

Memorandum

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DATE: October 24, 2012
TO: Paul Levesque, Tillamook County
Aaron Palter, Port of Tillamook Bay
FROM: Vaughn Collins, P.E.
SUBJECT: Modifications to Benefit-Cost Analysis and Additional Supporting Information

At the appeal hearing conducted by video tele-conference on September 21, 2012, FEMA HQ staff requested that 1) Revised information be submitted related to the BCA modification due to the demolition of the Safeway store, and 2) Any additional information that would support additional benefits be provided in order to provide a buffer should questions arise with the core BCA analysis. This memorandum provides the requested information. Please note that no new BCA report is being provided; this memorandum notes where data in the report is superseded.

We present updated results with the Safeway store removed, and a new transportation detour cost analysis performed using standard FEMA methodology. These two actions result in a revised Benefit-Cost Ratio. We also discuss two additional benefit categories that, when included, result in significant increases to the Benefit–Cost Ratio.

Removal of Safeway Store from Benefit-Cost Analysis

The Benefit-Cost Analysis submitted to date included a Safeway grocery store located along Highway 101 that was prone to flooding. In the week before the hearing, the analysts were made aware that this store was being demolished. In reviewing the BCA data, this store had, by a large margin, the greatest damages of any commercial structures in the analysis. This necessitated a recalculation of the BCA with this structure removed, which also changed the data presented in the commercial loss validation analysis.

Loss Validation of Commercial Properties

A revised Table 6 from section 6.2 of the March 2012 Benefit-Cost Analysis is presented below. The HAZUS total commercial damages are reduced and the number of structures used to calculate the average reduced by one. The historic flood damages were reviewed and no claims from the Safeway store are included in the record. As a result of removing the Safeway store, the difference between historic claims and the HAZUS analysis is significantly reduced. This indicates the Safeway store was skewing the differential between historic and HAZUS losses. In our opinion, by removing the disproportionate influence the Safeway store had on HAZUS damages, the reduced differential is a more robust number. The revised differentials are much closer than those previously reported. The table has been modified from the report to show Replacement Cash Value (RCV) rather than paid claims using a

1.14 multiplier as documented in the BCA report. We would expect HAZUS to output damages well in excess of flood payments or RCV as it captures many more types of damages than those covered by flood insurance. The fact that the values are equal for the 2006 event indicates that HAZUS is likely underestimating true damages for commercial structures.

Table 1: Revised Table 6 from the March 2012 BCA Report: Commercial Damages Validation

Flood Event	Insurance Claims/RCV		HAZUS Analysis 22-yr Flood		% differential
	Total Claims	Average RCV (2011\$)	Total Commercial Loss	Average Loss	
12/28/1998	\$1,176,731	\$84,970	\$8,057,041	\$104,637	+23%
11/6/2006	\$1,769,332	\$105,023	\$8,057,041	\$104,637	0%

Change in Damage Estimates

Consistent with our previous approach, inventory damages for commercial and agricultural structures for the 6- and 22-year events were reduced by 50%. We note that under this approach, we lowered damages for commercial structures even though the HAZUS outputs indicate that no downward adjustment is necessary; adding a multiplier to the results would have been justified in our opinion. In addition, residential damages remain unadjusted although they fall 40% lower than historic damages. Removing the Safeway store from the damage estimates reduces total damages for all floods under pre- and post-project conditions. The revised benefits total is \$9,063,000.

We have also calculated project benefits with no reduction in Commercial inventory losses, which we believe is justified based on the data presented above. We did not adjust residential damages upwards and left agricultural inventory losses reduced as before. For this scenario the revised benefits total is \$10,519,000.

Transportation Delay Analysis

Benefits due to reduced delay time have also been calculated and are presented here. During floods, Highway 101 is routinely closed. The lowest elevations of the highway are at the head of the Southern Flow Corridor project. The proposed project will allow Highway 101 itself to reopen sooner than under existing conditions by facilitating faster drainage and flood recession times.

Average Daily Traffic (ADT) data was obtained from the Oregon Department of Transportation and determined to be 17,100 trips/day at MP 65.23¹. The 5 mile detour route is shown in the figure below. An average travel speed for the detour was assumed to be 10 mph. This value reflects the high traffic volume that must be detoured, drivers slowing to observe the flood, reduction in lanes from four on Highway 101 to two for the detour, and the traffic control required where Wilson Loop Road intersects Highway 6. This is an uncontrolled intersection that during the detour requires northbound 101 traffic to make a left turn across westbound Highway 26 traffic, which itself has an ADT of 4100. The total additional detour time is therefore estimated to be 30 minutes.

¹ http://www.oregon.gov/ODOT/TD/TDATA/tsm/docs/2011_TVT.pdf

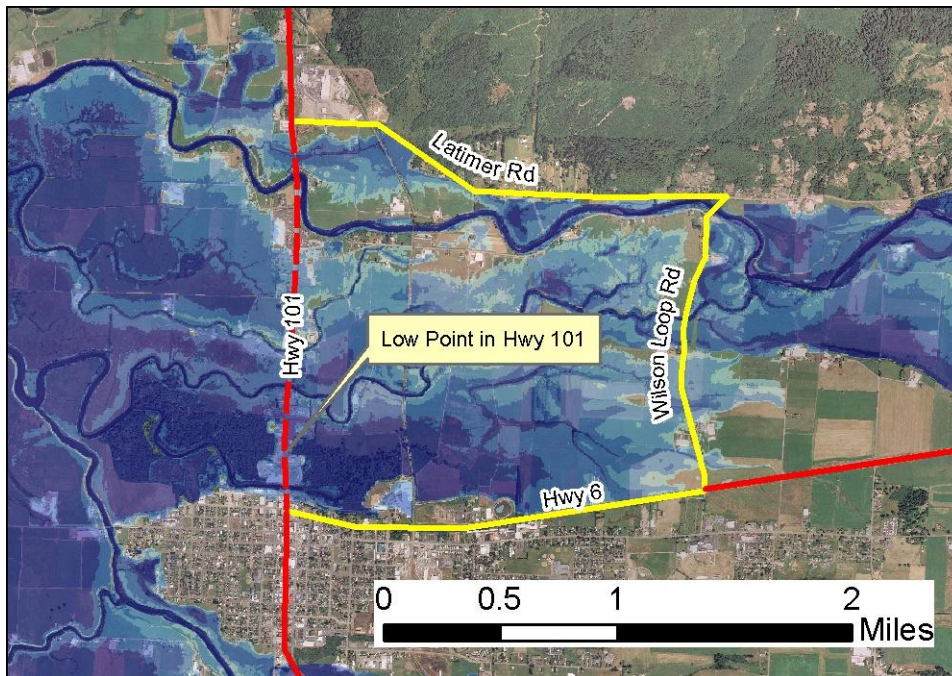


Figure 1: Highway 101 Detour Route (shown in yellow)

Reduced Highway 101 closure time was determined by the duration of time flood levels were above road grade at the lowest point of Highway 101 for each simulation. Reductions in road closure times are 2.5, 3.0, and 5.0 hours for the 6, 22, and 100-year floods, respectively.

Transportation Project Benefits

The data described above was loaded into a separate BCAR model and annualized avoided damages calculated. The project benefits due to reduced detour times are \$141,100 over the project life.

Recreational Fishery Benefits

The proposed project was developed as a flood damage reduction project, but has the advantage of providing large ecological benefits through the removal of existing levees and restoration of tidal marsh habitat. Recreational fishing for salmon is a large economic driver in Tillamook County, and this project will increase the salmon populations. The attached letter from Rick Klumph of the Oregon Department of Fish and Wildlife (ODFW) provides more detail, but in summary, this project creates a large increase in the habitat type that is the “bottleneck” in increasing salmon run size. As salmon are an economically valuable species, increasing salmon populations provides direct benefits to Tillamook County. Benefits due to increased production of both Chinook and Coho salmon are calculated. The two species residence time and preferred habitat within the project area are different so it is assumed that fish production gains are independent and can therefore be summed.

ODFW Chinook Valuation

The first method was completed by ODFW specifically for the proposed project and is detailed in the accompanying letter. The economic analysis presented is focused on increased production of Chinook salmon. The analysis uses a value of \$95.00/fish for an annual benefit of \$296,000. We note that this fish value is on the low end of the ranges presented in the following table and more recent studies have higher values. The present value at a 7% discount rate over 50 years is then \$4,085,000.

Coho Valuation

The second method uses a recent study by Sheeran & Hesselgrave² (2012) of a very similar restoration project on the Coquille River, located south of Tillamook on the Oregon Coast. Here the species of focus is Coho salmon. The study provides a literature review of numerous other studies on economic valuation of recreational salmon fisheries and a methodology to calculate benefits due to habitat restoration. This study determined the increase in salmon production due to habitat restoration by calculating average smolt (juvenile) production on a per acre basis, and applying a 6.1% ocean survival rate to estimate each acre of restored habitat can produce 11-14 adult Coho available for catch. A review of catch rates provided by ODFW for the Tillamook Bay Coho run indicates that the sum of ocean and freshwater take is in the range of 12%. Multiplying the low end estimate of 11 fish/acre produced by the 500 acre project area by the catch rate gives a total increase of 660 additional Coho caught annually. The Coquille study conducted an extensive literature review of Pacific Northwest salmon economic studies. The following table summarizes values from the analysis.

Table 2: Summary of Economic Value of Sport-Caught Coho Salmon from Sheeran & Hesselgrave (2012)

Reference	Value \$/fish	Value \$/yr @ 660 fish	Benefits over Project Life (\$2010)	Notes
Expenditure Approach				
Thomsen & Speir (2011)	\$ 398.95	\$ 263,307	\$3,633,833	Based on \$101/day food, fuel, boat, outfitting expenses etc and 3.95 days/fish catch effort
Willingness to Pay Approach				
Thomsen & Speir (2011)	\$ 255.56	\$ 168,670	\$2,327,766	Review of 8 Studies
Heilvoigt & Charlton (2009)	\$ 165.16	\$ 109,006	\$1,504,359	Rogue river coho based on review of 22 studies
Heilvoigt & Charlton (2009)	\$ 67.33	\$ 44,438	\$613,275	Ocean catch. Based on review of 22 studies
Sheeran & Hesselgrave (2012)	\$ 96.52	\$ 63,703	\$879,152	Data from Heilvoigt & Charlton, filtered for PNW salmon
ODFW³ (2010)	\$ 63.21	\$ 41,719	\$575,748	Based on a study by Olsen et al, (1990) for ocean caught coho

² Sheeran, Kristen & Hesselgrave, Taylor. Analysis of the Economic Benefits of Salmon Restoration Efforts on the Lower Coquille River and Associated Economic Impacts, Report to the Nature Conservancy. April 2012. Draft currently in peer review. Available at <http://www.wildriverscoastalliance.com/SIB/files/ECOTRUST-salmon%20economics%20doc%20Final%20April.pdf>

³ ODFW. Plan to Reform Department Operated Fish Hatcheries on the Oregon Coast. Submitted to the Oregon Legislature by the Oregon Department of Fish and Wildlife. December 14, 2010. Available at <http://library.state.or.us/repository/2011/201104191116182/>. This is the same report used by ODFW to value Chinook salmon at \$95/fish as documented in the attached letter.

It can be seen that using the low end of fish productivity and low catch rates, the project benefits accrued still range from \$580,000 to \$3.63million, depending on the fish valuation used. For an average estimate we use the “medium” value selected by Sheeran & Hesselgrave (2012) of \$165.16/fish which was used in their benefits calculation. This value results in \$1.50million in benefits.

Recreational Fishery Project Benefits

We note that the economic benefits shown here are direct benefits related to the value of recreational fishing, without economic multipliers or other benefits such as ecosystem services included. Summing the increased Chinook and the range of estimated Coho production results in benefits of \$4.67 million - \$7.72 million. The summed Chinook and midrange Coho benefits are \$5.59 million.

Construction Cost Contingency

The project construction cost estimate includes a 25% contingency. FEMA guidance on project costs for regular mitigation grant applications is to disallow contingencies. This issue has been raised several times with FEMA staff but no guidance has been received to date on whether this contingency is allowable or not. Construction cost contingencies at the stage of design this project is contain two primary components. One is not a true contingency but an allowance for minor project details that have not been fully developed at this stage and hence are not itemized. A better term for this component would be “Miscellaneous Project Elements”. As a project progresses to final design, these minor items become individually defined and the costs are shifted from the lumped contingency to itemized units. The second component is a true contingency: additional funds reserved for unforeseen increases in project cost due to circumstances beyond the control of the project designers.

Project Costs

This project is primarily an earthmoving project on rural lands without utility, infrastructure, or structure complications. The cost estimate has been developed in detail to account for all known project elements of any significance. We estimate that additional project costs from miscellaneous project elements could account for an additional 15% of the construction cost estimate. This leaves 10% (\$521,000) as a true contingency that perhaps should not be included in the project cost estimate.

Summary

The following table summarizes the results of the adjustment to benefits and costs described above. The removal of the Safeway store and addition of transportation delay reduction benefits are used to generate a revised Benefit-Cost ratio, shown for both the prior approach and without commercial inventory reduction. In addition, the table shows how the BCR would change with either the addition of recreational fishery benefits or a reduction in project cost due to contingency removal.

Table 3: Revised Benefits

	Revised Benefits, Prior Approach	BCR	Revised Benefits, Ag Inventory Reduction Only	BCR
Structures	\$ 9,063,433		\$ 10,518,666	
Transportation	\$ 141,000		\$ 141,000	
Project Benefits Total	\$ 9,204,433		\$10,659,666	
Project Costs	\$ 8,336,015	1.10	\$ 8,336,015	1.28
Change to BCR with Additional Benefits/Lowered Cost				
No Construction Contingency	\$ (521,000)		\$ (521,000)	
Revised Project Cost	\$ 7,815,015	1.18	\$ 7,815,015	1.36
Sport Fishing Value, Low	\$ 4,661,000		\$ 4,661,000	
Revised Total Benefits	\$ 13,865,000	1.66	\$ 15,320,000	1.84
Sport Fishing Value, Medium	\$ 5,589,000		\$ 5,589,000	
Revised Total Benefits	\$ 14,794,000	1.77	\$ 16,249,000	1.95
Sport Fishing Value, High	\$ 7,719,000		\$ 7,719,000	
Revised Total Benefits	\$ 16,923,000	2.03	\$ 18,379,000	2.20

As a result of these adjustments, we believe the validation of commercial damages (the single largest category) is strengthened. We believe the analysis shows HAZUS may be underestimating true damages for this category. Applying the inventory reduction factors as was done prior results in a somewhat lower BCR. Without reducing commercial inventory losses, an approach we believe better matches the validation data, results in a revised BCR slightly higher than previous.

The project also creates large benefits by increasing the value of the sport fishery in Tillamook County. We believe that the economic analysis of the value of increased salmon production is robust and supported by multiple studies. Accounting for this results in large increases in the BCR.

We conclude by noting that the analysis still ignores numerous benefits that were not included due to lack of documentation or the effort required. Commercial and agricultural structures generate 75% of the benefits. The majority of these businesses have employees, so loss of employee income is expected to be a significant uncounted factor. In addition, debris cleanup, vehicle damage and external equipment damage are not accounted for. In summary, this analysis is a lower-bounds, robust, validated effort that has generates positive benefit-cost ratio even under the most conservative assumptions used.