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Employment Impacts of California Salmon Fishery Closures in 2008 and 2009

April 1, 2010

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Recently, there has been much discussion in California about the relationship between water and jobs. Water deliveries from the Sacramento-San Joaquin Delta have been reduced due to drought and environmental protections for fish including Salmon that are harmed by the powerful pumps which generate reverse flows on some rivers in the Delta. The decrease in water deliveries resulted in fallowed fields and reduced agricultural production in some areas of the San Joaquin Valley supplied by Delta water. California's salmon fishery was closed in 2008 and 2009 due to collapsing fish populations. The political battle over pumping restrictions has been characterized by some as fish versus farmers.

Recently, some misleading claims of employment loss have been made by supporters of salmon fishing interests citing a report from the consulting firm Southwick Associates.² Several Congressional representatives recently used this estimate of 23,000 lost Salmon fishing jobs in a recent letter, and the claim has been repeated several times in the media.³ This paper discusses the errors in the most recent salmon jobs claims, and makes alternative estimates. We estimate the salmon fishery closures resulted in the loss of 1,823 jobs and \$118.4 million in income compared to the level of the salmon fishery in 2004 and 2005.⁴

¹ The primary author of this report is Jeffrey Michael, Director of the Business Forecasting Center. We thank Emily Brown, Dave Hickson, and Hans Radtke for providing helpful information and insights. No external funding was sought or received to support this report. For more information the Center's analysis of trends and issues in the Central Valley and Northern California economy, see <http://forecast.pacific.edu>.

² The Southwick Report is on-line at http://www.asafishing.org/newsroom/documents/salmon_recovery_economics.pdf.

³ A copy of the letter from Congressional representatives can be found at <http://georgemiller.house.gov/news/houseletterfeb182010.pdf>.

⁴ We selected 2004 and 2005 for comparison, because these were relatively strong recent years for salmon abundance and thus seem a reasonable level from which to measure the short-run decline. As noted in the

Last year, there were many exaggerated claims about the impact of the reduced agricultural water supplies on agriculture jobs and unemployment in the San Joaquin Valley.⁵ Due to the current political debate and pending legal cases regarding the Delta water pumps, there will inevitably be comparisons of this estimate of salmon loss to our earlier estimates of approximately 2,000 lost jobs and \$150 million in lost income due to reduced agricultural water deliveries from endangered species restrictions at the Delta pumps. The employment impacts are roughly the same size. However, we caution against making too much of this comparison, because reduced Delta pumping does not ensure Salmon recovery to the levels of 2004 and 2005. In addition, the economic impacts measured in terms of jobs and income is only a short-run analysis and is not a complete measure of economic value.⁶

It is also important to note the role of seasonality, dispersion, and inequality when interpreting these impacts. First, the number of lost jobs is an annual average, following accepted norms in economic research and the structure of input-output models used to estimate multiplier effects. For industries with highly seasonal employment patterns such as fishing and agriculture, this means that the total number of people impacted by these job losses at some point during the year is higher than the total lost jobs reported here. Thus, there may be 1,000 commercial fishing boats pursuing salmon at some point in the year, but the number of salmon fishing jobs on an annualized basis is substantially lower. Second, the fishing impacts are dispersed across hundreds of miles of coastline and inland waterways and include some major cities, whereas the agricultural water impacts are more geographically concentrated in small rural areas and mixed with impacts of natural drought. Although the agricultural water delivery impacts and salmon fishing impacts are similar in magnitude, the fishing impacts are harder to observe due to their dispersion and presence within larger metro areas. Third, there is much less inequality in the salmon fishing impacts than the agricultural impacts. The average employee compensation of lost jobs in the fishing industry is roughly double employee compensation in the agricultural industry. However, total income loss is higher in agriculture, because the majority of income loss to the agriculture sector is proprietor and corporate income rather than employee compensation.

Southwick Associates Report

The Southwick report estimates 23,825 lost jobs and a decline of \$1.375 billion in sales based on the decline in the salmon fishery from its 2004-05 level. These estimated effects are

Southwick report, salmon abundance was much higher in recent decades and recovery to these levels would generate even larger economic impacts.

⁵ See http://forecast.pacific.edu/articles/PacificBFC_Fish%20or%20Foreclosure.pdf and <http://forecast.pacific.edu/water-jobs/Pacific-BFC-Water-Jobs.pdf> for our discussion of the employment effects of water supplies.

⁶ For instance, the loss of local wild salmon may not create job or income loss in restaurants if consumers choose substitutes. However, the value or quality of the experience is diminished by the loss of a preferred alternative. Non-consumptive economic values such as wildlife viewing are also diminished even though it may not generate employment or income loss.

dominated by the commercial fishery estimate of 21,480 jobs and \$1.17 billion in sales, compared to 1,345 recreational jobs and \$205 million in sales associated with the declining recreational industry. Southwick’s recreational impacts seem reasonable, but the commercial impact is implausibly large, especially since the value of California commercial salmon landings were less than \$20 million in 2004 and 2005.

Southwick’s methodology was to apportion 12% of the total value of commercial fishing related sales in California as calculated by the National Marine Fisheries Service⁷, because this was the portion of California commercial landings that were salmon during these years. This is invalid because the NMFS report includes the value and jobs created by retail seafood sales and wholesaling. Retail and wholesale impacts dominate California’s impacts in the NMFS report because of the state’s enormous consumer market. Table 1 shows the categories of total sales and employment impacts attributed to all commercial fishing in California and Alaska in the NMFS report. In a state with a huge consumer market like California, over 95% of the employment impact is in seafood retail, wholesalers and distributors and the majority of this activity is supplied with seafood from areas outside the state such as Alaska. Closing the salmon fishery in California is unlikely to have any significant impact on these retail and distribution jobs as consumers can easily substitute to other sources. To illustrate the contrast, Table 1 shows that the NMFS reports the vast majority of jobs and sales in Alaska are from harvesting and processing locally caught seafood.

Table 1. National Marine Fisheries Services of Commercial Fishing Economic Impacts in California and Alaska in 2006.

	California		Alaska	
	Sales	Employment	Sales	Employment
Commercial Harvesters	\$150,973,000	1,928	\$936,180,000	18,992
Processors and Dealers	\$838,727,000	5,706	\$1,744,954,000	14,052
Wholesalers and Distributors	\$2,252,663,000	19,392	\$142,899,000	1,387
Retail Sectors	\$6,510,953,000	152,374	\$199,745,000	5,413
Total	\$9,753,315,000	179,400	\$3,023,778,000	39,844

In our view, Southwick should have only attributed impacts in fish harvesting and processing and dealers to the Salmon fishery closure. Table 2 shows the effect on their results if their simple methodology of the 14% reduction is applied to only the first two categories. The commercial and recreational impacts are much more balanced with recreational effects being somewhat larger. This corresponds to other studies, and our informal discussions with those

⁷ NMFS values used by Southwick are available at http://www.st.nmfs.noaa.gov/st5/publication/economics_communities.html

familiar with the industry. Total employment impact declines to roughly 2,400 lost jobs, and the output impact declines to \$344 million.

Table 2. Southwick Impacts and Adjusted to Remove Retail and Distribution Effects. (Note: Adjusted impact is an author calculation and is not part of the Southwick report).

	Sales	Jobs
<i>Original Analysis</i>		
Commercial	\$1.17 billion	21,480
Recreational	\$205 million	1,345
Total	\$1.375 billion	22,825
<i>Adjusted Impact</i>		
Commercial	\$139 million	1,069
Recreational	\$205 million	1,345
Total	\$344 million	2,414

Other Studies of California Salmon Fishing

In addition to the Southwick Report, there have been a number of other assessments over the years, although we have had some trouble obtaining full reports in some cases. Most notably, a press release from the Governor’s office on April 21, 2009 references a California Department of Fish and Game estimate that the salmon fishery closure results in a loss of \$279 million in output and 2,690 jobs. A similar proclamation from the Governor on April 10, 2008 puts the impact of the 2008 closure at \$255 million and 2,263 jobs. We were unable to obtain a full report of these estimates, but the overall scale appears reasonable and is similar to the simple adjustment we made to the Southwick estimates in the previous section.

The Pacific Fishery Management Council estimated economic impacts of ocean salmon fisheries in the Review of 2009 Ocean Salmon Fisheries published February 2010. The total economic impacts are reported in terms of personal income, not jobs, and include multiplier effects estimated with an input-output model, IMPLAN. In 2004 and 2005, the PFMC estimates commercial salmon fishing generated an estimated \$32 million in personal income in California, and recreational ocean salmon fishing generated \$17 million in income in California. In 2008 and 2009, the personal income impact of commercial fishing dropped to zero, and recreational fishing to near zero (an average \$160,000). The PFMC report does not include estimates of non-ocean recreational salmon fishing.

A 2001 report by Madalene Ransom estimated the economic impact of salmon fishing in terms of dollars per fish caught. Like most fishing studies, she found the economic impact per harvested fish is higher in recreational fishing due to the large amount of associated expenditures with the highest impact being Sacramento river fishing where the range of economic impact was \$545 to \$1,100 per fish. A 2008 report by Carolyn Alkire for California Trout translated

Ransom's Sacramento River results to total impacts by utilizing an estimate of 142,805 recreational fishing days. Thus, Alkire estimated Sacramento river recreational salmon fishing generated \$17.3 million in total spending and a total economic impact of \$32 million including multiplier effects.

Estimating Economic Impact of Salmon Fishery Closure

In estimating the impact of closing commercial salmon fishing, we look only at the impact on landings and processing. We assume no wholesale, distribution or retail impacts on employment or income, because consumers are able to switch to substitute products, and assume 50% of the decrease in Oregon salmon landings are due to the collapse of Sacramento river salmon. We use the economic impact model, IMPLAN, using 2007 data to construct the social accounting matrix and resulting multipliers. We adjusted the production function in IMPLAN for the commercial fishing sector to match the expenditure patterns for commercial salmon fishing reported by Hackett and Hansen.⁸ Thus, we estimate a \$21.3 million decline in commercial salmon landings due to the closure.

The model estimates 505 lost jobs and a decrease of \$17.1 million in income from the decrease in commercial fishing income. In addition, we estimate that this causes a \$60.9 million decrease in final sales to seafood processors. After netting out downstream commercial fishing impacts from the processing effects to avoid double counting, we find an additional decrease of 457 jobs and \$30.8 million in income. Combining the two effects yields a total loss from the commercial fishery closure of 961 jobs and \$47.9 million in income.

Recreational impacts are potentially even larger, but are much more problematic to estimate. Data is less readily available, and recreational spending may simply be transferred to fishing effort for different species or entirely out of fishing and directed towards other recreational pursuits in the area. Another difficulty is that recreational spending is highly dispersed across many sectors of the economy. We do not have the resources to carefully research and model these dispersed, highly substitutable impacts for this unfunded project, so we utilize some rough assumptions and results from other studies to create a reasonable approximation.

We utilize the National Marine Fisheries Service data that was the basis for the Southwick estimates. This report notes that out-of-state anglers are less than 10% of fishing trips in California, but account for 24.8% of trip-related expenditures. To account for the recreational substitution effect, we only use out-of-state expenditures to estimate the economic impacts.⁹ To

⁸Cost and Revenue Characteristics of the Salmon Fisheries in California and Oregon.
http://www.dfg.ca.gov/marine/pdfs/salmonfisheries_entirereport.pdf

⁹ Some out-of-state anglers may still choose to vacation in California and pursue other types of recreation. At the same time, some in-state anglers may choose to vacation out-of-state because of the salmon fishery closure. Our assumption is that these effects roughly cancel one another, and that the out-of-state share is a good approximation of the total loss of recreational spending to the California economy.

this 24.8% share of recreational expenditures, we assume 14.8% of this loss is attributable to the inability to fish for salmon following Southwick’s assumption based on the results of the California Recreational Fisheries Survey. Applying these two proportions to the NMFS estimates gives a total loss of 862 jobs and \$70.5 million in income. This recreational impact is about 1/3 lower than the Southwick recreational estimates, reflecting increased substitution effects.

Table 3. Estimated Economic Impact of Salmon Fishery Closure.

	Income	Jobs
Commercial	\$47.9 million	961
Recreational	\$70.5 million	862
Total	\$118.4 million	1,823