WASHINGTON DEPARTMENT OF ECOLOGY

ENVIRONMENTAL ASSESSMENT PROGRAM

FRESHWATER MONITORING UNIT

STREAM DISCHARGE TECHNICAL NOTES

STATION ID: 05H070

STATION NAME: Squire Creek at Squire Creek Park

WATER YEAR: 2011

AUTHOR: Don Watt

Introduction

Watershed Description

Squire Creek drains a steep, north-facing basin covering about 20 square miles upstream of the gage at Squire Creek Park. Much of the basin lies in the Boulder River Wilderness as the stream drains the flanks of Three Fingers South and Whitehorse Mountain. Elevation in the basin ranges from 460 ft at the gage to more than 6800 ft on the higher peaks. Mean basin elevation is 2590 ft. Average basin slope is 57 percent. Over 60 percent of the area is covered in forest canopy. Mean annual precipitation is about 93 inches. Squire Creek and its tributaries provide more than 13 miles of spawning habitat for Chinook, Coho, pink and chum salmon, as well as for steelhead and resident trout.

Gage Location

The gage is on the right bank of Squire Creek, north of the Highway 530 bridge. Access for gage maintenance is through Squire Creek Park property.

Table 1. Basin Area and Legal Description

Drainage Area (square miles)	19.8 square miles
Latitude (degrees, minutes, seconds)	48, 16, 13 (NAD83)
Longitude (degrees, minutes, seconds)	-121, 40, 19(NAD83)

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	220 cfs
Median Annual Discharge (cfs)	171 cfs
Maximum Daily Mean Discharge (cfs)	5620 cfs
Minimum Daily Mean Discharge (cfs)	29 cfs
Maximum Instantaneous Discharge (cfs)	8770 cfs
Minimum Instantaneous Discharge (cfs)	24 cfs
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	327 cfs
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	53 cfs
Number of Days Discharge is Greater Than Range of Ratings	None
Number of Days Discharge is Less Than Range of Ratings	None
Number of Un-Reported Days	None
Number of Days Qualified as Estimates	39 days
Number of Modeled Days	15 days

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

Table 2 Discussion (Discharge Statistics)

Water year 2011 had the highest annual mean and median discharge values for the nine-year period of record at the Squire Creek station. The high flow event on December 12 also produced the highest instantaneous discharge and the highest mean daily discharge recorded during the period of record at the station. An erratic or noisy stage record and documented instrument drift combined to cause 24 days to be qualified as estimated data during the water year. The slope-conveyance model was used to estimate high flow values on another 15 days.

Table 3. Error Analysis Summary.

Potential Logger Drift Error (% of discharge)	6 %
Potential Weighted Rating Error (% of discharge)	11 %
Total Potential Error (% of discharge)	17 %

Table 3 Discussion (Error Analysis)

The potential logger drift error of 6 percent of discharge refers to the amount of instrument drift that has been corrected using a time-weighted adjustment to the stage record. The potential weighted rating error is calculated based on the quality of individual discharge measurements used to define the rating and on the degree to which those defining measurements conform to the respective rating curve.

Table 4. Stage Record Summary

Minimum Recorded Stage (feet)	3.91 ft
Maximum Recorded Stage (feet)	13.18 ft
Range of Recorded Stage (feet)	9.27 ft

Table 4 Discussion (Stage Record)

The maximum gage height of 13.18 ft was the highest water level recorded here during the period of record for the station. As noted above, 24 days of data were qualified as estimates due to erratic variations in the stage record, and 15 days were qualified as estimates because of modeled high flow discharge values.

Table 5. Rating Table Summary

Rating Table No.	201	4	
Period of Ratings	10/1/2010 - 8/19/2011	3/31/2011 - 9/30/2011	
Range of Ratings (cfs)	0.01 to 9370 cfs	15 to 9370 cfs	
No. of Defining Measurements	41 Mmts	19 Mmts	
Rating Error (%)	12 %	9 %	

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 (%)			

Table 5 Discussion (Rating Tables)

Channel geometry in the gage reach at Squire Creek has been quite stable through the period of record for this station. The phased shift from Rating 201 to Rating 4 was the result of a minor channel fill.

Table 6. Model Summary

Model Type (Slope conveyance, other, none)	Slope Conveyance
Range of Modeled Stage (feet)	8.4 ft to 13.5 ft
Range of Modeled Discharge (cfs)	1900 cfs to 9370 cfs
Valid Period for Model	Oct. 1 thru Sept. 30
Model Confidence	+/- 5 %

Table 6 Discussion (Modeled Data)

The slope conveyance model for Squire Creek is based on a cross-section and longitudinal survey taken on September 16, 2010, and on data from nine channel-control discharge measurements taken between December 2006 and November 2012. Results from this model are applied throughout the period of record for the station because of the overall stability of the channel geometry.

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

Type	Date
None.	

Table 7 Discussion (Surveys)

Activities Completed

Routine maintenance and discharge measurements were completed at six-week intervals. The Campbell Scientific data collection platform was replaced by a Design Analysis platform on November 3, 2010.