**WASHINGTON DEPARTMENT OF ECOLOGY**

**ENVIRONMENTAL ASSESSMENT PROGRAM**

**FRESHWATER MONITORING UNIT**

**STREAM DISCHARGE TECHNICAL NOTES**

**STATION ID:** 01G100

**STATION NAME:** M.F. Nooksack R. above Clearwater Creek

**WATER YEAR:** 2009

**AUTHOR:** Chuck Springer

## Introduction

Watershed Description

The Nooksack watershed contains the three (North, Middle, and South) forks of the Nooksack River, which drain approximately 1,250 sq. mi. of the west slopes of the Cascade Range. The Middle Fork drains approximately 103 sq. mi., originating at the Deming Glacier on the southern flank of Mt. Baker. The river flows northwest for approximately 20 miles to its confluence with the North Fork Nooksack River near the town of Deming. The upper watershed is predominantly managed timber land, while the lower watershed is a broad alluvial plain dominated by rural residential development and small farms.

Gage Location

The Middle Fork gage is located at the bridge crossing, on the right bank of the Middle Fork at river mile 9.5 off of Forest Road 38.

Table 1.

| | |
|---|---|
| Drainage Area (square miles) | 47.1 |
| Latitude (degrees, minutes, seconds) | 48° 46' 02" N |
| Longitude (degrees, minutes, seconds) | -122° 02'18" W |

**Discharge**

Table 2. Discharge Statistics.

| | |
|---|---|
| Mean Annual Discharge (cfs) | 356 |
| Median Annual Discharge (cfs) | 264 |
| Maximum Daily Mean Discharge (cfs) | 3,110 |
| Minimum Daily Mean Discharge (cfs) | 81 |
| Maximum Instantaneous Discharge (cfs) | 7,170 |
| Minimum Instantaneous Discharge (cfs) | 59 |
| Discharge Equaled or Exceeded 10 % of Recorded Time (cfs) | 714 |
| Discharge Equaled or Exceeded 90 % of Recorded Time (cfs) | 136 |
| Number of Days Discharge is Greater Than Range of Ratings | 0* |
| 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 2009 is estimated based on linear regression with USGS Station 12208000 M.F. Nooksack R. near Deming. The regression results were then calibrated using the individual discharge measurements taken during the water year.

**Error Analysis**

Table 3. Error Analysis Summary.

| | |
|---|---|
| Logger Drift Error (% of discharge) | N/A |
| Weighted Rating Error (% of discharge) | N/A |
| Total Potential Error (% of discharge) | N/A |

**Rating Table(s)**

Table 4. Rating Table Summary

| | | | |
|---|---|---|---|
| Rating Table No. | N/A | | |
| 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 (%) | | | |

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

**Narrative**

The stage-discharge relationship at this station completely broke down at the beginning of water year 2008, rendering the rating curves unusable. Continuous discharge for water year 2009 was estimated based on linear regression with USGS Station 12208000 M.F. Nooksack R. near Deming. The regression results were then calibrated using the discharges from the individual measurements taken during the water year.

**Stage Record**

Table 5. Stage Record Summary

| | |
|---|---|
| Minimum Recorded Stage (feet) | 4.35 |
| Maximum Recorded Stage (feet) | 8.93 |
| Range of Recorded Stage (feet) | 4.58 |
| Number of Un-Reported Days | 8 |
| Number of Days Qualified as Estimates | 357 |
| Number of Days Qualified as Unreliable Estimates | 0 |

**Narrative**

Continuous monitoring at this site was discontinued in 2005. The entire continuous stage record is estimated based on USGS Station 12208000 M.F. Nooksack R. near Deming using linear regression. The continuous stage record was then further adjusted to the individual stage height observations taken during the water year. On average, these adjustments amounted to a 50% change in the continuous stage height values produced by the linear regression.

**Modeled Discharge**

Table 6. Model Summary

| | |
|---|---|
| Model Type (Slope conveyance, other, none) | Slope-conveyance |
| Range of Modeled Stage (feet) | 4.0 - 8.1 |
| Range of Modeled Discharge (cfs) | 77 - 4,295 |
| Valid Period for Model | 2005 - 2007 |
| Model Confidence | 14.4% |

**Surveys**

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

| Type | Date |
|---|---|
| none | |

**Activities Completed**

| |
|---|
| Established new laser level and reference marks and reestablished staff gage following bridge replacement in summer 2008. |