

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

STATION ID: 25F060
STATION NAME: Mill Creek
WATER YEAR: 2009
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Introduction

Watershed Description

Mill Creek is one of three watersheds in the Lower Columbia River Intensively Monitored Watersheds project complex. Over 95% of the underlying lithology is of volcanic origin, consisting primarily of flow basalts with interbedded sandstone. The basin is rain dominated with an average annual precipitation rate of 160 centimeters. Focal species within the drainage include coho, chinook, chum, steelhead, and cutthroat. Land cover is 94% forested. Sixty-eight percent of the forested lands are managed by the Department of Natural Resources, and 32% are managed by private landowners. Road density estimates in the complex range from 4.2 to 5.8 miles per square mile.

Gage Location

The monitoring station on Mill Creek is located at the Mill Creek Road bridge approximately 0.3 miles upstream from the confluence with the Columbia River.

Table 1.

Drainage Area (square miles)	30.5
Latitude (degrees, minutes, seconds)	46 11 26 N
Longitude (degrees, minutes, seconds)	123 10 43 W

Discharge

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	72
Median Annual Discharge (cfs)	56
Maximum Daily Mean Discharge (cfs)	432
Minimum Daily Mean Discharge (cfs)	5.8
Maximum Instantaneous Discharge (cfs)	520
Minimum Instantaneous Discharge (cfs)	5.7
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	165
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	8.4
Number of Days Discharge is Greater Than Range of Ratings	13
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

Predicted discharge values for Water Year (WY) 2009 do not include 13 days in which, for some or all of the day, the recorded stage values exceeded the stage value associated with twice the highest measured discharge. The missing days are November 12 and 13, 2008, and January 1 through January 11, 2009. The unusually large and long storm event in January 2009 marked the highest recorded stage for the station.

Error Analysis

Table 3. Error Analysis Summary.

Logger Drift Error (% of discharge)	3.7
Weighted Rating Error (% of discharge)	12.0
Total Potential Error (% of discharge)	15.7

Rating Table(s)

Table 4. Rating Table Summary

Rating Table No.	5		
Period of Ratings	10/01-01/15		
Range of Ratings (cfs)	8-802		
No. of Defining Measurements	8		
Rating Error (%)	12.0		

Rating Table No.	6		
Period of Ratings	01/15-09/30		
Range of Ratings (cfs)	0.001-594		
No. of Defining Measurements	7		
Rating Error (%)	12.0		

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

Narrative

Discharge was predicted at the beginning of Water Year 2009 using Rating 5. The rating shifted to Rating 6 following the large and relatively long storm event of January 2009. Rating 6, coupled to the continuous stage record, predicted discharge for the remainder of WY2009.

Stage Record

Table 5. Stage Record Summary

Minimum Recorded Stage (feet)	1.22
Maximum Recorded Stage (feet)	8.30
Range of Recorded Stage (feet)	7.08
Number of Un-Reported Days	13
Number of Days Qualified as Estimates	46
Number of Days Qualified as Unreliable Estimates	0

Narrative

Two relatively large storm events marked WY2009, one in November 2008 and a much larger event in January 2009. Data gaps within the stage record caused by storm damage and equipment failure were typically filled with well-correlated stage data from an adjacent station. Smaller gaps in the record were filled using linear interpolation. Records associated with these edits were qualified as estimates. Tidal spikes were removed from the final record by manual editing. Data gaps associated with power failure were reduced to zero following the power supply consolidation and improvement initiative implemented in August 2008.

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

Station re-located to downstream side of Mill Creek Road bridge following large, damaging flood of January 2009.