

MEMORANDUM

Date: October 29, 2020
To: Chehalis Basin Board
From: Andrea McNamara Doyle, OCB Director
Re: Magnitude of Late Century Flood for Local Actions Program

This memorandum responds to the 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 results of the most recent climate change modeling provide forecasted streamflow rates that show peak flows would increase by 26% in the late century (2055 to 2099, averaged at 2080) (Anchor QEA and WSE 2019). To address uncertainties inherent in climate change predictions, the adjustments to streamflow were applied uniformly to historical flows based on U.S. Geological Survey (USGS) gages basin-wide. This means the forecasted late-century 100-year floods were composed of the historical condition 100-year floods with all flow values increased by 26% at each USGS gage.

Table 1 compares the modeled late century 100-year flood to the peak historical flow, or "flood of record," at several USGS gages throughout the basin. This modeled flood event was designed to represent extreme flood conditions throughout the basin, not just on a single river or reach.

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
Chehalis River near Doty	45,100	52,600 ¹	12/3/2007
Chehalis River near Grand Mound	102,200	79,100	12/4/2007
Chehalis River at Porter	120,700	86,500	12/5/2007
SF Chehalis River near Wildwood ²	N.A.	12,200	12/3/2007
SF Chehalis River at Boistfort ²	26,700	5,700	2/7/1945
Newaukum River near Chehalis	18,500	13,300	2/8/1996
Skookumchuck River near Bucoda	19,500	11,300	2/8/1996
Satsop River near Satsop ³	26,600	63,600	3/19/1997
Wynoochee River above Black Creek ³	18,100	25,600	3/19/1997

1 WSE estimated value (2014), the USGS estimated that this event had a peak flow of 63,100 cfs

2 The hydraulic model only extends to Boistfort so late century catastrophic flood data is 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 might be approximated as about double the flow at Wildwood.

3 The Satsop and Wynoochee rivers, as well as other creeks and rivers 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 smaller (e.g., lower return period) than the concurrent main stem flood. That is why the basin-wide late century catastrophic flood shown for the Satsop and Wynoochee rivers is smaller than the historical floods of record on those rivers. The late century catastrophic 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.