

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

STATION ID: 19E060
STATION NAME: Deep Creek
WATER YEAR: 2011
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Introduction

Watershed Description

The Deep Creek watershed contains one of three stations in the Intensively Monitored Watersheds (IMW) project Strait of Juan de Fuca complex. The stream is approximately 7.9 miles long, the basin area is 17.3 square miles. Watershed elevations range from sea level to 3,020 feet. Precipitation falls primarily as rain between October and May, averaging 86 inches annually. Crescent formation volcanic rocks in the upper watershed, and marine sedimentary rock overlain by terraces of glacial deposits in the lower watershed, coarsely define the complex geology of the watershed. The primary land use for the last century has been commercial forestry. Three vegetation zones define the basin--Sitka spruce in the valley bottoms, Western hemlock in the low to mid elevations, and Silver fir in the headwaters. The fish species present include Coho salmon, chum salmon, steelhead or rainbow trout, cutthroat trout, Pacific lamprey, western brook lamprey, torrent scuplin, and reticulate sculpin.

Gage Location

The gaging station for Deep Creek is located in Clallam County, Washington, approximately 27 miles west of Port Angeles. Deep Creek is a tributary to the Strait of Juan de Fuca. The gage, placed on the left bank, is on the downstream side of the Highway 112 bridge at approximately river mile 0.2. The stage record is tidally influenced. Tidal spikes in the stage record are removed.

Table 1.

Drainage Area (square miles)	17.3
Latitude (degrees, minutes, seconds)	48 10 21 N
Longitude (degrees, minutes, seconds)	124 01 36 W

Discharge

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	95
Median Annual Discharge (cfs)	59
Maximum Daily Mean Discharge (cfs)	666
Minimum Daily Mean Discharge (cfs)	2.0
Maximum Instantaneous Discharge (cfs)	974
Minimum Instantaneous Discharge (cfs)	1.4
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	243
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	4.3
Number of Days Discharge is Greater Than Range of Ratings	1
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

Due to rating curve exceedances, the highest day of the water year(WY) in the predicted discharge record was excluded from some statistics in Table 2. The mean annual discharge, median annual discharge, maximum daily mean discharge, and maximum instantaneous discharge in Table 2 are less than the actual values. Discharge declines to low flow conditions in October 2010 were punctuated briefly by a small event in the middle of the month. A series of relatively small to moderate storm events began in late October. The largest event of the water year peaked on December 12. A series of lesser storms followed through the winter and spring months. The typical seasonal decline to baseflow conditions began in late May 2011. Very small events in July slowed the seasonal decline to low flow. Baseflow occurred in mid-September. Two small events in late September elevated discharge levels slightly above low flow conditions.

Error Analysis

Table 3. Error Analysis Summary.

Logger Drift Error (% of discharge)	16.1
Weighted Rating Error (% of discharge)	9.2
Total Potential Error (% of discharge)	25.3

Rating Table(s)

Table 4. Rating Table Summary

Rating Table No.	9		
Period of Ratings	10/01-09/30		
Range of Ratings (cfs)	0-988		
No. of Defining Measurements	24		
Rating Error (%)	9.2		

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 9, coupled to the stage record, predicted discharge for all of WY2011. Rating 9 has proven to be a robust rating covering a wide range of flows.

Stage Record

Table 5. Stage Record Summary

Minimum Recorded Stage (feet)	0.69
Maximum Recorded Stage (feet)	8.05
Range of Recorded Stage (feet)	7.36
Number of Un-Reported Days	1
Number of Days Qualified as Estimates	69
Number of Days Qualified as Unreliable Estimates	10

Narrative

The stage record was continuous and complete for WY2011. 1 day was excluded from discharge record predictions because all or some of the recorded stage values for the day exceeded rating curve thresholds. Discrepancies between the logged record and the primary gage index observations were reconciled using an automated data shift procedure. Frequent tidal spikes in the stage record were manually edited. What appears now to have been a faulty pressure transducer during much of the low flow period in summer compromised discharge record quality. The decline to baseflow began in late May. Low flow conditions persisted until late September.

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
station	10/14/2010

Activities Completed

Turbidity threshold sampling initiative ongoing.