Washington State Department of Ecology

Stream Discharge Technical Notes

Station ID: 01C070
Station Name: Hutchinson Creek near Acme
Water Year: 2022
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Watershed Description

Hutchinson Creek drains a forested basin in the North Cascade foothills that lies between Bowman Mountain on the east and its confluence with the South Fork Nooksack on the west. The creek supports populations of steelhead, coho salmon, and cutthroat trout. Above the gage, the basin ranges in elevation from 530 feet up to 4220 feet along the mountain ridges to the east. The mean elevation is 1750 feet. About 72% of the area is covered by forest canopy. Average annual precipitation is about 70 inches.

- Drainage area (square miles) = 14.0

Gage Location

This stream gage is located on the left bank at an unmarked Washington State Department of Natural Resources bridge off Mosquito Lake Road in Whatcom County, Washington.

- Latitude (decimal degrees) = 48.723531° N
- Longitude (decimal degrees) = -122.155629° W

Location Photograph(s)

Figure 1: Gage pool control of Hutchinson Creek.

Discharge Summary

Discharge is the volumetric flow rate of water that passes through a given cross-sectional area of a creek or river, and is measured in cubic feet per second (cfs). The following section summarizes the streamflow conditions at the gage location during the reported water year.

Table 1: Discharge statistics

Discharge attribute	**Number in cfs or number of days**
Mean annual discharge	52 cfs
Median annual discharge	49 cfs
Maximum daily mean discharge	291 cfs
Minimum daily mean discharge	3.4 cfs
Maximum instantaneous discharge	346 cfs
Minimum instantaneous discharge	3.4 cfs
Discharge equaled or exceeded 10% of recorded time	103 cfs
Discharge equaled or exceeded 90% of recorded time	5.2 cfs
Days discharge is greater than range of ratings	14 days
Days discharge is less than range of ratings	0 days
Un-reported days	14 days
Days qualified as estimates	84 days
Modeled days	0 days

Note: Table 1 may not include values in which the predicted discharge exceeds the range of ratings.

Discussion of discharge statistics

Fourteen days were greater than the range of ratings. No days were less than the range of ratings. Fourteen days were unreported in water year 2022.

Eighty-four days were qualified as estimates. All the days were qualified as estimates based on logger drift error assessment.

Error Analysis Summary

The following section outlines the main component sources of potential error in the annual discharge record at this station. Logger drift is an undesired change in the continuous stage sensor that is not a function of real changes in the water surface elevation. Weighted rating error is the difference between discharges predicted by the rating curve and measured discharges adjusted to the maximum degree of possible error, based on the field observed measurement quality rating.

Table 2: Summary of errors

Error type	Percent of discharge
Potential logger drift error	18%
Potential weighted rating error	12%
Total potential error	30%

Discussion of error analysis

The potential logger drift and weighted rating error are about evenly spilt. For potential logger drift error, most of the error likely stems from fall leaf litter intermittently gathering on the slant pipe and at times causing issues with the bubbles being released from the orifice line. This issue can cause the stage measurement to be noisy or be artificially high which increases the error.

The weighted rating error comes from difficult measurement conditions during higher flows. During higher flows the exposed bedrock outcroppings in the left half of the channel cause turbulence and create shear zones that make it difficult to obtain a good quality measurement.

Stage Record Summary

Stage is the height of the water surface in a creek, river, or lake above a known datum. The table below summarizes the range of stage observed at this gage during the water year.

Table 3: Summary of recorded stages

Stage record	Feet	Date
Minimum recorded stage	0.71 feet	09/26/2022
Maximum recorded stage	4.77 feet	11/15/2021
Range of recorded stage	5.48 feet	

Discussion of stage record

Typically, lowest flows in the western part of Washington State occur from late September to early October. The minimum recorded stage occurred in late September which falls within the normal range. Maximum recorded stage occurred in the middle of November during a large and intense rain event that caused moderate flooding in parts of northwestern Washington State.

Ratings Summary

Rating curves are developed to define the relationship between observed stage and measured discharge at a gaging station for a specific period. The table below lists which ratings were used during the water year, followed by a discussion of notable aspects of rating development and progression through the year.

Table 4: Rating summary table

Rating number	Period of ratings	Range of ratings in cfs	Number of defining measurements	Rating error (percent)
241	10/1/21 to 12/13/21	0.10 to 200	9	13.4%
166	11/13/21 to 4/19/22	0.38 to 350	27	11.3%
233	2/26/22 to 7/11/22	0.50 to 203	7	11.9%
242	6/05/22 to 9/30/22	0.10 to 200	9	13.4%

Discussion of rating(s)

Rating 241 is a clone of rating 24 that begins at the water year boundary. Rating 241 makes a shift for scour to rating 166. Rating 166 makes a shift for fill to rating 233. Rating 233 makes a shift for scour to rating 242.

High Flow Model Summary

In cases where it is not practical to measure the entire range of discharge at a gaging station, a hydrologic model is developed to estimate discharges significantly greater than the measured range.

- Model type (slope conveyance, other, none) = none
- Range of modeled stage (feet) =
- Range of modeled discharge (cfs) =
- Valid period for model =
- Model confidence =

Discussion of modeled data

Survey Type and Date

Periodic surveys are conducted to establish or validate gage datum continuity, reference marks, and gage height indices. In addition, channel shape and slope are surveyed to develop high flow models.

Table 5: Types of surveys conducted with dates

Survey Type	Date
None	

Discussion of surveys

Activities Completed

Seven flow measurements and one site visit were conducted in water year 2022.

Appendix