

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

**STATION ID:** 25E060  
**STATION NAME:** Abernathy Creek  
**WATER YEAR:** 2013  
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**Introduction**

Watershed Description

Abernathy Creek is a right bank tributary to the Columbia River located approximately 9 miles west of Longview, Washington. Historically, the stream supported runs of coho and chinook salmon and steelhead and cutthroat trout. Land use is primarily commercial forestry with state and private holdings. Flow basalt with interbedded sandstone defines the underlying geology. Precipitation varies with elevation but typically ranges between 60 and 70 inches annually. Hydrology is almost entirely rainfall driven.

Gage Location

The gage is on the right bank near the downstream side of the Slide Creek road bridge.

Table 1. Basin Area and Legal Description

|                                       |                  |
|---------------------------------------|------------------|
| Drainage Area (square miles)          | 20.3             |
| Latitude (degrees, minutes, seconds)  | 46 12 20.7 north |
| Longitude (degrees, minutes, seconds) | 123 09 14.0 west |

Table 2. Discharge Statistics.

|                                                           |      |
|-----------------------------------------------------------|------|
| Mean Annual Discharge (cfs)                               | 108  |
| Median Annual Discharge (cfs)                             | 79   |
| Maximum Daily Mean Discharge (cfs)                        | 513  |
| Minimum Daily Mean Discharge (cfs)                        | 8.1  |
| Maximum Instantaneous Discharge (cfs)                     | 611  |
| Minimum Instantaneous Discharge (cfs)                     | 7.8  |
| Discharge Equaled or Exceeded 10 % of Recorded Time (cfs) | 259  |
| Discharge Equaled or Exceeded 90 % of Recorded Time (cfs) | 12.6 |
| Number of Days Discharge is Greater Than Range of Ratings | 2    |
| Number of Days Discharge is Less Than Range of Ratings    | 0    |
| Number of Un-Reported Days                                | 2    |
| Number of Days Qualified as Estimates                     | 0    |
| Number of Modeled Days                                    | 0    |

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)

Baseflow conditions in early October 2012 were moderately elevated by a series of relatively small events beginning in mid-October. Similar, relatively small events continued through the winter and spring. No large events occurred during WY2013. The decline to baseflow conditions began in June. The discharge record during baseflow conditions, primarily late July and August were affected by a distinct diurnal oscillation. The diel fluctuation may be due to evapotranspiration within the forested basin. An unusually large event occurred in late September. Two days were not included in the Table 2 statistics because some of the scans recorded on those days exceeded the stage value associated with twice the highest measured discharge for the effective Rating Table. The absence of these 2 days lowered some of the values in Table 2.

Table 3. Error Analysis Summary.

|                                                  |      |
|--------------------------------------------------|------|
| Potential Logger Drift Error (% of discharge)    | 4.0  |
| Potential Weighted Rating Error (% of discharge) | 10.8 |
| Total Potential Error (% of discharge)           | 14.8 |

Table 3 Discussion (Error Analysis)

Total Potential Error (TPO) is the sum of the logger drift error and the weighted rating error. The logger drift error is associated with the difference between the observed value of the primary gage index and the paired stage value logged within the continuous record. The weighted rating error is associated with the quality of discrete discharge measurements used to develop rating curves. The TPO is consistently applied as a range of predicted discharge throughout the hydrograph for the entire water year. For example, if the predicted discharge for WY2013 at Abernathy creek is 100 cfs, the range of predicted flows incorporating the TPO is 114.8 to 85.2 cfs. If the predicted flow is 10 cfs, the range of predicted flows incorporating the TPO is 11.5 to 8.5 cfs.

Table 4. Stage Record Summary

|                                |      |
|--------------------------------|------|
| Minimum Recorded Stage (feet)  | 4.40 |
| Maximum Recorded Stage (feet)  | 8.39 |
| Range of Recorded Stage (feet) | 3.99 |

Table 4 Discussion (Stage Record)

The Abernathy creek stage record for WY2013 is continuous and complete. Any discrepancies between the primary gage index observations and the stage values recorded on the datalogger were resolved using the data shift function.

Table 5. Rating Table Summary

|                              |             |  |  |
|------------------------------|-------------|--|--|
| Rating Table No.             | 8           |  |  |
| Period of Ratings            | 10/01-09/30 |  |  |
| Range of Ratings (cfs)       | 4.2 - 848   |  |  |
| No. of Defining Measurements | 23          |  |  |
| Rating Error (%)             | 10.8        |  |  |

|                              |  |  |  |
|------------------------------|--|--|--|
| 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)

Rating Table 8, coupled to the continuous stage record predicted discharge at Abernathy creek for all of WY2013. Rating 8 continues to be a stable and robust rating for predicting discharge. It is worth noting that the substrate material composing the control at the Abernathy creek gage consists of cobbles, small boulders, and bedrock. Shifts in the control are infrequent due to the hydraulic power required to move material of this size and composition.

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                           |  |

Table 6 Discussion (Modeled Data)

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

| Type | Date |
|------|------|
|      |      |

Table 7 Discussion (Surveys)

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Activities Completed

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## Appendix