) cited at footnote 19 above.

[25] IRU Report cited at footnote 1 above, page 17.

[26] "Recent Salmon Returns" by Save Our Wild Salmon (2005) cited at footnote 19 above.

[27] The IRU report attributed its community-level input-output models to those developed at the University of Idaho by Dr. M. Henry Robison, Dr. Charles W. McKetta, and Steven Peterson.

total is therefore overestimated.

In addition the 2.77 multiplier seems too large in comparison with other studies.[28] For example, in Idaho "every dollar of timber industry income generated another $1.29 by flowing through the economy."[29] This is a 2.29 multiplier. In southeastern Idaho, recreational fisheries on the Henry's Fork and South Fork of the Snake River attracted 460,000 angler days in 2004 and provided $46 million in local income; with a multiplier of 1.60 each dollar of direct income from angler expenditures generated an additional 60 cents in indirect income.[30]

The multiplier values for most industries are generally around 2.5 – 3.5 for national impacts, 2.0 – 2.5 for state impacts and 1.5 – 2.0 for local area (large city) impacts.[31] The smaller the community, the closer to 1.00 the multiplier will be.[32] The smallest of the 19 multipliers in the IRU report is 2.11 in North Fork, a remote town of 204 people on the banks of the Salmon River near the Montana border in Lemhi County. People earning income in small towns like North Fork have few goods and services they can buy there. The report's community-level multipliers, which range as high as 3.12 in Lewiston and Clarkston, are too large.[33]

[3.A] How much angling effort will there be?

The IRU report stated that "Estimating fishing effort (number of angler trips) into the future—in a recovered salmon and steelhead fishery—is challenging." The $544 million "restored" scenario impact estimate is based on 458,000 angler trips. To accept this estimate, one must agree with the proposition that there will be more angling effort in the future for fewer fish than returned and were fished for recently.

The most problematic part of the estimate is spring/summer chinook salmon. The facts are that in 2001 there were 125,000 trips to fish for a mixed stock of 186,000 wild and hatchery salmon. The report assumed that in the future there will be 271,000 trips for 86,000 fish. Based on what is known about angler motivations, this assumption is implausible.

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[28] According to Dr. Hank Robison, a multiplier of 2.50 for the entire state would be more reasonable than 2.77 (personal communication, September 2, 2005).

[29] Robison, H. (1998). "Documentation of Select Economic Statistics for the 1998 Revision of Idaho Forest Products Commission's publication 'The Idaho Forest, A Miracle at Work'." Report in author's files, College of Natural Resources Policy Analysis Group, University of Idaho.

[30] Loomis, J., with D. Reading and L. Koontz (2005). "The Economic Value of Recreational Fishing and Boating to Visitors and Communities Along the Upper Snake River." Report prepared for Trout Unlimited and the Henry's Fork Foundation <http://www.henrysfork.com/Loomis.pdf>.

[31] "Measuring Impact of Projects and Programs" by Weisbrod and Weisbrod (1997) cited at footnote 9 above.

[32] Dr. Hank Robison, personal communication, September 2, 2005.

[33] Id.

The IRU report recognized that "trip numbers, trips/fish, and catch" are related to fishing effort.[34] Although recreational angling motivations are not well understood, fisheries biologists and managers as well as economists recognize the importance of fish to anglers; some social science research results offer a different viewpoint.[35]

Fisheries scientists recognize that the number of fish available to anglers influences the quality of angling: "Although the specific definition varies among individuals, . . . quality angling depends on the catch rate or number of fish caught per unit of effort. . . . and catch rate is a highly rated factor in angler surveys and sociological studies "[36] Furthermore, "Fish constitute an extremely valuable source of commercial and recreational benefits whether they are based on native stocks, hatchery populations of salmon and trout, or introduced species."[37]

Quantifying the benefits from recreational fisheries is not a simple matter.[38] The task begins with numbers of fish, then value is assigned. These two steps are explained first by a fisheries biologist, then by economists:

> The benefits humans gain from a fishery are diverse and may be enumerated in several ways. Most commonly, benefits are computed as commodity output—the weight or number of fish produced. Benefits are also commonly measured as wholesale or retail economic value of the commodity output. Such benefits are easily calculated for commercial fisheries because the products are usually sold, but for sport or recreational fisheries, the quality of the fishing experience is very important, so measures of catch in weight, number, or value only partially measure the benefits provided to fishermen or to society.[39]

> The value given to a fish for the purpose of [economic impact studies] depends on the number of fish that might be available, whether harvest is managed and timed to meet market needs, the quality of the fish itself and how the fish was caught. Commercial values are market driven. Recreationally-caught fish typically have greater value attached because of the time, energy and expense often put in by anglers in pursuit of a prize

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[34] IRU report cited at footnote 1 above, page 17.

[35] Fedler, A.J., and R.B. Ditton (1994). "Understanding angler motivations in fisheries management." *Fisheries* 19(4): 6-13.

[36] Cox, S.P., C.J. Walters, and J.R. Post (2003). "A Model-Based Evaluation of Active Management of Recreational Fishing Effort." *North American Journal of Fisheries Managment* 23(4): 1294-1302.

[37] Fluharty, D.L. (2000). "Characterization and Assessment of Economic Systems in the Interior Columbia Basin: Fisheries." General Technical Report PNW-GTR-451, U.S. Dept. of Agriculture – Forest Service, Pacific Northwest Research Station, Portland, OR.

[38] Kearney, R.E. (2002). "Recreational Fishing: Value is in the Eye of the Beholder." In, *Recreational Fisheries: Ecological, Economic and Social Evaluation*. T.J. Pitcher and C. Hollingworth, editors. Blackwell Science, Oxford, U.K. Pages 17-33.

[39] Lackey, R.T. (2005, in press). "Fisheries: History, Science, and Management." In, *The Encyclopedia of Water*. J.H. Lehr, editor. John Wiley & Sons, New York, NY <http://www.epa.gov/naaujydh/pages/staff/lackey/pubs/history.pdf>.

> salmon or steelhead. . . . [T]he economic [contribution] model . . . [uses] recreational fishery effort that may result from changes in fish populations. . . . Changes in salmonid production and salmon harvest management may allow for increased regional income generation associated with recreational harvest expenditures."[40]

Economists employing the travel cost model use a standard assumption that the cost of accessing the fishery works like a price in its effect on angling demand.[41] Anticipated or typical fish catch is used as a measure of fishing quality in the travel cost demand function. Because actual catch on a single trip is widely viewed as a random outcome, due to unknown or unanticipated events, it is generally not accepted as a measure of fishing quality. Catch rate is therefore a function of fish abundance and angler skill. Site quality is assumed to be causally independent of an angler's decision to invest in gear, fishing guides, etc.[42]

Social science research on angler motivations suggests that fishing experiences involve many dimensions besides catching fish, but such findings have not been well received by fisheries biologists or managers, who argue that fish are important to anglers.[43] A University of Idaho social scientist concluded that the best assumption on the relationship of fish numbers and fishing effort was that "Increases in the number of fish available for harvest suggests that the number of days fished would increase."[44]

Economists confirmed this relationship in a survey-based study of recreational fishing in southeastern Idaho. On the Henry's Fork and South Fork of the Snake River, a 1% change in fish catch would result in a 0.65% change in angler use.[45] This elasticity relationship works both ways[46]—if anglers anticipate catching more fish, expect more anglers; conversely, if anglers anticipate catching fewer fish, expect fewer anglers.

If the "restored" historic return goal of 86,000 wild spring/summer chinook salmon could be attained, hatchery salmon supplementation ceased, and 1,000 river miles were open to angling

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[40] Radtke H., R. Mann, N.R. Netusil, K.L. Casavant, D.D. Huppert, J.R. Hamilton, L.L. Peters, and S.S. Hanna (2005). "Economic Effects From Columbia River Basin Anadromous Salmonid Fish Production." IEAB 2005-1. Independent Economic Analysis Board, Northwest Power and Conservation Council, Portland, OR <http://www.nwcouncil.org/library/ieab/ieab2005-9.pdf>.

[41] Huppert, D.D. (1989). "Measuring Value of Fish to Anglers: Application to Central California Anadromous Species." *Marine Resource Economics* 6: 189-197.

[42] Ibid.

[43] "Understanding angler motivations" by Fedler and Ditton (1994) cited at footnote 35 above.

[44] Foster Wheeler Environmental Corporation and C.C. Harris, Jr. (2001). "Assessment and Evaluation of the Drawdown Regional Economic Workgroup (DREW) Recreation Analysis Findings." Report submitted to U.S. Army Corps of Engineers Walla Walla District <http://www.nww.usace.army.mil/lsr/reports/recreation/drew/default.htm>.

[45] "Economic Value of Recreational Fishing—Upper Snake River" by Loomis et al. (2005) cited at footnote 30 above.

[46] Ibid.

as in 1959, three general outcomes could occur: [1] angling effort could increase, as additional anglers are attracted to the more geographically dispersed fishery (the IRU report assumed this outcome and estimated 271,000 trips); [2] the fishery would not attract more anglers, fishing effort would remain at recent levels, and it would be spread across a larger area (125,000 trips in 2001);[47] or [3] there would be fewer anglers attracted to the fishery and less angling effort for 86,000 wild salmon in 1,000 river miles than for 186,000 salmon in the 50 river miles open to fishing in 2001.

The report should have provided a more adequate justification for its choice of the first outcome to develop a "restored" scenario. It assumes 86,000 returning salmon would generate more than double the fishing effort that occurred in 2001 for 186,000 fish and explains simply that more river miles would be open to fishing. This scenario is not consistent with either the importance anglers place on anticipated catch rate or the travel cost demand function. Without a more adequate rationale, this assumption of increased future fishing effort is a major flaw in the analysis that supported the IRU report's conclusions regarding a $544 million economic impact.

[3.B] How much is the direct purchase of goods and service by anglers?

According to the IRU report, $196 million in benefits would be generated from direct sales of fishing-related goods and services to anglers. The report relied on IDFG angler expenditure data for steelhead fishing (1992/1993), salmon fishing (2001), and trout fishing on the Selway River and Middle Fork of the Salmon River (2003). The earlier data were adjusted to the present time with the Consumer Price Index (CPI). The data were partitioned into 19 Idaho regions, with a median of $326 per 2-day trip for s&s angler expenditures. Data ranged from $296 on the Clearwater River below the Orofino bridge upwards to $400 on the Salmon River upstream from Whitebird Creek and $500 on the Salmon River segment from the South Fork to the Middle Fork, and topped out at $1000 for the Selway River and $1,200 for the Middle Fork of the Salmon River, both in the midst of vast difficult-to-access wilderness areas. Based on estimated effort for "restored" fisheries in each region, the report's conclusion works out to a calculated weighted mean of $428 per trip. This seems too high considering that $326 is the median for the 19 areas where s&s will occur in the "restored" scenario, and that travel costs affect angler behavior.

The IRU report ignored the travel cost demand function and assumed many more future angling trips in the very high-cost Selway River and Middle Fork of the Salmon River fisheries than would be likely. As noted in section **3.A** above, travel costs affect sportfishing demand. A

[47] For example, an angler participating in the limited 2005 season on the upper Salmon River near his hometown of Salmon said in an interview with IDFG that he liked not having to drive to Riggins to catch salmon <http://fishandgame.idaho.gov/apps/releases/view.cfm?NewsID=2721>.

study with co-authors at the University of Idaho stated that "The critical exogenous variable in the travel cost model is the cost of travel from home to the sportfishing site. . . . a higher cost or price to visit the sportfishing site will reduce sportfishing visits per year."[48]

Several survey research studies of Idaho angling have produced estimates of angler expenditures that are lower than those in the IRU report:

- U.S. Forest Service researchers estimated Idaho steelhead angler expenditures for 1982 at $72 per 2-day trip.[49] Adjusting to 2005 with the CPI, as in the IRU report, this is comparable to 2-day trip expenditures of $144 in 2005, or 56% less than the IRU report's $326 median estimate. As the report noted, s&s angling techniques have changed since then.[50]

- U.S. Forest Service researchers estimated Idaho non-steelhead angler expenditures for 1982 at $37 per trip for coldwater fishing, $24 per trip for warmwater fishing, and $35 per trip for mixed fishing; trips were roughly two days in length.[51] Adjusting with the CPI, the highest of these estimates is comparable to 2-day trip expenditures of $74 in 2005. This study is useful because together with the study above one can say that in 1982 steelhead anglers spent two or three times as much as other anglers.

- The U.S. Fish and Wildlife Service (USFWS), working with the U.S. Census Bureau, estimated that in 2001 a total of 4,070,000 angling days in Idaho generated $311 million in angler expenditures.[52] On average, anglers in Idaho spent $76 per day. Adjusting with the CPI, this is comparable to $83 per day in 2005, or 2-day trip expenditures of $166. However, this averages s&s angling with less expensive fishing opportunities. With appropriate adjustments (see section **4.A** below) this works out to $299 per trip, which is within 10% on the low side of the IRU $326 median estimate.

[3.C] How much is the "indirect" economic impact attributable to anglers?

Of the $544 million estimate, $348 million is from indirect effects. The IRU report defined these as "estimates of the total economic impact of angler spending in a community—calculated by applying standard economic multipliers to direct expenditures."[53]

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[48] Agricultural Enterprises, Inc., and the Department of Fish and Wildlife, University of Idaho (1999). "Willingness-to-Pay and Expenditures by Anglers in the Snake River Basin of Central Idaho." Final draft report to the U.S. Department of the Army, Corps of Engineers, Walla Walla District <http://www.nww.usace.army.mil/lsr/reports/sportfish/central_idaho/wtp_anglers/anglers.htm>

[49] Donnelly, D.M., J.B. Loomis, C.F. Sorg, and L.J. Nelson (1985). "Net Economic Value of Recreational Steelhead Fishing in Idaho." Resource Bulletin RM-9, U.S. Dept. of Agriculture – Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

[50] IRU report cited at footnote 1 above, page 2.

[51] Sorg, C.F., J.B. Loomis, D.M. Donnelly, G.L. Peterson, and L.J. Nelson (1985). "Net Economic Value of Cold and Warm Water Fishing in Idaho." Resource Bulletin RM-11, U.S. Dept. of Agriculture – Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

[52] U.S. Fish and Wildlife Service and U.S. Bureau of the Census (2003). *2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Idaho*. FHW/01-ID Rev. U.S. Dept. of the Interior and U.S. Dept. of Commerce <http://www.census.gov/prod/2003pubs/01fhw/fhw01-id.pdf>.

[53] IRU report cited at footnote 1 above, page 2.

Comments in section **1** above conclude that this overstates the indirect impact of angler spending.

[4] How does the $544 million estimate compare to other studies?

In section **3.B** above is evidence that the IRU report used higher expenditures per trip than comparable studies. In this section the IRU report is compared to [A] the USFWS *2001 National Survey* on fishing, hunting, and wildlife-based recreation and its collection of reports for each state; [B] a report by a group of eight independent economists on the contribution of commercial and recreational s&s fishing throughout the Pacific Northwest; [C] a combination of [A] and [B], with the economists analyzing the regional economic impact of s&s fishing using data from the USFWS *2001 National Survey*; and [D] earlier studies by Dr. Don C. Reading, author of the IRU report, estimating the contribution of recreational s&s fishing to the Idaho economy.

[4.A] *2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Idaho*.

The *2001 National Survey* by the U.S. Fish and Wildlife Service and the U.S. Bureau of the Census provides a data base that can be used to verify the estimate of recent s&s fishing's benefits of $253 million as calculated using data and methods in the IRU report (see section **2.A** above). The *2001 National Survey* found that 416,000 people (40% of them non-residents) fished a total of 4,070,000 days in Idaho in 2001; 475,000 days were for steelhead and 448,000 for salmon.[54] Although the survey report did not say so, the salmon-fishing effort included landlocked salmon planted in lakes,[55] such as chinook salmon in Lake Couer d'Alene and kokanee (landlocked sockeye salmon) in a number of lakes. According to the IDFG 2001 salmon season survey there were 125,000 2-day angler trips for anadromous chinooks. Add to this 237,000 steelhead trips (based on 475,000 days) and there were 362,000 trips for s&s river fishing in 2001.

In 2001 anglers spent a total of $311 million in Idaho on travel, lodging, meals, equipment, licenses, and other items related to fishing.[56] This does not include "multiplier" effects for indirect impacts, and averages out to $76 spent by each angler for each day of fishing. Adjusting with the CPI, this is comparable to $83 per day in 2005, or 2-day trip expenditures of $166. The two U.S. Forest Service studies cited in section **3.B** above determined that Idaho s&s anglers spent almost twice as much as cold water anglers, and three times as much as warm water anglers.

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[54] *2001 National Survey* cited at footnote 52 above.

[55] "Willingness-to-Pay and Expenditures by Anglers in the Snake River Basin of Central Idaho" report (1999) cited at footnote 48 above.

[56] *2001 National Survey* cited at footnote 52 above.

Adjusting the average $166 trip expenditure upward based on these relationships increases the s&s 2-day trip expenditure estimate to $299, which is within 10% of the $326 median expenditure estimate for 19 Idaho regions in the IRU report. When multiplied by 362,000 trips this is a direct contribution of $108 million in sales to anglers. With the 2.77 multiplier from the IRU report, there would be additional indirect sales effects for a total economic impact of $300 million for s&s fishing. With a multiplier of 2.50, as suggested by Dr. Hank Robison,[57] the total impact would be $271 million. These estimates are higher than the $253 million estimate primarily because the *2001 National Survey* data indicated 237,000 steelhead trips and the IRU report used 155,000 recent steelhead trips, relying on an estimate by IDFG for the 2002/2003 season.

This analysis, using the IRU report's methods, confirms that recent direct and indirect benefits of s&s fishing in Idaho are in the neighborhood of $253 million per year. However, because the IRU methods are flawed (see section **1** above), so are these results.

[4.B] Independent Economic Analysis Board of the Northwest Power and Conservation Council.

As mentioned in section **1** above, a group of eight independent economists reported that recent recreational fishing for s&s in the Pacific Northwest region contributed considerably less than the $5.5 billion potential impact claimed in the offshoot of the IRU report by Save Our Wild Salmon:[58]

> Based on fish production and harvest in recent years the economic impacts [throughout the Pacific Northwest] total $142 million annually . . . about 63 percent of the total economic contribution was generated by the Columbia in-river fishery. . . . [O]f the $142 million in economic impacts, commercial fishing accounts for 59 percent and recreational fishing contributes about 36 percent."[59]

According to data in the above quotation, in recent years recreational angling for s&s in the entire Columbia River basin region may have had an impact of $32.2 million per year on household personal income. Idaho's share would be some fraction of this total. According to USFWS data in the *2001 National Survey* reports for the states, there were 6.7 million angler days for steelhead and in-river salmon fishing in the region. Idaho experienced 11% of the total, Oregon 41%, and Washington 48%. Using this relationship, and assuming that all other things are equal, Idaho's proportional share of the personal income impact of s&s fishing works out to be $3.5 million. This is likely an underestimate.

The economists used the travel cost method, beginning with angler expenditures and the

[57] Personal communication, September 2, 2005.

[58] "Wild Salmon Stocks: A Sound Investment" report by SOS (2005) cited at footnote 10 above.

[59] "Economic Effects" report by Radtke et al. (2005) cited at footnote 40 above.

income derived directly and indirectly from it as the impact measure. The study was done on a regional scale using angler expenditures for s&s fishing at $60 per day, or $120 for a 2-day trip. This expenditure estimate is low compared to other studies reviewed in sections **3.B** and **4.A** above. An upward adjustment to $326 per trip (171%) is appropriate for comparison purposes. If all other things were equal, the income impact of recent s&s fishing in Idaho is $6.0 million. As illustrated by the same economists' higher estimate below, this impact may be understated.

[4.C] Analysis of the *2001 National Survey* data by the Independent Economic Analysis Board.

In the same report as above, the board of eight economists for the Northwest Power and Conservation Council also used data from the *2001 National Survey*. They stated that the number of anglers in the Columbia River basin may be as high as 1.1 million. These anglers spent 12.4 million days fishing for a variety of resident and anadromous species in the basin. Their direct expenditures on gasoline, fishing tackle, etc. from these angler trips were $884 million, an average of $71 per day. The economists estimated that the contribution of these anglers in terms of regional economic impact (REI) on household personal income may be as much as $408 million: "REI considers how many people participate in fishing and how much they spend while fishing. The spending introduces money into the economies, which finds its way to household income from wages, proprietor's incomes, rents, interest and dividends."[60]

The USFWS *2001 National Survey* showed that anglers spent $311 million in Idaho, which is 35% of the total in the Columbia River basin region. Assuming that all other things are equal, Idaho's share of the $408 million regional economic impact was $143 million for all fisheries. In section **4.A** above, analysis indicated that s&s river anglers in Idaho spent $108 million, which is, coincidentally, 35% of total angler expenditures in the state. Thus using household personal income as the measure, the economic impact of s&s fishing in Idaho in 2001 could have been $50 million.

[4.D] Previous studies by Dr. Reading.

The author of the IRU report, Dr. Don C. Reading, wrote in it that "The analysis is the fourth in a series. The three former studies were funded by the Idaho Fish & Wildlife Foundation." In the IRU report Dr. Reading provided brief one-paragraph summaries of each of the three earlier economic impact studies, quoted below as follows. I added several comments to each.

[60] Ibid.

- "'The Economic Impact of Steelhead Fishing and the Return of Salmon Fishing in Idaho' was released in 1996, and was based on the1992-93 steelhead fishing season. That season generated over $90 million in expenditures [direct and indirect effects] throughout the state. . . . a restored salmon fishing season would produce about $60 million in economic activity."[61]

  The total $152.7 million impact from s&s fishing included direct expenditures of $59.9 million from s&s fishing and the rest indirect effects, so a 2.55 multiplier was used. Adjusted with the CPI, the impact is $200 million impact in 2003, or 37% of the IRU report's $544 million estimate.

- "'The Economic Impact of a Restored Salmon Fishery in Idaho,' was released in 1999 and estimated from IDFG angler surveys the economic impact of a limited 1997 salmon season at $72 million. . . . The results of this study show a restored salmon fishery when combined with a steelhead recreational fishing would support $170 million in economic expenditures in the state."[62]

  The conclusion for salmon is an extrapolation of a $14.5 million total impact of a less-than-full season, of which $5.7 million was angler purchases, so again a multiplier of 2.55 was used. The $170 million impact adjusted to 2003 is $188 million, or 35% of the IRU report's $544 million estimate.

- "'The Economic Impact of the 2001 Salmon Season In Idaho,' was released in April 2003. Based on a survey of salmon anglers by IDFG, this study found the economic benefit of the 2001 salmon season to be nearly $90 million of direct [$38 million] and indirect impact, with more than half—$46.2 million—occurring in communities in the lower Salmon and Clearwater River basins."[63]

  Calculations show that this study used a 2.37 multiplier for indirect impacts. Adding total steelhead angler impacts of $118 million (the $90 million from the first study adjusted with the CPI) results in a s&s fishery impact of $208 million, or 38% of the IRU report's $544 million estimate.

Data from these three earlier studies can be used to check the consistency of the IRU report's angler expenditure data. In the first study, steelhead anglers' direct expenditures were a calculated $328 per trip in 1992/1993, which would be $430 adjusted to 2003 with the CPI. In the second, IDFG surveys determined that salmon anglers' expenditures were $189 per trip in 1997, or $217 when adjusted to 2003. The third study used $307 per trip in 2001, or $319 when adjusted to 2003. These estimates average $322, which is almost the same as the IRU report's $326 median value. The report's mean value of $428 in angler expenditures that was used to determine the $544 million in benefits is higher than the earlier studies would warrant.

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[61] Although this study is no longer available on the Idaho Fish & Wildlife Foundation's website, it is archived in the University of Idaho library (call number SH 334.R433 1996).

[62] This study is available on the Idaho Fish & Wildlife Foundation's website. However, all dollar estimates of economic contribution have been deleted or purposely masked. The full report with dollar values can be found at <http://www.bluefish.org/reading.htm>.

[63] This study is available on the Idaho Fish & Wildlife Foundation's website. Nowhere on that website or in the study report is Dr. Reading identified as the author, although he does claim authorship of this study in the subsequent IRU report cited at footnote 1 above.

The IRU report "analyzes the economic impact of a fully recovered salmon and steelhead fishery in Idaho, based on current data and data from the 1950s, when full salmon and steelhead fishing seasons were last allowed in the Gem state." The estimated benefits of $544 million annually for a restored salmon and steelhead fishery in Idaho is considerably larger than estimates in the earlier studies ranging from $188 – $208 million. The main difference is the elevated estimate of fishing effort in the IRU report. The higher angler expenditure estimate in the IRU report is also responsible for some of the difference, as is the 2.77 multiplier for indirect impacts used instead of 2.37 or 2.55 as in the earlier studies.

After reviewing the first of these earlier reports, the Independent Economic Analysis Board of the Northwest Power and Conservation Council commented as follows:

> [I]t is not unlikely that when the resource opportunity is changed by some act of river management, the local 'impact' will change proportionately . . . these types of studies do not provide decision makers with the information needed to evaluate system modifications for fish and wildlife mitigation or enhancement, or more specifically, dam removal. . . . The question is whether such a calculation has value for decision making when the economic benefits from alternative projects or policies are scattered across the whole Columbia/Snake River basin, or, indeed, the whole nation.[64]

According to these economists, two reasons why such analysis lacks value for decision-making are because [1] it does not demonstrate the impact of s&s restoration in comparison with other options (the "with" and "without" problem), and [2] change in local income is the preferred impact measure, and this analysis used the total sales from which income is derived.

The half-billion dollar conclusion in the IRU report nevertheless has become part of the public dialogue on the relationship of river management and salmon recovery. For example, in June 2005 representatives of the Northwest Sportfishing Industry Association and the Nez Perce Tribe both cited the report's conclusion during testimony before a congressional field hearing on Snake River system management in Clarkston, WA.[65]

[5] Conclusions.

The bottom line conclusion in the IRU report is that "the benefit of a restored salmon and steelhead fishery to Idaho's economy could reach $544 million annually." This estimate used an inappropriate measure of benefit derived from an unlikely scenario of future fishing effort. First, the report should have used income, rather than sales, as the impact measure. Second, the report should have more carefully explained the justification for doubling recent fishing effort for

[64] "Review of Local Economic Impact Studies" by Castle et al. (1997) cited at footnote 7 above.

[65] Testimony (June 6, 2005). Oversight Field Hearing on "Keeping the Columbia/Snake a Working River System." U.S. House of Representatives, Committee on Resources, Subcommittee on Water and Power, Clarkston, WA <http://resourcescommittee.house.gov/archives/109/wp/060605.htm>.

spring/summer chinook salmon because salmon and steelhead returns under the "restored" scenario are less than the number of fish anglers pursued in 2001-2004 (Table 1).

The report rationalized doubling the amount of spring/summer chinook salmon trips simply because more river miles would be available to anglers when the "restored" scenario's goals are realized. Although the report recognized that there is a relationship between fish numbers and fishing effort, it did not take that into account by using an implicit assumption that in the future each returning spring/summer chinook salmon would generate three angler trips. This is more than either historic (1959) or recent (2001-2004) experience can justify (Table 2).

Based on the analysis in this document using the IRU report methods, flawed as they are, a more likely benefit estimate than $544 million would be that "restored" scenario goals for s&s returns could perhaps maintain the recent level of fishing effort and its economic contribution of $253 million measured by sales (Table 1). Sustaining that into the future would depend on 125,000 trips for spring/summer chinook salmon, as in 2001 when 186,000 returned and were fished for along 50 river miles. Perhaps that same level of effort would continue if there were 86,000 salmon dispersed along 1,000 miles of rivers open to fishing, but perhaps there would be less than 125,000 trips because there would be fewer fish. Either of these two outcomes (the same or less fishing effort) seems more likely than the IRU "restored" scenario (more fishing effort) in which 86,000 fish would generate 271,000 trips.

Fishing is big business in Idaho, but its impact is not as large as the IRU report might lead one to believe. According to data in the U.S. Fish and Wildlife Service's *2001 National Survey*, 416,000 anglers spent $311 million in Idaho in 2001. They fished more than 4 million days, and 18% of their effort was directed at steelhead and salmon in rivers. U.S. Forest Service research has shown that these anglers spend two or three times more than others. Relatively bountiful recent salmon and steelhead runs, especially in 2001, have helped the Idaho economy, as anglers spent in the neighborhood of perhaps $91 to $108 million, depending on the data and methods one uses. (The $91 million estimate is based on data and methods used in the IRU report.) If an analysis of salmon and steelhead fishing's contribution to the Idaho economy used statewide income derived from angler expenditures as the measure of economic impact, rather than total sales of goods and services to anglers as in the IRU report, the results could be in the neighborhood of $50 million (see section **4.C** above).

From an economic point of view, more fish are better than less fish for anglers as well as the Idaho economy. The IRU report's future goals for returning fish are less than the numbers of fish actually returning in recent years. Because of the way most economists measure recreational fishery benefits, Idahoans should expect smaller economic impacts in the future from fewer fish, not larger impacts as estimated in the IRU report .