

WASHINGTON DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
FRESHWATER MONITORING UNIT
STREAM DISCHARGE TECHNICAL NOTES

STATION ID: 46B060
STATION NAME: Roaring Creek near Mouth
WATER YEAR: 2011
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Introduction

Watershed Description

Roaring Creek is a minor tributary, approximately 6% of the drainage area of the Entiat River, and enters the watershed at river mile 5.7. The watershed is bound at its headwaters by Chumstick Mountain (5820 ft) to the west, Roaring Ridge to the north, and Dinkleman Ridge to the south. Land cover above the gage consists of predominantly coniferous forest and shrub-steppe habitats, but also includes riparian woodlands and bedrock/talus slopes. Below the gage rangeland and fruit orchards predominate. Mean annual precipitation across the watershed above this gage location is 33 inches (U.S. Weather Bureau, 1965).

Gage Location

The telemetered stream gaging station on Roaring Creek was installed on September 27, 2002. The gage is located off Roaring Creek Road, approximately 0.80 miles upstream of its confluence with the Entiat River, on the left bank.

Table 1.

Drainage Area (square miles)	25 (USGS, 2015)
Latitude (degrees, minutes, seconds)	47°41'15" N
Longitude (degrees, minutes, seconds)	120°19'56" W

Discharge

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	12
Median Annual Discharge (cfs)	5.0
Maximum Daily Mean Discharge (cfs)	83
Minimum Daily Mean Discharge (cfs)	0.90
Maximum Instantaneous Discharge (cfs)	100
Minimum Instantaneous Discharge (cfs)	0.80
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	34
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	1.39
Number of Days Discharge is Greater Than Range of Ratings	15
Number of Days Discharge is Less Than Range of Ratings	0

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

Narrative

Eight discharge measurements were taken, ranging from 1.50 to 24.5 cfs. Snowmelt runoff began early March, and reached its peak on May 16, 2011, after a period of very hot weather. The minimum discharge was recorded during baseflow conditions on September 13, 2011. The stage record exceeded the extrapolated range of the rating curve for 15 days through middle to late May during the peak of spring runoff.

Error Analysis

Table 3. Error Analysis Summary.

Logger Drift Error (% of discharge)	16.6%
Weighted Rating Error (% of discharge)	14.3%
Total Potential Error (% of discharge)	30.9%

Rating Table(s)

Table 4. Rating Table Summary

Rating Table No.	#802	#11	#901
Period of Ratings	10/01/2010-11/01/2010	10/23/2010-01/18/2011	1/13/2011-5/20/2011
Range of Ratings (cfs)	0.01-910	1.25-910	2.36-910
No. of Defining Measurements	23	4	9
Rating Error (%)	17.4%	10.6%	14.6%

Rating Table No.	#12	#13	
Period of Ratings	5/16/2011-7/11/2011	7/11/2011-9/30/2011	
Range of Ratings (cfs)	0.03-2490	0.03-2490	
No. of Defining Measurements	0	14	
Rating Error (%)	0	16.9%	

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Narrative

The water year began with Table 802, carrying over from the previous water year. Table 802 was phased into Table 11 as minor fall rain events scoured the control. In mid-January, Table 11 was phased into Table 901 (a clone of Table 9) across a minor rain-on-snow event that further scoured the control. In mid-May, Table 901 was phased into Table 12, following the peak of snowmelt runoff, in which deposition occurred to fill the control. Finally, in mid-July, Table 12 was quickly phased to Table 13 where removal of debris from the control resulted in a scour and shift in the rating. Table 13 remained valid through the end of the water year.

Stage Record

Table 5. Stage Record Summary

Minimum Recorded Stage (feet)	0.76
Maximum Recorded Stage (feet)	3.49
Range of Recorded Stage (feet)	2.73
Number of Un-Reported Days	34
Number of Days Qualified as Estimates	147
Number of Days Qualified as Unreliable Estimates	0

Narrative

Nineteen days were unreported due to an ice-impacted channel. The remaining 15 unreported days were due to stage exceeding the extrapolated range of the rating curve. The stage record is considered an estimate for 147 days during the water year. Seventy-five of those days were qualified as estimates because the logger drift exceeded 20 percent, and the difference in reported discharge was greater than 0.50 cfs. Thirty days were coded estimates due to a partially detached slant pipe. The remaining 42 qualified days occurred near periods of ice-impacted data prior to the first ice-free gage observation.

Modeled Discharge

Table 6. Model Summary

Model Type (Slope conveyance, other, none)	None
Range of Modeled Stage (feet)	---
Range of Modeled Discharge (cfs)	---
Valid Period for Model	---
Model Confidence	---

Surveys

Table 7. Survey Type and Date (station, cross section, longitudinal)

Type	Date

Activities Completed

During the first pulse of spring runoff in early April, the staff gage was damaged. From that time forward it was decided that the laser level would become the primary gage index at the same datum.