

Proposal to Upgrade the Streamgage Datum at Sixteen USGS Monitoring Sites in the Chehalis River basin

Prepared by the USGS for the Chehalis River Basin Flood Authority **Updated August 16, 2017**

The Chehalis River Basin Flood Authority requested a proposal from the USGS for changing the datums of the streamgaging network in the Chehalis River basin to a common datum. There are 16 USGS-operated streamgages in the network that need to update their datum to North American Vertical Datum of 1988 (NAVD 88).

Note that the NWS requests that the Chehalis River Basin Flood Authority coordinate any gage or datum changes with the NWS because making changes has implications for the flood warning system, river modeling, official flood stages, historical crest records, and the hydrograph and flood inundation mapping information displayed on the webpages generated by the Advanced Hydrologic Prediction Service (AHPS). The USGS requires a 90-day notification period prior to gage datum changes at streamgages to alert stakeholders, including the NWS, of the changes (<http://water.usgs.gov/admin/memo/SW/sw13.02.html>).

Elevations of 16 streamgages (table 1) in the Chehalis River basin that currently use either an arbitrary datum or the National Geodetic Vertical Datum of 1929 (NGVD 29) will be surveyed and tied to the NAVD 88 datum. Station no. 12026600 (Skookumchuck River at Centralia) and 12025500 (Chehalis River at Centralia) that are currently operated by the National Weather Service (NWS) will be included in the survey. These sites will be provided with a nearby benchmark, but the installation of staff plates and nearby reference marks will be done by West Consultants who are taking over the operation of the gages.

NAVD 88 datums will be determined by running levels from an NAVD 88 benchmark with a vertical accuracy of 5 cm or better. If no benchmark exists within about 1/2 mile of the gage, either real-time kinematic (RTK) GPS system will be used to determine the gage elevation or the datum will be converted from an existing NGVD 29 datum using the National Geodetic Survey (NGS) program, VERTCON. A test of the accuracy of the VERTCON conversion method showed that comparing the VERTCON-derived elevations to surveyed NAVD 88 first and second order elevations in the NGS database, VERTCON was within a two hundredths of a foot when the comparison was near Centralia-Chehalis corridor that has many surrounding benchmarks and less accurate (>0.1 ft) away from the Centralia-Chehalis corridor. Those streamgages farthest away from the Centralia-Chehalis corridor will be determined by RTK GPS if no nearby benchmark exists.

Changing the datum of a gage is a complex process that involves multiple steps. For example, for each surveyed gage, approximately eight points will be surveyed, each tied back to a benchmark. These eight points include gage reference marks, multiple new staff plates for some of the gages, wire-weight gages, etc. Once the gages have been surveyed, USGS gage documentation and databases will be updated to reflect the new datum. In addition, historical measurements that are used for the most recent stage-discharge rating curve will be reentered into the database to create a new rating curve that is consistent with the new datum. The latter will need to be done for 14 of the 16 gages.

Once a Joint Funding Agreement has been signed for the proposed work, the USGS can complete the task in two month or less. The datum changes would be activated after the required public notification period described above. There are some available cooperative matching funds for federal fiscal year 2017 (FFY17) that can contribute \$10,000 for this project, but only if the agreement is signed by Sept. 15, 2017. Total cost of the project is \$27,100.

Budget and Funding Sources:

Agency	FFY17	FFY18	Total
USGS	\$10,000	\$0	\$10,000
Chehalis River Basin Flood Authority	\$700	16,400	17,100
Total	\$10,700	\$16,400	\$27,100

Table 1. List of 16 streamgages in the Chehalis River basin for which the datum would be changed to the North American Vertical Datum of 1988, their current datum, and probable conversion method.

USGS Station No.	Station Name	Current Datum	Probable Conversion Method
12020000	Chehalis River near Doty	Arbitrary	GPS
12020525	Elk Creek below Deer Creek near Doty	NGVD 29	GPS
12020800	South Fork Chehalis River near Wildwood	NGVD 29	Levels
12021800	Chehalis River near Adna	NGVD 29	Levels
12024000	South Fork Newaukum River near Onalaska	NGVD 29	GPS
12024400	North Fork Newaukum River above Bear Creek near Forest	NGVD 29	GPS
12025000	Newaukum River near Chehalis	NGVD 29	VERTCON
12025100	Chehalis River at Wastewater Treatment Plant at Chehalis	NGVD 29	Levels
12025500	Chehalis River at Centralia	NGVD 29	VERTCON
12025700	Skookumchuck River near Vail	NGVD 29	GPS
12026150	Skookumchuck River below Bloody Run Creek near Centralia	NGVD 29	Levels
12026400	Skookumchuck River near Bucoda	NGVD 29	VERTCON
12026600	Skookumchuck River at Centralia	NGVD 29	Levels
12027500	Chehalis River near Grand Mound	NGVD 29	VERTCON
12031000	Chehalis River at Porter	NGVD 29	Levels
12035000	Satsop River near Satsop	NGVD 29	Levels