

# DRAFT MEMORANDUM

**Date:** December 1, 2020  
**To:** Chehalis Basin Board  
**From:** Andrea McNamara Doyle, Office of Chehalis Basin Director  
**Re:** UPDATED Local Actions Program Near-term Technical Analyses for Office of Chehalis Basin: Magnitude of Late-Century Flood

This memorandum updates my October 29, 2020 response to the Chehalis Basin Board’s request for a summary of how the predicted late-century catastrophic flood (i.e., 100-year flood in 2080) compares to peak historical flood events at several gages within the Chehalis River Basin.

The State Environmental Policy Act (SEPA) Draft Environmental Impact Statement (EIS) climate change modeling projected that streamflow rates could increase by 26% by the late-century (2055 to 2099, averaged at 2080) (Anchor QEA and WSE 2019). More recent analysis indicates that the 26% increase is likely a median projection, and that flow increases might be as high as 50% (UW CIG, WSE, and Anchor QEA 2020). To address uncertainties inherent in climate change predictions, the adjustments to streamflow were applied uniformly across the basin to historical flows based on U.S. Geological Survey (USGS) gages. The modeled flood event was designed to represent extreme flood conditions throughout the basin, not just on a single river or reach, by increasing all flow values at each USGS gage and hydraulic model inflow location.

Based on the Board’s direction to consider a larger range of potential late-century 100-year flows, Table 1 has been updated to show a range of modeled late-century 100-year flood flows that are increased by 26% and 50% compared to the peak historical flow, or “flood of record” at several USGS gages throughout the basin.

**Table 1**  
**Comparison of Historical and Modeled Flows in Chehalis River Basin**

LOCATION	LATE-CENTURY 100-YEAR FLOOD		FLOOD OF RECORD (CFS)	FLOOD OF RECORD DATE
	WITH 26% INCREASE	WITH 50% INCREASE		
Chehalis River near Doty	45,100	53,500	52,600 <sup>1</sup>	12/3/2007
Chehalis River near Grand Mound	102,200	128,600	79,100	12/4/2007
Chehalis River at Porter	120,700	151,800	86,500	12/5/2007
South Fork Chehalis River near Wildwood <sup>2</sup>	N/A	N/A	12,200	12/3/2007
South Fork Chehalis River at Boistfort <sup>2</sup>	26,700	31,700	5,700	2/7/1945
Newaukum River near Chehalis	18,500	22,000	13,300	2/8/1996
Skookumchuck River near Bucoda	19,500	23,300	11,300	2/8/1996
Satsop River near Satsop <sup>3</sup>	26,600	31,600	63,600	3/19/1997
Wynoochee River above Black Creek <sup>3</sup>	18,100	21,500	25,600	3/19/1997

Notes:

1. WSE estimated value (WSE 2014); the USGS estimates that this event had a peak flow of 63,100 cfs.
2. The hydraulic model only extends up the South Fork Chehalis to Boistfort so late-century catastrophic flood data are not available at Wildwood. The USGS gage at Boistfort stopped operating in 1965 and the gaging near Wildwood began in 1995. The basin area to Boistfort is approximately double the basin area at Wildwood so the December 2007 flow at Boistfort could be approximated as about double the flow at Wildwood.
3. The Satsop and Wynoochee rivers, as well as other rivers and creeks downstream of Grand Mound, often see their largest floods during events when the mainstem Chehalis River is not experiencing its highest floods. Thus, the Wynoochee and Satsop river flows concurrent with very large Chehalis River floods are typically a lower return period than the concurrent mainstem flood. That is why the flows in the basin-wide late-century 100-year floods shown for the Satsop and Wynoochee rivers are smaller than the historical floods of record on those rivers. The late-century 100-year flood on lower basin tributaries could be larger than the basin-wide flood that was modeled for the Draft SEPA EIS.

## References

Anchor QEA and WSE (Anchor QEA, LLC, and Watershed Science and Engineering), 2019. Memorandum to: A. McNamara Doyle and C. Bailey (Office of Chehalis Basin). Regarding: Chehalis River Basin Climate Change Flows and Flooding Results. May 6, 2019.

WSE, 2014. Memorandum to: Hydrologic and Hydraulic (H&H) Technical Committee. Regarding: Chehalis Basin Strategy—Peer Review of December 2007 Peak and Hydrograph at Doty Gaging Station. January 31, 2014.

UW CIG, WSE, and Anchor QEA (University of Washington Climate Impacts Group, Watershed Science and Engineering, and Anchor QEA, LLC), 2020. Memorandum to: A. McNamara Doyle (Office of Chehalis Basin). Regarding: Local Actions Program Near-term Technical Analyses for Office of Chehalis Basin: Climate Change Modeling Options. October 2020, in progress.