

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

STATION ID: 45B070
STATION NAME: Icicle Creek near Leavenworth, WA
WATER YEAR: 2011
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Introduction

Watershed Description

Icicle Creek originates in the snowfields of the eastern slopes of the central Cascade Mountain range and flows into the Wenatchee River at the City of Leavenworth. The watershed is bounded by both the Stuart Range and the Chiwaukum Mountains. Land cover above the gage consists of predominantly coniferous forest but also includes alpine shrubland, montane grassland, bedrock/talus slopes, and riparian woodlands of the Wenatchee National Forest and Alpine Lakes Wilderness Area. Mean annual precipitation across the watershed above this gage location is 82.3 inches (U.S. Weather Bureau, 1965).

Gage Location

The gage is located at the East Leavenworth Road bridge on the right bank, approximately one half mile downstream of the Leavenworth National Fish Hatchery Complex at river mile 2.5 mi. At the request of the Chelan County Natural Resources Department, continuous data collection and telemetry instrumentation were installed on November 17, 2010.

Table 1.

Drainage Area (square miles)	211 (USGS, 2012)
Latitude (degrees, minutes, seconds)	47° 33' 49" N
Longitude (degrees, minutes, seconds)	120° 40' 04" W

Discharge

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	943
Median Annual Discharge (cfs)	531
Maximum Daily Mean Discharge (cfs)	4290
Minimum Daily Mean Discharge (cfs)	146
Maximum Instantaneous Discharge (cfs)	4960
Minimum Instantaneous Discharge (cfs)	142
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	2350
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	225
Number of Days Discharge is Greater Than Range of Ratings	0
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 161 to 2532 cfs. Two notable flow events occurred during the water year. Peaks occurred during mid-May, due to typical warming and snowmelt runoff. The recorded maximum discharge occurred on January 17, 2011 following a significant rain-on-snow event.

Error Analysis

Table 3. Error Analysis Summary.

Logger Drift Error (% of discharge)	0.75%
Weighted Rating Error (% of discharge)	10.1%
Total Potential Error (% of discharge)	10.85%

Rating Table(s)

Table 4. Rating Table Summary

Rating Table No.	#1		
Period of Ratings	5/2007-10/2012		
Range of Ratings (cfs)	47-9230		
No. of Defining Measurements	38		
Rating Error (%)	10.1%		

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

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

Narrative

Rating Table #1 applies to the current period of record at this station. It has evolved slightly with the addition of new measurements but, overall, has continued to be persistent. The rating has been logarithmically extended to cover one half the lowest measured discharge and two times the highest measured discharge.

Stage Record

Table 5. Stage Record Summary

Minimum Recorded Stage (feet)	2.27
Maximum Recorded Stage (feet)	10.41
Range of Recorded Stage (feet)	8.14
Number of Un-Reported Days	40
Number of Days Qualified as Estimates	23
Number of Days Qualified as Unreliable Estimates	0

Narrative

The maximum stage was recorded on January 17, 2011 during a notable rain-on-snow event. The minimum stage was recorded on September 17, 2011 during baseflow conditions. Forty days were unreported due to an ice-impacted stage record. The stage record is considered a reliable estimate for 23 days during the water year, following a period of ice-impacted data prior to the next station visit.

Modeled Discharge

Table 6. Model Summary

Model Type (Slope conveyance, other, 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
Station Levels	10/22/2008

Activities Completed

The station was upgraded to a continuous recorder with telemetry on November 17, 2010. At this time a laser level and associated reference marks were also installed.