

## Comparing Income Impact Estimates from IOPAC and FEAM (Salmon Review) Models

Prepared for the:

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The PFMC is in the process of transitioning its fisheries economic impact estimation method from models developed based on key informant interview data and the Fisheries Economic Impact Model (FEAM) to a structure based on more systematic data collections and the NWFSC's IOPAC model. In April 2014 the SSC Economics Subcommittee heard presentations on alternative model configurations for estimating income impacts of West Coast commercial salmon fisheries. The main issue was whether the cost of non-fish processing inputs such as labor and packaging should be treated as proportional to the weight (weight-based approach) or the ex-vessel value (cost-based approach) of fish purchased. The FEAM economic impact model assumes the former while the IOPAC model is based on the latter. The Subcommittee recommended the issue be subjected to further analysis using available data to determine whether there was justification for altering the current cost-based approach used in IOPAC.

In response the results of a statistical analysis of processor cost data collected by the West Coast Economic Data Collection (EDC) program were presented to the Economics Subcommittee at its September 2014 meeting. Linear regressions were performed using several years of available EDC data to test alternative hypotheses that in a given year processors' revenues were proportional to either (1) the weight or (2) the cost of salmon purchased by processors. Results of the analysis showed that while the weight-based hypothesis showed stronger results in certain years, the regression results lacked consistency over time. Subsequently the SSC Economics Subcommittee recommended that the cost-based approach for calculating salmon processing costs in IOPAC be used.

Table 1 compares commercial troll salmon fisheries income impact estimates calculated using IOPAC and the FEAM-based model that was used to produce the results shown in the *Review of 2013 Ocean Salmon Fisheries*. Income impact estimates are displayed in terms of thousands of inflation-adjusted 2013 dollars by year and port group. The table also shows for each port the "Processed Share", or the proportion of salmon revenue landed that is assumed to be processed in the port. In the FEAM-based model this was assumed to be 100% in all cases. This discrepancy accounts for at least some of the difference in estimated impacts for ports where the IOPAC processed share parameter is less than 100%.

Results of a more "apples-to-apples" comparison with 100% local processing shares assumed for all ports are shown in Table 2. For the two ports where IOPAC assumes zero processing, and thus no processor impact coefficients, processor impact components were "borrowed" from adjacent ports: Coos Bay was used to represent Brookings, and Eureka's processor impact measure was substituted for Crescent City.

In general, even assuming 100% local processing shares, IOPAC local-level impacts shown in Table 2 are still lower than FEAM for many ports, but by a smaller margin than in Table 1. However IOPAC state-level impact estimates shown in Table 2 are now all larger than the corresponding FEAM estimates, and often so by a wide margin (>20%). The reason for this result is not immediately clear. But it is useful to keep in mind that the multipliers used in the FEAM salmon impact model were calibrated from a 1998 IMPLAN model and year 2000 PacFIN landings, whereas the IOPAC model uses much more current data.

**Table 1. Comparison of Income Impact Estimates from IOPAC and FEAM (Salmon Review) Models of Non-Tribal Salmon Fisheries [In thousands of inflation-adjusted, 2013 dollars]**

	State-Level Impacts (Ocean Troll Fisheries Only)			Local Model Impacts (Ocean Troll Fisheries)												Local Model Impacts (CR Net Fisheries)	
	Washington	Oregon	California	North Washington Coast	South & Central WA Coast	Astoria	Tillamook	Newport	Coos Bay	Brookings	Crescent City	Eureka	Fort Bragg	San Francisco	Monterey	WA Col. River	OR Col. River
<b>2010</b>																	
IOPAC	4,708.6	4,543.2	2,140.9	539.8	3,234.7	826.5	137.5	1,069.1	947.2	172.7	0.0	28.4	1,286.2	136.4	90.3	2,182.3	5,489.3
Salmon Review	5,244.1	4,181.5	2,198.7	863.6	4,077.3	945.1	274.5	1,371.9	931.1	367.3	0.0	35.3	1,779.8	140.4	160.9	2,735.1	7,340.6
% diff (IOPAC-Review)	-10.2%	+8.7%	-2.6%	-37.5%	-20.7%	-12.5%	-49.9%	-22.1%	+1.7%	-53.0%		-19.6%	-27.7%	-2.8%	-43.8%	-20.2%	-25.2%
<b>2011</b>																	
IOPAC	2,560.5	3,922.1	8,775.7	657.2	1,219.0	207.1	50.1	437.5	1,970.2	237.3	30.1	364.0	3,612.1	2,272.3	576.5	2,118.5	5,085.7
Salmon Review	2,873.4	3,502.1	8,943.0	1,069.9	1,518.3	235.1	99.4	546.2	1,871.9	504.2	67.9	437.4	4,952.4	2,225.3	978.7	2,647.9	6,707.2
% diff (IOPAC-Review)	-10.9%	+12.0%	-1.9%	-38.6%	-19.7%	-11.9%	-49.6%	-19.9%	+5.3%	-52.9%	-55.7%	-16.8%	-27.1%	+2.1%	-41.1%	-20.0%	-24.2%
<b>2012</b>																	
IOPAC	3,620.5	7,033.6	22,372.8	1,126.6	1,422.8	626.2	248.4	1,668.5	1,962.9	322.9	17.3	597.3	3,562.3	11,107.3	3,413.0	1,793.6	3,241.9
Salmon Review	3,927.3	6,140.8	22,371.7	1,804.3	1,664.4	681.9	479.2	2,048.5	1,795.9	697.6	39.0	686.4	4,705.9	10,652.7	5,759.3	2,145.0	4,230.2
% diff (IOPAC-Review)	-7.8%	+14.5%	+0.0%	-37.6%	-14.5%	-8.2%	-48.2%	-18.6%	+9.3%	-53.7%	-55.5%	-13.0%	-24.3%	+4.3%	-40.7%	-16.4%	-23.4%
<b>2013 (prelim)</b>																	
IOPAC	4,362.0	12,354.8	39,857.8	880.0	2,452.5	267.0	308.1	1,549.4	6,497.1	583.4	100.6	1,690.6	9,972.5	20,431.7	2,429.1	2,786.9	5,268.1
Salmon Review	4,606.4	10,740.8	39,121.0	1,360.5	2,866.2	287.0	585.9	1,882.3	5,974.3	1,251.7	223.2	1,923.1	12,909.1	19,180.9	4,010.5	3,351.2	6,746.7
% diff (IOPAC-Review)	-5.3%	+15.0%	+1.9%	-35.3%	-14.4%	-7.0%	-47.4%	-17.7%	+8.8%	-53.4%	-54.9%	-12.1%	-22.7%	+6.5%	-39.4%	-16.8%	-21.9%
Processed Share	Assumed Percent Locally Processed																
IOPAC	55%	64%	44%	25%	90%	44%	19%	52%	100%	0%	0%	100%	100%	100%	38%	90%	44%
Salmon Review	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

**Table 2. Comparison of Income Impact Estimates from IOPAC and FEAM (Salmon Review) Models of Non-Tribal Salmon Fisheries Assuming 100% Local Processed Share [In thousands of inflation-adjusted, 2013 dollars]**

	State-Level Impacts (Ocean Troll Fisheries Only)			Local Model Impacts (Ocean Troll Fisheries)												Local Model Impacts (CR Net Fisheries)	
	Washington	Oregon	California	North Washington Coast	South & Central WA Coast	Astoria	Tillamook	Newport	Coos Bay	Brookings	Crescent City	Eureka	Fort Bragg	San Francisco	Monterey	WA Col. River	OR Col. River
<b>2010</b>																	
IOPAC	5,598.4	5,216.9	2,669.7	747.5	3,354.8	1,038.6	206.7	1,300.1	947.2	309.9	0.0	28.4	1,286.2	136.4	121.0	2,250.6	6,698.3
Salmon Review	5,244.1	4,181.5	2,198.7	863.6	4,077.3	945.1	274.5	1,371.9	931.1	367.3	0.0	35.3	1,779.8	140.4	160.9	2,735.1	7,340.6
% diff (IOPAC-Review)	+6.8%	+24.8%	+21.4%	-13.4%	-17.7%	+9.9%	-24.7%	-5.2%	+1.7%	-15.6%		-19.6%	-27.7%	-2.8%	-24.8%	-17.7%	-8.8%
<b>2011</b>																	
IOPAC	3,070.0	4,533.3	11,064.5	925.4	1,266.3	263.2	76.8	537.0	1,970.2	439.2	52.2	364.0	3,612.1	2,272.3	782.7	2,188.0	6,270.3
Salmon Review	2,873.4	3,502.1	8,943.0	1,069.9	1,518.3	235.1	99.4	546.2	1,871.9	504.2	67.9	437.4	4,952.4	2,225.3	978.7	2,647.9	6,707.2
% diff (IOPAC-Review)	+6.8%	+29.4%	+23.7%	-13.5%	-16.6%	+12.0%	-22.7%	-1.7%	+5.3%	-12.9%	-23.1%	-16.8%	-27.1%	+2.1%	-20.0%	-17.4%	-6.5%
<b>2012</b>																	
IOPAC	4,391.3	8,203.0	28,640.0	1,623.6	1,481.1	808.3	392.0	2,074.4	1,962.9	623.6	31.3	597.3	3,562.3	11,107.3	4,721.8	1,856.2	4,054.7
Salmon Review	3,927.3	6,140.8	22,371.7	1,804.3	1,664.4	681.9	479.2	2,048.5	1,795.9	697.6	39.0	686.4	4,705.9	10,652.7	5,759.3	2,145.0	4,230.2
% diff (IOPAC-Review)	+11.8%	+33.6%	+28.0%	-10.0%	-11.0%	+18.5%	-18.2%	+1.3%	+9.3%	-10.6%	-19.7%	-13.0%	-24.3%	+4.3%	-18.0%	-13.5%	-4.1%
<b>2013 (prelim)</b>																	
IOPAC	5,290.6	14,408.9	51,023.1	1,268.3	2,553.1	344.6	486.1	1,926.4	6,497.1	1,126.7	181.4	1,690.6	9,972.5	20,431.7	3,360.6	2,884.2	6,588.9
Salmon Review	4,606.4	10,740.8	39,121.0	1,360.5	2,866.2	287.0	585.9	1,882.3	5,974.3	1,251.7	223.2	1,923.1	12,909.1	19,180.9	4,010.5	3,351.2	6,746.7
% diff (IOPAC-Review)	+14.9%	+34.2%	+30.4%	-6.8%	-10.9%	+20.1%	-17.0%	+2.3%	+8.8%	-10.0%	-18.7%	-12.1%	-22.7%	+6.5%	-16.2%	-13.9%	-2.3%
Processed Share	Assumed Percent Locally Processed																
IOPAC	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Salmon Review	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%