

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

STATION ID: 25F060
STATION NAME: Mill Creek
WATER YEAR: 2012
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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 percent 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 63 inches. Focal species within the drainage include Coho, Chinook, chum, steelhead, and cutthroat. Land cover is 94 percent forested. Sixty-eight percent of the forested lands are managed by the Department of Natural Resources, and 32 percent 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)	114
Median Annual Discharge (cfs)	56
Maximum Daily Mean Discharge (cfs)	672
Minimum Daily Mean Discharge (cfs)	10
Maximum Instantaneous Discharge (cfs)	867
Minimum Instantaneous Discharge (cfs)	9.7
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	299
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	13
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

The discharge record for water year (WY) 2012 was again impacted by a period of backwater effects from the Columbia River. However, unlike WY2011, the period was less severe in magnitude, of shorter duration, and much earlier in the year. The backwater period for the Columbia in WY 2011 was mid-May through mid-July. In WY 2012, the backwater period began at the very end of March and ended in mid-May. Metrics enumerated in Table 2 do not include the backwater period since discharge could not be accurately predicted at that time. One additional day was excluded from the discharge statistics due to a rating curve exceedance. The discharge pattern could best be described as moderate during the year. No exceptionally large storm events occurred. A relatively steady decline to baseflow conditions began in late May. What appears to be a diel evapotranspiration signal in discharge expressed itself from mid-summer to the end of the water year.

Error Analysis

Table 3. Error Analysis Summary.

Logger Drift Error (% of discharge)	12.5
Weighted Rating Error (% of discharge)	10.0
Total Potential Error (% of discharge)	22.5

Rating Table(s)

Table 4. Rating Table Summary

Rating Table No.	8	402	
Period of Ratings	10/01-08/06	06/25-09/30	
Range of Ratings (cfs)	0.001-994	4.4-994	
No. of Defining Measurements	8	23	
Rating Error (%)	10.4	9.1	

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

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Period of Ratings			
Range of Ratings (cfs)			
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Rating Error (%)			

Narrative

Rating Table 8 covered the beginning of WY 2012 and predicted discharge until late March 2012. Rating 8 predicted discharge until gradual seasonal filling of the control during July resulted in a slight, low-end shift of the rating back to rating 4 (402). Rating 4 and replicas (401 and 402) is proving itself to be the primary rating for the Mill Creek gaging station. Rating 402 predicted discharge for the remainder of WY 2012.

Stage Record

Table 5. Stage Record Summary

Minimum Recorded Stage (feet)	1.63
Maximum Recorded Stage (feet)	5.19
Range of Recorded Stage (feet)	3.56
Number of Un-Reported Days	41
Number of Days Qualified as Estimates	106
Number of Days Qualified as Unreliable Estimates	0

Narrative

The stage record was complete for WY 2012. Factors that influenced the quality of the stage record included tidal spikes, backwatering effects from the Columbia River, data gaps caused by equipment failure, discrepancies between logged values and primary gage index observations, and stage values that exceeded the effective rating curve. 40 days in the stage record were not used to predict discharge because of backwatering effects. One day was not used because of rating curve exceedances. 75 days were coded as estimates due to threshold exceedances in the logger drift error analysis. An additional 31 days were estimated due to data gaps.

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

Slant pipes housing station sensors were repositioned on October 31, 2011. Basin lead and support staff confirm Design Analysis Firmware, version 4.30, is incompatible with BASIC code programs.