



# Stream stage, stream temperature and air temperature for the Nisqually River at Longmire

*Water year 2013*

Water-Data Report NPS/MORA/WDR—2017/004



**ON THE COVER**

High water on the Nisqually River on Monday, October 29, 2012 at 9:42 AM. This view is on the Longmire Suspension bridge facing upstream. This flood occurred 2 days after an outburst flood damaged the Longmire Stream Gage.

Photograph by: Scott Beason, Mount Rainier National Park

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U.S. Department of the Interior  
National Park Service  
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Care has been taken to assure accuracy of raw data values, but a thorough analysis and interpretation of the data has not been completed. Consequently, the initial analyses of data in this report are provisional and subject to change. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

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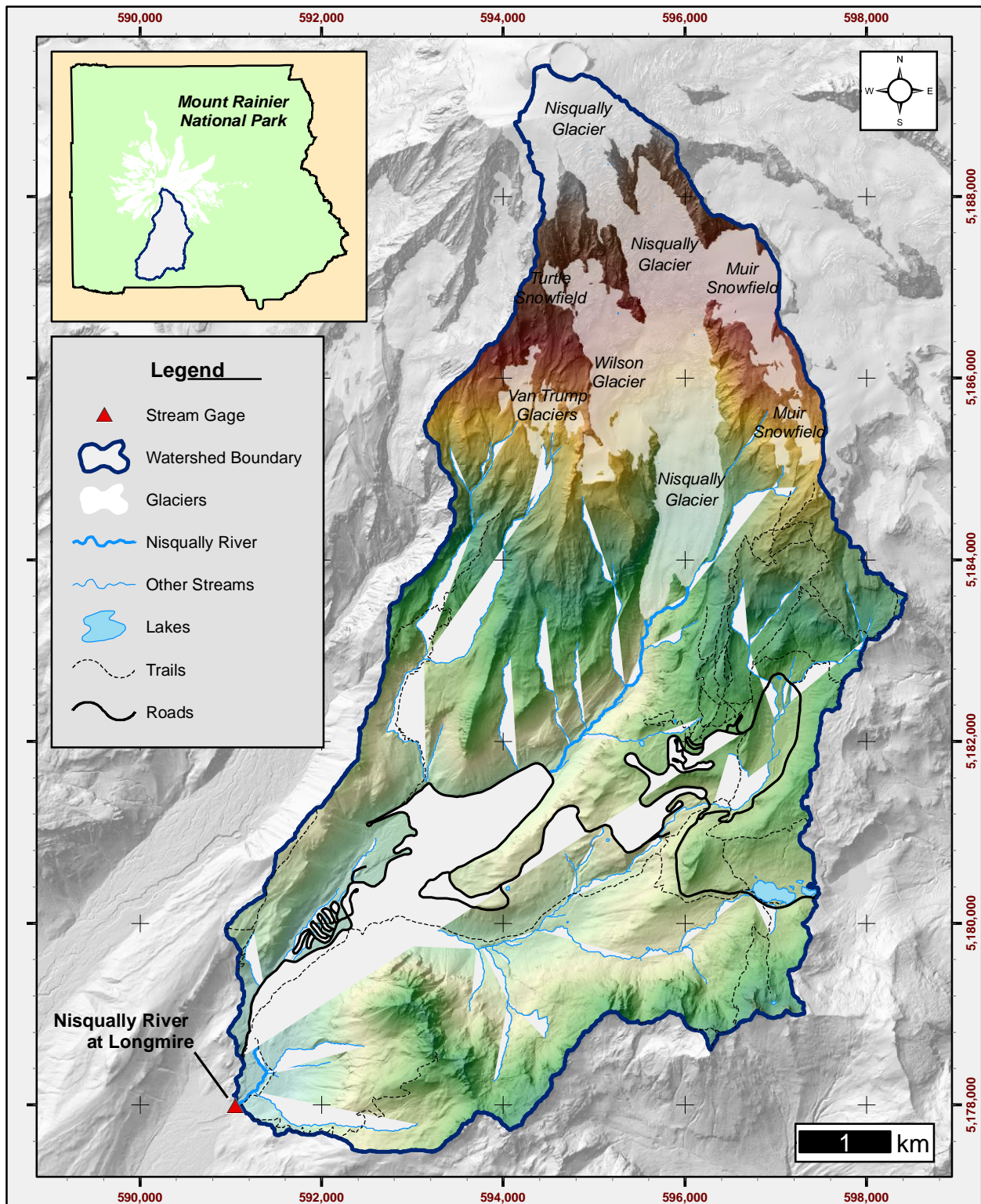
## Introduction

Mount Rainier is a 4,392 m (14,410 ft) volcano in southwestern Washington State. Braided rivers radiate away from the volcano and are generally glacially-sourced. Approximately 4.17 km<sup>3</sup> (1.0 mi<sup>3</sup>) of ice and perennial snows cover Mount Rainier (Driedger and Kennard, 1986). The mountain receives an average of 16.3 m (53.4 ft) of snow at Paradise and melting snow causes high flows in spring and summer months (NPS, 2011). Fall and winter storms lead to periodic flooding and higher flows. Generally, the lowest river flows occur late in the summer prior to the onset of fall storms and in the middle of winter. Most streams in the park exhibit a braiding or anastomosing character due to their glacial source, however, several of the lower order streams that have non-glacial sources exhibit pool-riffle morphology with very coarse median grain sizes. Average stream gradient ranges from 1 to 4%.

The Nisqually River is one of six major stream networks that drain a significant portion of the volcano (the others being the Puyallup, Carbon, West Fork White, White, and Ohanapecosh). The Nisqually River watershed (Figure 1) begins at the Nisqually Glacier and ends at the Nisqually National Wildlife Refuge, emptying into the Puget Sound. The Nisqually River at Longmire has a watershed size of 48.7 km<sup>2</sup> (18.8 mi<sup>2</sup>), a mean basin elevation of 1,814 m (5,950 ft) and drains from the summit of Mount Rainier down to 853 m (2,800 ft) at Longmire (Table 1). The drainage basin includes three glaciers (Nisqually, Wilson and Van Trump Glaciers) and the permanent Muir Snowfield. Mean basin slope is 48.2% and has 39.0% canopy cover. Mean annual precipitation in the watershed is approximately 262 cm (103 in) (USGS Stream Stats, 2011). The Nisqually River's headwaters start at the terminus of the Nisqually Glacier, at approximately 1,585 m (5,200 ft). From there, the river cascades down a steep braided stream with very coarse sediment. The river character is a classic braided system with multiple debris flow inputs from Van Trump Creek and other small streams.

Stream gage data from the Nisqually River at Longmire within Mount Rainier National Park are presented for water year 2013 (October 1, 2012 – September 30, 2013). The Longmire location is currently the only year-round stream gaging station in the park. Stream statistics are obtained via pressure transducers that are mounted within a stilling well at Longmire. Data were obtained at 15 minute intervals for most of the water year with the exception of an outage period between approximately October 29, 2012 and November, 27, 2012. Different sensors had a different outage period during this time. The stream gage recorded the passage of a glacial outburst flood, the first recorded passage of an event like this on the stream gaging equipment at Longmire since WY2010 and the first recorded outburst flood event from the Nisqually Glacier since June 22, 1987.

Stream gage data is useful for determining critical in-stream flows for aquatic habitats as well as showing the range of temperatures exhibited in park streams during the year.



**Figure 1:** Overview map of the Nisqually River Watershed at Longmire showing major glaciers and snowfields, rivers, lakes, roads and trails. (Grid: NAD 1983 UTM Zone 10N, Meters; Scale: 1:65,000)



**Table 1:** Stream gage information for the Nisqually River at Longmire. Watershed data is derived from surveys, 2008 LiDAR basemap of park (Watershed Sciences, 2009) and GIS layers at Mount Rainier National Park.

|                                               |                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Location Description:</b>                  | NE ¼, NW ¼, Section 33, T15N, R08E, Pierce County, Washington.<br><br>On bedrock of river-right bank, approximately 15 feet upstream of the Longmire Back-Gate Road suspension bridge.                                                                                                                                                                                                         |
| <b>Location:</b>                              | <u>NAD 1983 Washington State Plane Coordinate System, South Zone, US Survey Feet:</u><br>N: 519,055.200 feet<br>E: 1,312,570.088 feet<br><br><u>NAD 1983 UTM Zone 10 North, Meters</u><br>N: 5,177,989 meters<br>E: 591,050 meters<br><br><u>Geographic, WGS1984</u><br>Latitude: 46° 44' 57.30405" (46.7492511°)<br>Longitude: -121° 48' 28.55694" (-121.8079325°)                            |
| <b>Elevation (Gage Cap):</b>                  | 2,795.849 feet (NAVD 1988)<br>852.175 meters (NAVD 1988)                                                                                                                                                                                                                                                                                                                                       |
| <b>Drainage Area:</b>                         | 18.80 square miles<br>48.69 square kilometers<br>12,032.72 acres<br>48,694,675.76 square meters                                                                                                                                                                                                                                                                                                |
| <b>Period of Record:</b>                      | October 28, 2009 3:45 PM – December 3, 2010 2:30 PM<br>June 8, 2011 2:15 PM – November 23, 2012 12:30 PM<br>November 27, 2012 2:30 PM – September 30, 2013 11:45 PM                                                                                                                                                                                                                            |
| <b>Recording Interval:</b>                    | 15 minutes                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Gage Equipment (Stilling Well):</b>        | 15 foot total height in three 5-foot sections:<br>(1) White 5 foot by 2 inch schedule 40 PVC pipe with 0.020" slots.<br>(2 and 3): White 5 foot by 2 inch schedule 40 PVC riser pipe.<br><br>Mounted to bedrock exposure with expansion bolts and steel brackets.<br>PVC well cap on the top locked with a National Park Service/Mt. Rainier 17-2 padlock.                                     |
| <b>Gage Equipment (Pressure transducers):</b> | Stage: Solinst® Levelogger® Gold 10 meter/30 foot pressure transducer hung approximately 15 feet from the cap, measuring water pressure and water temperature at 15-minute intervals.<br><br>Barometric: Solinst® Barologger® Gold 1.5 meter/5 foot pressure transducer hung approximately 1 foot from the cap, measuring air pressure and air temperature at 15-minute intervals.             |
| <b>Measured Variables:</b>                    | (1) Water Pressure (Automated pressure transducer measurement)<br>(2) Water Temperature (Automated pressure transducer measurement)<br>(3) Air Pressure (Automated pressure transducer measurement)<br>(4) Air Temperature (Automated pressure transducer measurement)<br>(5) Stage (Calculated, Variable 1 - Variable 4)                                                                      |
| <b>Landscape Types in Watershed:</b>          | <i>Glaciers and Permanent Snowfields:</i> 3.02 mi <sup>2</sup> (7.82 km <sup>2</sup> ), 16.06%<br><i>Alpine:</i> 4.27 mi <sup>2</sup> (11.05 km <sup>2</sup> ), 22.69%<br><i>Subalpine:</i> 4.89 mi <sup>2</sup> (12.66 km <sup>2</sup> ), 25.99%<br><i>Forest:</i> 6.59 mi <sup>2</sup> (17.08 km <sup>2</sup> ), 35.07%<br><i>Lakes:</i> 0.04 mi <sup>2</sup> (0.09 km <sup>2</sup> ), 0.19% |

## Methods

### Stage Computation

Stage heights were calculated with a Solinst® Levelogger® Gold 10 meter/30 foot pressure transducer mounted in the stream bed, above the low flow stage height. The pressure transducer measures the weight of the column of air and water above the transducer. A Solinst® Barologger® Gold 1.5 meter/5 foot pressure transducer mounted above the high water line records air pressure and corrects the water pressure transducer to the effects of changing air pressure. A photo of the completed stream gage site and pressure transducers used in this study is shown in Figure 2.

During the field season and when the equipment was removed, the pressure transducers were downloaded. Barometric compensation was performed to remove the variable of changing air pressure to arrive at the true stage height.



**Figure 2:** (A) Nisqually River stream gage (stilling well) at Longmire and (B) Solinst® Levelogger® and Barologger® pressure transducers used in this study.

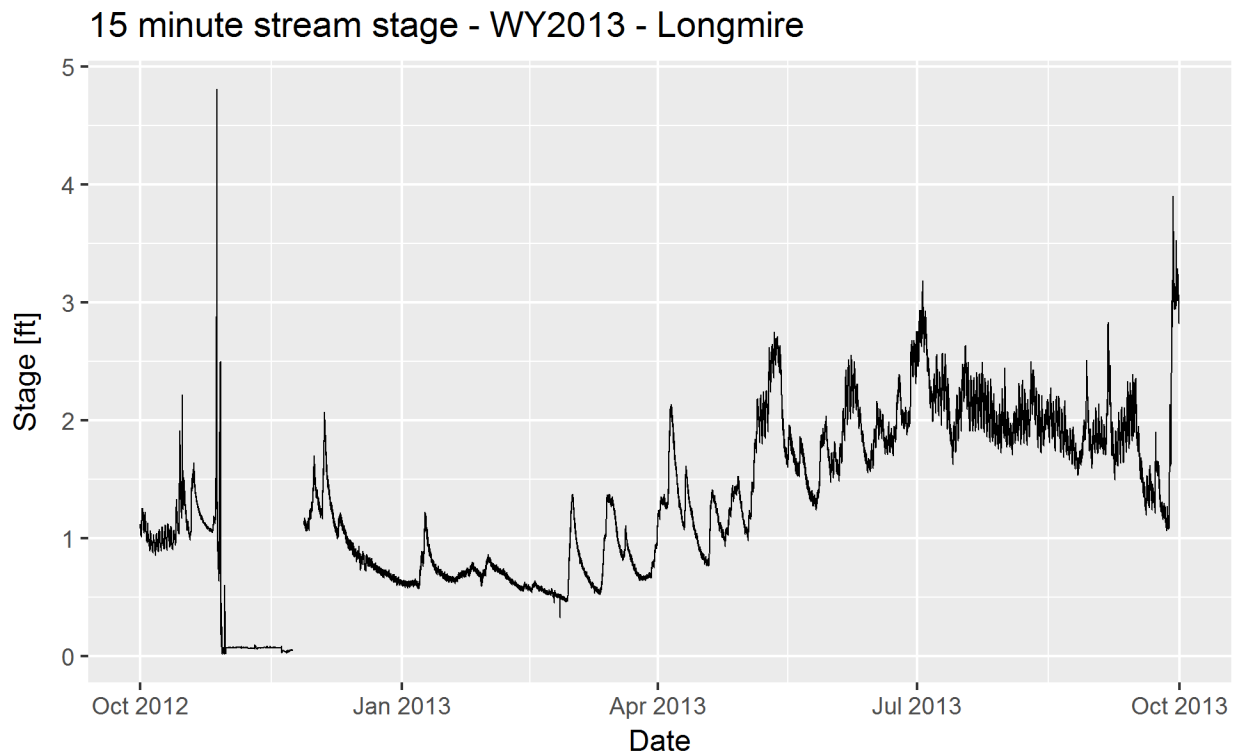
## Air and Water Temperatures

Air and water temperatures are recorded automatically by the mounted pressure transducers in the stilling well. Air temperature is recorded by the barometric pressure transducer mounted approximately 1 foot from the top of the well. Water temperature is recorded by the stage transducer which is mounted at the base of the stilling well. This data is recorded at the same time as pressure measurements and is an inherent function of the Solinst® pressure transducers.

## Results

### Stream stage

Fifteen minute stage heights were recorded during two continuous periods during Water Year 2013 (WY2013) and shown in Figure 3. Stage ranges from 0.0127 ft (0.0039 m) which occurred October 29, 2012 at 6:15 PM to 4.8116 ft (1.4670 m) which occurred October 27, 2012 at 9:45 PM. The dramatic peak that occurred on October 27 was likely the result of a glacial outburst flood from the Nisqually Glacier (Beason, 2012). Rain events and small floods are clearly shown in the record, as well as increases in daily runoff in the spring to summer months associated with snowmelt. Daily minimum, mean and maximum stream stage for every day in WY2013 are shown in appendixes A-1, A-2 and A-3, respectively.



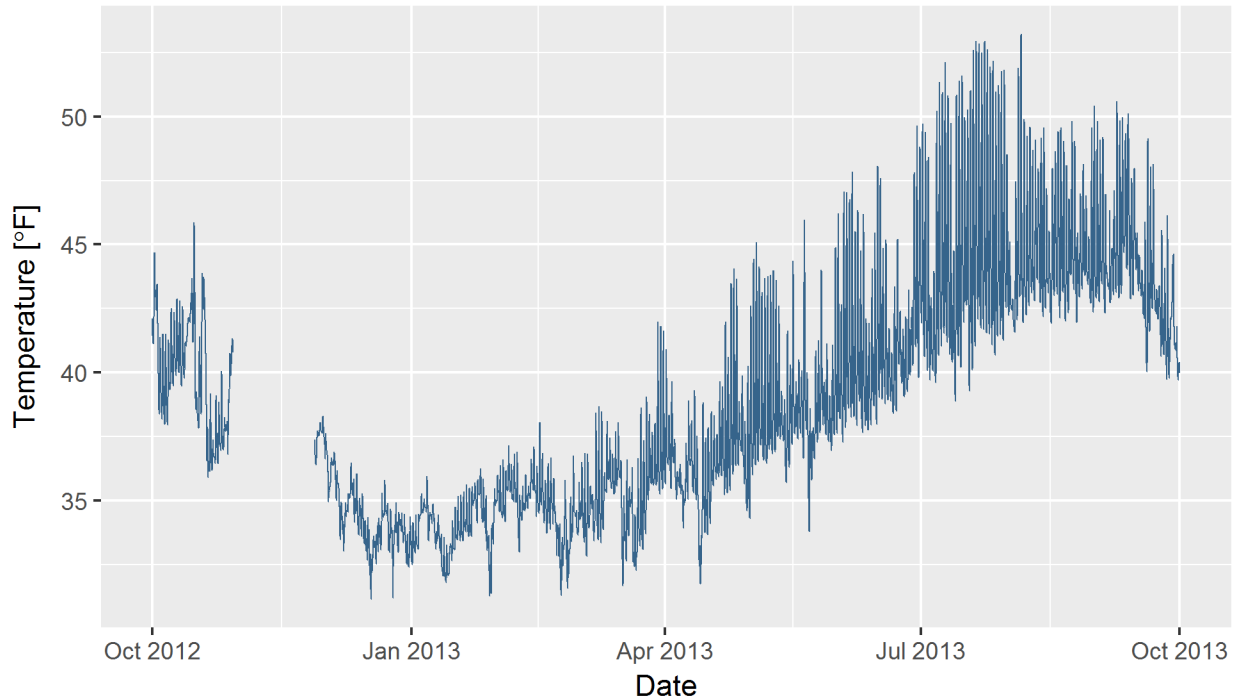
**Figure 3:** Stream stage during water year 2013 at Longmire.

### Stream temperature

Figure 4 shows the 15-minute water temperatures during WY2013. The lowest water temperature recorded was 31.1450 °F (-0.4750 °C) on December 17, 2012 at 2:45 PM while the highest water temperature was 53.2220 °F (11.7900 °C) on August 5, 2013 at 3:15 PM. Daily

minimum, mean and maximum water temperatures for every day in WY2013 are shown in appendixes B-1, B-2 and B-3, respectively.

### 15 minute water temperature - WY2013 - Longmire

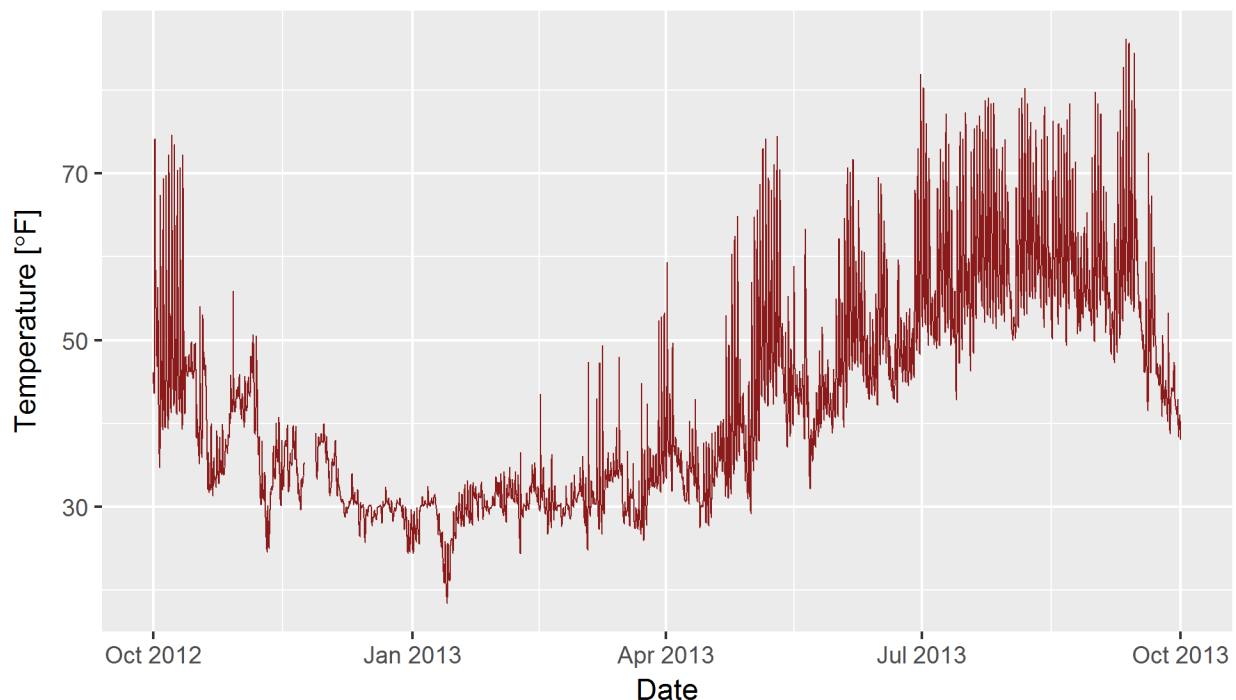


**Figure 4:** Stream temperature during water year 2013 at Longmire.

### Air Temperature

Figure 5 shows the 15-minute air temperature during WY2013. The daily, monthly and yearly range of air temperatures is much more variable than water temperatures. The minimum air temperature was 18.4118 °F (-7.5490 °C) on January 13, 2013 at 8:15 AM and the highest air temperature was 86.1260 °F (30.0700 °C) on September 11, 2013 at 2:30 PM. Daily minimum, mean and maximum air temperatures for every day in WY2013 are shown in appendixes C-1, C-2 and C-3, respectively.

### 15 minute air temperature - WY2013 - Longmire



**Figure 5:** Air temperature during water year 2013 at Longmire.

#### Raw Data

Raw tabular data from this study is available as a Microsoft Excel file and includes two worksheets: “15 Minute Data” and “WY2013 Stats.” “15 Minute Data” includes the raw 15-minute data from WY2013 with the following columns (35,041 rows): Date/Time, Day of Water Year, Stage, Water Temperature and Air Temperature. “WY2013 Stats” is the daily summary data of the 15 minute data for WY2013 and includes the following columns (366 rows): Date; Day of Water Year; Number of Measurements; Minimum, Average and Maximum Stage; Minimum, Average and Maximum Water Temperature; and Minimum, Average and Maximum Air Temperature. The data is available as download at the following link or by contacting the author of this report: <https://irma.nps.gov/DataStore/Reference/Profile/2247957>.

## Literature Cited

- Beason, S.R. 2012. Small glacial outburst flood occurs on Mount Rainier – October 27, 2012: Mount Rainier National Park Unpublished Science Brief, 3 p.  
[http://www.morageology.com/view\\_pub.php?id=29](http://www.morageology.com/view_pub.php?id=29).
- Driedger, C.L. and P.M. Kennard. 1986. Ice volumes on Cascade Volcanoes: Mount Rainier, Mount Hood, Three Sisters and Mount Shasta: United States Geological Survey Professional Paper 1365. 38 p.
- National Park Service. 2011. Annual snowfall totals at Paradise, 1920-2011 [Online]: Fetched 1/18/2011 from  
<http://www.nps.gov/mora/loader.cfm?csModule=security/getfile&pageid=457177>.
- United States Geological Survey Stream Stats. 2011. USGS Stream Stats: Washington [Online]: Fetched 1/18/2011 from <http://water.usgs.gov/osw/streamstats/Washington.html>.
- Watershed Sciences, Inc. 2009. LiDAR remote sensing data collection: Mount Rainier, WA, March 25, 2009. Watershed Sciences, Inc., Corvallis, OR. 31 p.

## Appendix A: WY2013 stream stage data tables

**Note:** Stream stage was adversely affected by a glacial outburst flood that occurred on October 27, 2012 (peak time: 21:45). Data quality from October 27, 2012 at 22:00 to November 23, 2012 at 12:30 is questionable and data is missing from November 23, 2012 at 12:45 to November 27, 2012 at 14:15. Because of these quality issues and outages, values in Appendixes A-1 to A-3 are not reported for the time period between October 28, 2012 and November 27, 2012.

**Appendix A-1:** Minimum daily stream stage (in feet) recorded at the Longmire stream gage during water year 2013.

| Date           | Oct         | Nov         | Dec         | Jan         | Feb         | Mar         | Apr         | May         | Jun         | Jul         | Aug         | Sep         |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1              | 1.01        | -           | 1.33        | 0.59        | 0.73        | 0.96        | 1.15        | 1.03        | 1.51        | 2.46        | 1.77        | 1.72        |
| 2              | 1.04        | -           | 1.22        | 0.58        | 0.72        | 1.03        | 1.28        | 0.98        | 1.54        | 2.62        | 1.77        | 1.72        |
| 3              | 0.96        | -           | 1.16        | 0.57        | 0.71        | 0.85        | 1.25        | 1.16        | 1.48        | 2.57        | 1.71        | 1.76        |
| 4              | 0.89        | -           | 1.21        | 0.59        | 0.70        | 0.78        | 1.25        | 1.39        | 1.64        | 2.38        | 1.80        | 1.71        |
| 5              | 0.87        | -           | 1.43        | 0.59        | 0.68        | 0.71        | 1.84        | 1.72        | 1.82        | 2.10        | 1.82        | 1.71        |
| 6              | 0.85        | -           | 1.26        | 0.57        | 0.65        | 0.66        | 1.63        | 1.81        | 1.96        | 1.99        | 1.79        | 2.09        |
| 7              | 0.88        | -           | 1.12        | 0.57        | 0.62        | 0.62        | 1.37        | 1.80        | 2.01        | 2.06        | 1.80        | 1.69        |
| 8              | 0.89        | -           | 1.02        | 0.76        | 0.60        | 0.58        | 1.20        | 1.85        | 2.06        | 2.04        | 1.79        | 1.49        |
| 9              | 0.91        | -           | 0.99        | 0.94        | 0.59        | 0.53        | 1.09        | 1.90        | 2.09        | 1.95        | 1.86        | 1.61        |
| 10             | 0.90        | -           | 1.10        | 0.83        | 0.57        | 0.53        | 1.07        | 2.24        | 1.93        | 2.07        | 2.05        | 1.63        |
| 11             | 0.92        | -           | 1.03        | 0.76        | 0.55        | 0.52        | 1.29        | 2.36        | 1.81        | 1.93        | 1.96        | 1.64        |
| 12             | 0.90        | -           | 0.94        | 0.71        | 0.55        | 0.56        | 1.17        | 2.46        | 1.63        | 1.79        | 1.76        | 1.72        |
| 13             | 0.94        | -           | 0.90        | 0.69        | 0.56        | 0.94        | 1.03        | 2.40        | 1.56        | 1.63        | 1.72        | 1.76        |
| 14             | 1.04        | -           | 0.86        | 0.68        | 0.55        | 1.30        | 0.95        | 1.88        | 1.56        | 1.73        | 1.78        | 1.82        |
| 15             | 1.17        | -           | 0.80        | 0.66        | 0.54        | 1.26        | 0.86        | 1.67        | 1.59        | 1.82        | 1.92        | 1.89        |
| 16             | 1.23        | -           | 0.80        | 0.63        | 0.58        | 1.15        | 0.81        | 1.60        | 1.76        | 1.90        | 1.81        | 1.73        |
| 17             | 1.07        | -           | 0.73        | 0.63        | 0.56        | 0.96        | 0.78        | 1.71        | 1.84        | 2.16        | 1.84        | 1.47        |
| 18             | 0.98        | -           | 0.75        | 0.62        | 0.55        | 0.85        | 0.77        | 1.64        | 1.84        | 2.09        | 1.74        | 1.33        |
| 19             | 1.26        | -           | 0.72        | 0.61        | 0.54        | 0.81        | 0.87        | 1.53        | 1.71        | 1.91        | 1.86        | 1.19        |
| 20             | 1.29        | -           | 0.76        | 0.63        | 0.52        | 0.85        | 1.29        | 1.52        | 1.71        | 1.91        | 1.72        | 1.26        |
| 21             | 1.19        | -           | 0.73        | 0.66        | 0.52        | 0.85        | 1.18        | 1.68        | 1.73        | 1.91        | 1.68        | 1.24        |
| 22             | 1.15        | -           | 0.71        | 0.66        | 0.50        | 0.78        | 1.06        | 1.49        | 1.70        | 1.92        | 1.71        | 1.21        |
| 23             | 1.10        | -           | 0.70        | 0.67        | 0.45        | 0.71        | 1.00        | 1.38        | 1.81        | 1.93        | 1.66        | 1.45        |
| 24             | 1.07        | -           | 0.68        | 0.67        | 0.49        | 0.67        | 0.93        | 1.31        | 2.14        | 1.89        | 1.63        | 1.19        |
| 25             | 1.06        | -           | 0.66        | 0.71        | 0.33        | 0.64        | 1.03        | 1.27        | 1.96        | 1.86        | 1.59        | 1.16        |
| 26             | 1.05        | -           | 0.67        | 0.70        | 0.46        | 0.64        | 1.18        | 1.24        | 1.93        | 1.81        | 1.53        | 1.06        |
| 27             | 1.12        | -           | 0.65        | 0.68        | 0.46        | 0.64        | 1.31        | 1.33        | 1.88        | 1.82        | 1.62        | 1.08        |
| 28             | -           | 1.06        | 0.63        | 0.59        | 0.47        | 0.65        | 1.37        | 1.69        | 1.95        | 1.78        | 1.70        | 1.62        |
| 29             | -           | 1.06        | 0.62        | 0.60        | ---         | 0.66        | 1.30        | 1.78        | 2.37        | 1.76        | 1.89        | 2.94        |
| 30             | -           | 1.19        | 0.60        | 0.68        | ---         | 0.75        | 1.13        | 1.66        | 2.31        | 1.72        | 1.74        | 2.82        |
| 31             | -           | ---         | 0.60        | 0.79        | ---         | 0.90        | ---         | 1.47        | ---         | 1.85        | 1.59        | ---         |
| <b>Minimum</b> | <b>0.85</b> | <b>1.06</b> | <b>0.60</b> | <b>0.57</b> | <b>0.33</b> | <b>0.52</b> | <b>0.77</b> | <b>0.98</b> | <b>1.48</b> | <b>1.63</b> | <b>1.53</b> | <b>1.06</b> |
| <b>Mean</b>    | <b>1.03</b> | <b>1.11</b> | <b>0.88</b> | <b>0.67</b> | <b>0.56</b> | <b>0.79</b> | <b>1.15</b> | <b>1.64</b> | <b>1.83</b> | <b>1.98</b> | <b>1.76</b> | <b>1.62</b> |
| <b>Maximum</b> | <b>1.29</b> | <b>1.19</b> | <b>1.43</b> | <b>0.94</b> | <b>0.73</b> | <b>1.30</b> | <b>1.84</b> | <b>2.46</b> | <b>2.37</b> | <b>2.62</b> | <b>2.05</b> | <b>2.94</b> |



**Appendix A-2:** Mean daily stream stage (in feet) recorded at the Longmire stream gage during water year 2013.

| Date           | Oct         | Nov         | Dec         | Jan         | Feb         | Mar         | Apr         | May         | Jun         | Jul         | Aug         | Sep         |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1              | 1.13        | -           | 1.49        | 0.62        | 0.78        | 1.23        | 1.23        | 1.09        | 1.64        | 2.68        | 1.92        | 1.88        |
| 2              | 1.13        | -           | 1.32        | 0.61        | 0.75        | 1.18        | 1.32        | 1.08        | 1.67        | 2.85        | 1.88        | 1.86        |
| 3              | 1.04        | -           | 1.22        | 0.61        | 0.74        | 0.94        | 1.29        | 1.26        | 1.61        | 2.80        | 1.86        | 1.86        |
| 4              | 0.97        | -           | 1.69        | 0.62        | 0.72        | 0.83        | 1.44        | 1.54        | 1.80        | 2.58        | 1.96        | 1.82        |
| 5              | 0.95        | -           | 1.63        | 0.62        | 0.71        | 0.75        | 2.04        | 1.91        | 2.06        | 2.26        | 2.03        | 1.96        |
| 6              | 0.95        | -           | 1.37        | 0.60        | 0.68        | 0.70        | 1.82        | 2.02        | 2.23        | 2.17        | 2.06        | 2.39        |
| 7              | 0.98        | -           | 1.22        | 0.74        | 0.66        | 0.65        | 1.53        | 2.01        | 2.26        | 2.29        | 2.02        | 1.83        |
| 8              | 0.99        | -           | 1.10        | 0.88        | 0.63        | 0.61        | 1.30        | 2.06        | 2.29        | 2.25        | 1.99        | 1.71        |
| 9              | 1.00        | -           | 1.07        | 1.10        | 0.61        | 0.58        | 1.15        | 2.17        | 2.24        | 2.29        | 2.04        | 1.82        |
| 10             | 1.02        | -           | 1.15        | 0.91        | 0.60        | 0.56        | 1.33        | 2.45        | 2.07        | 2.31        | 2.27        | 1.88        |
| 11             | 1.02        | -           | 1.07        | 0.81        | 0.58        | 0.55        | 1.41        | 2.53        | 1.92        | 2.18        | 2.15        | 1.89        |
| 12             | 0.98        | -           | 1.00        | 0.76        | 0.58        | 0.72        | 1.24        | 2.62        | 1.74        | 1.98        | 2.00        | 1.97        |
| 13             | 1.08        | -           | 0.95        | 0.73        | 0.60        | 1.07        | 1.11        | 2.53        | 1.63        | 1.79        | 1.95        | 2.06        |
| 14             | 1.18        | -           | 0.92        | 0.71        | 0.58        | 1.34        | 1.01        | 2.16        | 1.64        | 1.93        | 1.91        | 2.06        |
| 15             | 1.45        | -           | 0.87        | 0.68        | 0.57        | 1.31        | 0.91        | 1.78        | 1.74        | 2.06        | 2.05        | 2.13        |
| 16             | 1.37        | -           | 0.86        | 0.67        | 0.61        | 1.24        | 0.85        | 1.72        | 1.92        | 2.18        | 2.03        | 1.85        |
| 17             | 1.14        | -           | 0.82        | 0.66        | 0.59        | 1.06        | 0.81        | 1.85        | 2.00        | 2.38        | 2.00        | 1.59        |
| 18             | 1.04        | -           | 0.82        | 0.65        | 0.57        | 0.91        | 0.80        | 1.72        | 1.96        | 2.31        | 1.95        | 1.43        |
| 19             | 1.48        | -           | 0.79        | 0.64        | 0.56        | 0.85        | 1.22        | 1.62        | 1.83        | 2.15        | 2.04        | 1.35        |
| 20             | 1.40        | -           | 0.80        | 0.66        | 0.54        | 0.97        | 1.34        | 1.64        | 1.81        | 2.14        | 1.91        | 1.43        |
| 21             | 1.26        | -           | 0.78        | 0.69        | 0.54        | 0.91        | 1.24        | 1.76        | 1.84        | 2.15        | 1.91        | 1.38        |
| 22             | 1.18        | -           | 0.76        | 0.69        | 0.54        | 0.83        | 1.12        | 1.60        | 1.82        | 2.17        | 1.84        | 1.46        |
| 23             | 1.13        | -           | 0.73        | 0.71        | 0.52        | 0.76        | 1.05        | 1.44        | 1.95        | 2.18        | 1.79        | 1.58        |
| 24             | 1.10        | -           | 0.72        | 0.71        | 0.51        | 0.70        | 1.01        | 1.37        | 2.27        | 2.15        | 1.79        | 1.31        |
| 25             | 1.07        | -           | 0.71        | 0.76        | 0.50        | 0.67        | 1.10        | 1.34        | 2.09        | 2.10        | 1.71        | 1.22        |
| 26             | 1.09        | -           | 0.70        | 0.74        | 0.49        | 0.66        | 1.27        | 1.31        | 2.01        | 2.07        | 1.61        | 1.16        |
| 27             | 1.48        | -           | 0.69        | 0.71        | 0.48        | 0.66        | 1.39        | 1.46        | 1.98        | 2.03        | 1.70        | 1.43        |
| 28             | -           | 1.10        | 0.67        | 0.68        | 0.68        | 0.68        | 1.42        | 1.83        | 2.20        | 1.94        | 1.86        | 2.75        |
| 29             | -           | 1.17        | 0.65        | 0.69        | ---         | 0.71        | 1.41        | 1.89        | 2.51        | 1.93        | 2.15        | 3.11        |
| 30             | -           | 1.33        | 0.64        | 0.75        | ---         | 0.81        | 1.22        | 1.80        | 2.52        | 1.97        | 1.89        | 3.12        |
| 31             | -           | ---         | 0.63        | 0.82        | ---         | 1.00        | ---         | 1.62        | ---         | 2.03        | 1.77        | ---         |
| <b>Minimum</b> | <b>0.95</b> | <b>1.10</b> | <b>0.63</b> | <b>0.60</b> | <b>0.48</b> | <b>0.55</b> | <b>0.80</b> | <b>1.08</b> | <b>1.61</b> | <b>1.79</b> | <b>1.61</b> | <b>1.16</b> |
| <b>Mean</b>    | <b>1.13</b> | <b>1.20</b> | <b>0.96</b> | <b>0.72</b> | <b>0.60</b> | <b>0.85</b> | <b>1.25</b> | <b>1.78</b> | <b>1.98</b> | <b>2.20</b> | <b>1.94</b> | <b>1.84</b> |
| <b>Maximum</b> | <b>1.48</b> | <b>1.33</b> | <b>1.69</b> | <b>1.10</b> | <b>0.78</b> | <b>1.34</b> | <b>2.04</b> | <b>2.62</b> | <b>2.52</b> | <b>2.85</b> | <b>2.27</b> | <b>3.12</b> |

**Appendix A-3:** Maximum daily stream stage (in feet) recorded at the Longmire stream gage during water year 2013.

| Date           | Oct         | Nov         | Dec         | Jan         | Feb         | Mar         | Apr         | May         | Jun         | Jul         | Aug         | Sep         |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1              | 1.25        | -           | 1.70        | 0.65        | 0.82        | 1.37        | 1.35        | 1.16        | 1.82        | 2.93        | 2.07        | 2.11        |
| 2              | 1.23        | -           | 1.41        | 0.64        | 0.78        | 1.35        | 1.35        | 1.20        | 1.81        | 3.19        | 2.02        | 2.14        |
| 3              | 1.13        | -           | 1.28        | 0.64        | 0.78        | 1.06        | 1.37        | 1.48        | 1.78        | 3.06        | 2.06        | 2.03        |
| 4              | 1.06        | -           | 2.07        | 0.64        | 0.74        | 0.90        | 1.89        | 1.81        | 2.08        | 2.88        | 2.12        | 1.96        |
| 5              | 1.03        | -           | 1.93        | 0.65        | 0.74        | 0.81        | 2.13        | 2.18        | 2.43        | 2.46        | 2.32        | 2.57        |
| 6              | 1.04        | -           | 1.50        | 0.63        | 0.72        | 0.74        | 2.03        | 2.19        | 2.51        | 2.39        | 2.34        | 2.83        |
| 7              | 1.08        | -           | 1.31        | 0.89        | 0.69        | 0.68        | 1.67        | 2.24        | 2.56        | 2.56        | 2.26        | 2.08        |
| 8              | 1.10        | -           | 1.17        | 1.16        | 0.66        | 0.65        | 1.40        | 2.25        | 2.50        | 2.44        | 2.19        | 1.91        |
| 9              | 1.11        | -           | 1.18        | 1.22        | 0.64        | 0.62        | 1.24        | 2.62        | 2.44        | 2.57        | 2.34        | 2.07        |
| 10             | 1.12        | -           | 1.22        | 1.01        | 0.63        | 0.59        | 1.61        | 2.63        | 2.27        | 2.57        | 2.50        | 2.11        |
| 11             | 1.10        | -           | 1.15        | 0.89        | 0.60        | 0.58        | 1.55        | 2.75        | 2.07        | 2.37        | 2.34        | 2.11        |
| 12             | 1.07        | -           | 1.07        | 0.80        | 0.61        | 0.97        | 1.31        | 2.71        | 1.89        | 2.25        | 2.22        | 2.33        |
| 13             | 1.33        | -           | 1.00        | 0.76        | 0.63        | 1.32        | 1.21        | 2.70        | 1.72        | 1.99        | 2.21        | 2.32        |
| 14             | 1.66        | -           | 0.97        | 0.74        | 0.61        | 1.38        | 1.07        | 2.52        | 1.80        | 2.21        | 2.05        | 2.39        |
| 15             | 2.21        | -           | 0.92        | 0.71        | 0.61        | 1.36        | 0.97        | 1.93        | 1.93        | 2.28        | 2.18        | 2.36        |
| 16             | 1.51        | -           | 0.93        | 0.70        | 0.64        | 1.32        | 0.90        | 1.96        | 2.16        | 2.48        | 2.28        | 2.06        |
| 17             | 1.27        | -           | 0.87        | 0.68        | 0.61        | 1.17        | 0.84        | 1.95        | 2.13        | 2.63        | 2.16        | 1.73        |
| 18             | 1.26        | -           | 0.89        | 0.68        | 0.60        | 0.99        | 0.87        | 1.82        | 2.08        | 2.55        | 2.21        | 1.60        |
| 19             | 1.64        | -           | 0.86        | 0.67        | 0.59        | 0.91        | 1.41        | 1.69        | 1.98        | 2.38        | 2.21        | 1.53        |
| 20             | 1.60        | -           | 0.83        | 0.70        | 0.57        | 1.10        | 1.40        | 1.87        | 1.99        | 2.36        | 2.09        | 1.62        |
| 21             | 1.32        | -           | 0.83        | 0.73        | 0.56        | 0.99        | 1.32        | 1.85        | 1.94        | 2.41        | 2.17        | 1.50        |
| 22             | 1.22        | -           | 0.79        | 0.73        | 0.57        | 0.88        | 1.19        | 1.72        | 1.95        | 2.39        | 2.03        | 1.90        |
| 23             | 1.17        | -           | 0.77        | 0.75        | 0.56        | 0.80        | 1.11        | 1.54        | 2.19        | 2.49        | 1.93        | 1.66        |
| 24             | 1.12        | -           | 0.75        | 0.75        | 0.53        | 0.75        | 1.08        | 1.44        | 2.39        | 2.36        | 1.94        | 1.50        |
| 25             | 1.09        | -           | 0.74        | 0.80        | 0.53        | 0.70        | 1.24        | 1.39        | 2.30        | 2.34        | 1.82        | 1.30        |
| 26             | 1.19        | -           | 0.73        | 0.79        | 0.51        | 0.68        | 1.42        | 1.39        | 2.12        | 2.35        | 1.69        | 1.27        |
| 27             | 4.81        | -           | 0.73        | 0.74        | 0.49        | 0.68        | 1.45        | 1.75        | 2.09        | 2.29        | 1.76        | 2.13        |
| 28             | -           | 1.15        | 0.70        | 0.71        | 0.98        | 0.71        | 1.48        | 1.93        | 2.64        | 2.12        | 2.00        | 3.90        |
| 29             | -           | 1.25        | 0.69        | 0.73        | ---         | 0.80        | 1.53        | 2.04        | 2.68        | 2.14        | 2.51        | 3.49        |
| 30             | -           | 1.57        | 0.68        | 0.84        | ---         | 0.92        | 1.31        | 2.01        | 2.75        | 2.27        | 2.09        | 3.53        |
| 31             | -           | ---         | 0.65        | 0.86        | ---         | 1.21        | ---         | 1.73        | ---         | 2.45        | 2.01        | ---         |
| <b>Minimum</b> | <b>1.03</b> | <b>1.15</b> | <b>0.65</b> | <b>0.63</b> | <b>0.49</b> | <b>0.58</b> | <b>0.84</b> | <b>1.16</b> | <b>1.72</b> | <b>1.99</b> | <b>1.69</b> | <b>1.27</b> |
| <b>Mean</b>    | <b>1.40</b> | <b>1.32</b> | <b>1.04</b> | <b>0.77</b> | <b>0.64</b> | <b>0.94</b> | <b>1.36</b> | <b>1.95</b> | <b>2.17</b> | <b>2.46</b> | <b>2.13</b> | <b>2.13</b> |
| <b>Maximum</b> | <b>4.81</b> | <b>1.57</b> | <b>2.07</b> | <b>1.22</b> | <b>0.98</b> | <b>1.38</b> | <b>2.13</b> | <b>2.75</b> | <b>2.75</b> | <b>3.19</b> | <b>2.51</b> | <b>3.90</b> |

## Appendix B: WY2013 water temperature data tables

**Note:** The stream temperature sensor was adversely affected by a glacial outburst flood that occurred on October 27, 2012 (peak time: 21:45). Data is missing from October 29, 2012 at 16:30 to November 27, 2012 at 14:45. Because of the outages, values in Appendixes B-1 to B-3 are not reported for the time period between October 29, 2012 and November 27, 2012.

**Appendix B-1:** Minimum daily water temperature (in degrees Fahrenheit) recorded at the Longmire Stream Gage during water year 2013.

| Date           | Oct          | Nov          | Dec          | Jan          | Feb          | Mar          | Apr          | May          | Jun          | Jul          | Aug          | Sep          |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1              | 41.12        | -            | 36.62        | 32.51        | 34.56        | 33.65        | 35.66        | 34.30        | 37.63        | 41.92        | 42.24        | 42.90        |
| 2              | 41.32        | -            | 34.94        | 32.96        | 34.33        | 34.31        | 36.35        | 36.01        | 38.19        | 40.62        | 41.96        | 42.76        |
| 3              | 38.37        | -            | 35.55        | 33.09        | 34.18        | 33.37        | 35.48        | 36.40        | 37.29        | 40.09        | 41.58        | 43.46        |
| 4              | 38.17        | -            | 36.39        | 34.37        | 35.39        | 32.82        | 35.54        | 36.52        | 37.86        | 39.70        | 42.06        | 42.32        |
| 5              | 37.99        | -            | 35.00        | 34.52        | 35.03        | 33.94        | 35.06        | 36.73        | 38.62        | 40.05        | 42.97        | 43.24        |
| 6              | 37.95        | -            | 33.48        | 34.03        | 34.96        | 33.42        | 35.24        | 36.58        | 38.24        | 39.59        | 41.95        | 42.74        |
| 7              | 39.34        | -            | 33.09        | 33.42        | 33.87        | 33.77        | 33.94        | 36.45        | 38.28        | 40.68        | 42.27        | 43.03        |
| 8              | 39.48        | -            | 33.03        | 34.11        | 33.00        | 33.48        | 34.93        | 37.00        | 37.92        | 41.04        | 42.61        | 43.12        |
| 9              | 39.89        | -            | 34.56        | 33.10        | 34.23        | 33.35        | 35.06        | 36.82        | 38.27        | 41.53        | 43.11        | 42.91        |
| 10             | 40.00        | -            | 35.14        | 33.42        | 34.60        | 33.88        | 35.53        | 36.91        | 37.66        | 41.18        | 42.81        | 43.09        |
| 11             | 39.45        | -            | 34.14        | 32.24        | 34.71        | 35.33        | 35.31        | 37.51        | 37.94        | 40.72        | 43.63        | 44.68        |
| 12             | 39.78        | -            | 34.20        | 31.99        | 35.07        | 35.58        | 35.03        | 37.39        | 37.76        | 40.42        | 42.74        | 44.04        |
| 13             | 41.04        | -            | 33.64        | 31.79        | 35.39        | 35.26        | 31.74        | 36.17        | 37.95        | 38.88        | 42.19        | 42.88        |
| 14             | 41.96        | -            | 33.60        | 32.08        | 34.38        | 35.27        | 32.52        | 35.71        | 38.71        | 40.66        | 42.50        | 43.04        |
| 15             | 41.18        | -            | 33.02        | 32.64        | 34.51        | 35.62        | 33.75        | 36.31        | 37.99        | 40.20        | 42.99        | 44.02        |
| 16             | 38.56        | -            | 32.68        | 33.08        | 34.45        | 32.73        | 33.67        | 37.21        | 39.04        | 41.96        | 41.93        | 43.19        |
| 17             | 37.83        | -            | 31.15        | 33.49        | 34.13        | 31.67        | 34.11        | 37.60        | 38.96        | 42.35        | 43.01        | 42.46        |
| 18             | 38.38        | -            | 32.28        | 33.43        | 33.72        | 32.65        | 35.59        | 37.40        | 38.77        | 39.28        | 43.06        | 41.55        |
| 19             | 40.69        | -            | 32.54        | 33.44        | 33.87        | 33.64        | 35.82        | 37.63        | 38.94        | 40.10        | 42.14        | 40.02        |
| 20             | 35.90        | -            | 33.01        | 33.78        | 34.08        | 32.60        | 35.93        | 36.67        | 38.88        | 41.04        | 43.13        | 41.62        |
| 21             | 36.15        | -            | 33.07        | 33.60        | 32.85        | 32.28        | 35.98        | 36.81        | 38.41        | 42.08        | 42.02        | 42.50        |
| 22             | 36.17        | -            | 34.36        | 33.60        | 32.34        | 32.82        | 35.23        | 33.81        | 38.50        | 41.73        | 42.33        | 42.27        |
| 23             | 36.46        | -            | 33.04        | 34.71        | 31.30        | 33.23        | 35.31        | 35.81        | 40.13        | 41.69        | 43.81        | 42.09        |
| 24             | 36.45        | -            | 32.99        | 34.13        | 33.11        | 33.09        | 35.40        | 36.64        | 39.26        | 41.56        | 43.24        | 40.64        |
| 25             | 36.96        | -            | 31.20        | 34.52        | 31.58        | 33.71        | 36.02        | 37.27        | 39.05        | 41.51        | 41.97        | 40.70        |
| 26             | 36.99        | -            | 33.73        | 34.16        | 32.88        | 35.03        | 36.37        | 37.66        | 39.27        | 41.09        | 42.95        | 39.74        |
| 27             | 36.81        | -            | 32.99        | 33.06        | 33.59        | 35.59        | 36.37        | 37.95        | 39.92        | 40.68        | 43.26        | 39.78        |
| 28             | 38.41        | 36.39        | 33.73        | 31.28        | 33.71        | 35.62        | 36.57        | 37.59        | 40.29        | 41.42        | 43.78        | 41.60        |
| 29             | -            | 37.54        | 33.35        | 31.37        | ---          | 35.60        | 35.21        | 37.29        | 41.01        | 41.48        | 43.42        | 40.83        |
| 30             | -            | 37.51        | 32.46        | 33.31        | ---          | 35.25        | 34.59        | 36.95        | 39.81        | 41.25        | 42.70        | 39.71        |
| 31             | -            | ---          | 32.40        | 34.90        | ---          | 35.45        | ---          | 37.58        | ---          | 42.54        | 42.37        | ---          |
| <b>Minimum</b> | <b>35.90</b> | <b>36.39</b> | <b>31.15</b> | <b>31.28</b> | <b>31.30</b> | <b>31.67</b> | <b>31.74</b> | <b>33.81</b> | <b>37.29</b> | <b>38.88</b> | <b>41.58</b> | <b>39.71</b> |
| <b>Mean</b>    | <b>38.67</b> | <b>37.15</b> | <b>33.59</b> | <b>33.29</b> | <b>33.92</b> | <b>34.00</b> | <b>35.11</b> | <b>36.73</b> | <b>38.69</b> | <b>40.94</b> | <b>42.67</b> | <b>42.23</b> |
| <b>Maximum</b> | <b>41.96</b> | <b>37.54</b> | <b>36.62</b> | <b>34.90</b> | <b>35.39</b> | <b>35.62</b> | <b>36.57</b> | <b>37.95</b> | <b>41.01</b> | <b>42.54</b> | <b>43.81</b> | <b>44.68</b> |

**Appendix B-2:** Mean daily water temperature (in degrees Fahrenheit) recorded at the Longmire Stream Gage during water year 2013.

| Date           | Oct          | Nov          | Dec          | Jan          | Feb          | Mar          | Apr          | May          | Jun          | Jul          | Aug          | Sep          |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1              | 42.46        | -            | 37.16        | 33.13        | 35.22        | 34.32        | 0.00         | 37.70        | 40.68        | 44.82        | 43.33        | 45.13        |
| 2              | 42.82        | -            | 35.90        | 33.41        | 35.02        | 35.07        | 37.14        | 39.22        | 39.77        | 44.02        | 42.50        | 44.84        |
| 3              | 39.90        | -            | 36.13        | 33.73        | 35.11        | 34.48        | 37.13        | 39.63        | 41.08        | 43.32        | 43.42        | 45.01        |
| 4              | 39.52        | -            | 36.58        | 34.65        | 35.96        | 34.32        | 36.66        | 39.30        | 41.53        | 41.25        | 45.27        | 43.89        |
| 5              | 39.32        | -            | 35.65        | 34.78        | 35.63        | 34.79        | 35.67        | 39.00        | 41.55        | 41.41        | 46.20        | 43.54        |
| 6              | 39.30        | -            | 34.83        | 34.90        | 35.59        | 34.49        | 35.79        | 38.75        | 41.64        | 43.69        | 44.38        | 43.95        |
| 7              | 40.43        | -            | 34.19        | 34.17        | 35.35        | 35.44        | 35.00        | 38.91        | 40.71        | 44.57        | 44.61        | 44.82        |
| 8              | 40.60        | -            | 34.26        | 34.51        | 34.03        | 35.20        | 35.78        | 39.25        | 41.09        | 45.02        | 45.07        | 45.61        |
| 9              | 41.02        | -            | 34.89        | 33.73        | 34.71        | 35.10        | 36.56        | 39.18        | 40.71        | 45.49        | 44.81        | 45.56        |
| 10             | 41.08        | -            | 35.59        | 33.79        | 35.17        | 35.03        | 36.72        | 39.15        | 40.62        | 45.01        | 44.77        | 45.61        |
| 11             | 40.70        | -            | 35.20        | 33.04        | 35.10        | 36.23        | 36.61        | 39.21        | 39.49        | 43.57        | 45.67        | 46.52        |
| 12             | 40.54        | -            | 35.11        | 32.50        | 35.71        | 36.27        | 35.83        | 38.20        | 39.33        | 41.95        | 45.43        | 46.67        |
| 13             | 41.65        | -            | 34.34        | 32.26        | 35.91        | 35.86        | 32.87        | 37.75        | 40.22        | 43.76        | 45.07        | 44.96        |
| 14             | 42.31        | -            | 34.40        | 32.68        | 35.35        | 35.99        | 35.31        | 37.85        | 40.78        | 44.81        | 44.03        | 45.28        |
| 15             | 43.09        | -            | 33.63        | 33.30        | 35.57        | 36.46        | 35.20        | 38.04        | 41.97        | 44.72        | 44.02        | 44.83        |
| 16             | 40.07        | -            | 33.53        | 33.59        | 35.45        | 35.48        | 35.48        | 39.57        | 42.15        | 44.84        | 44.32        | 43.80        |
| 17             | 39.13        | -            | 32.46        | 33.96        | 34.82        | 33.26        | 35.99        | 38.32        | 41.34        | 45.35        | 45.29        | 43.29        |
| 18             | 40.76        | -            | 33.05        | 34.00        | 34.85        | 34.43        | 36.55        | 38.69        | 41.18        | 44.15        | 45.88        | 43.18        |
| 19             | 42.62        | -            | 33.31        | 34.05        | 35.00        | 34.58        | 36.50        | 38.74        | 40.08        | 45.15        | 45.56        | 43.17        |
| 20             | 37.60        | -            | 33.92        | 34.30        | 34.93        | 34.48        | 37.14        | 40.35        | 39.72        | 45.79        | 45.46        | 43.77        |
| 21             | 37.15        | -            | 34.03        | 34.16        | 33.97        | 32.99        | 37.23        | 38.56        | 40.21        | 46.18        | 44.28        | 44.22        |
| 22             | 36.70        | -            | 34.69        | 34.45        | 33.49        | 34.10        | 37.88        | 36.13        | 41.40        | 45.78        | 44.22        | 42.75        |
| 23             | 37.39        | -            | 34.31        | 35.20        | 32.50        | 34.97        | 37.42        | 36.88        | 41.03        | 45.85        | 45.85        | 42.70        |
| 24             | 37.38        | -            | 33.85        | 34.98        | 34.15        | 34.91        | 38.44        | 38.29        | 40.38        | 45.90        | 45.35        | 42.41        |
| 25             | 37.83        | -            | 33.07        | 35.44        | 32.77        | 35.80        | 39.00        | 38.86        | 40.18        | 45.58        | 43.62        | 41.90        |
| 26             | 37.52        | -            | 34.10        | 34.78        | 33.78        | 36.48        | 38.87        | 39.91        | 40.69        | 45.38        | 44.47        | 42.06        |
| 27             | 37.73        | -            | 33.92        | 34.11        | 34.73        | 36.35        | 37.44        | 38.86        | 41.10        | 44.60        | 45.24        | 41.08        |
| 28             | 39.73        | 37.17        | 34.09        | 32.70        | 34.30        | 36.54        | 37.88        | 38.92        | 43.48        | 44.82        | 44.93        | 43.31        |
| 29             | -            | 37.75        | 33.77        | 33.29        | ---          | 37.52        | 36.51        | 38.07        | 43.97        | 45.37        | 44.09        | 41.11        |
| 30             | -            | 37.83        | 32.90        | 34.57        | ---          | 37.44        | 36.45        | 38.58        | 43.61        | 45.19        | 44.84        | 40.24        |
| 31             | -            | ---          | 33.32        | 35.33        | ---          | 37.50        | ---          | 40.01        | ---          | 44.79        | 45.47        | ---          |
| <b>Minimum</b> | <b>36.70</b> | <b>37.17</b> | <b>32.46</b> | <b>32.26</b> | <b>32.50</b> | <b>32.99</b> | <b>0.00</b>  | <b>36.13</b> | <b>39.33</b> | <b>41.25</b> | <b>42.50</b> | <b>40.24</b> |
| <b>Mean</b>    | <b>39.87</b> | <b>37.58</b> | <b>34.39</b> | <b>33.98</b> | <b>34.79</b> | <b>35.35</b> | <b>35.37</b> | <b>38.71</b> | <b>41.06</b> | <b>44.59</b> | <b>44.76</b> | <b>43.84</b> |
| <b>Maximum</b> | <b>43.09</b> | <b>37.83</b> | <b>37.16</b> | <b>35.44</b> | <b>35.96</b> | <b>37.52</b> | <b>39.00</b> | <b>40.35</b> | <b>43.97</b> | <b>46.18</b> | <b>46.20</b> | <b>46.67</b> |

**Appendix B-3:** Maximum daily water temperature (in degrees Fahrenheit) recorded at the Longmire Stream Gage during water year 2013.

| Date           | Oct          | Nov          | Dec          | Jan          | Feb          | Mar          | Apr          | May          | Jun          | Jul          | Aug          | Sep          |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1              | 44.68        | -            | 37.64        | 34.16        | 36.37        | 35.73        | 40.91        | 42.61        | 46.21        | 49.72        | 45.10        | 49.80        |
| 2              | 43.47        | -            | 36.84        | 34.44        | 36.61        | 36.50        | 38.33        | 44.43        | 42.65        | 49.40        | 42.88        | 49.10        |
| 3              | 41.39        | -            | 36.67        | 34.48        | 36.18        | 36.86        | 39.64        | 45.08        | 47.05        | 48.41        | 47.46        | 49.19        |
| 4              | 41.51        | -            | 36.89        | 35.27        | 37.16        | 36.83        | 37.42        | 44.14        | 47.04        | 42.95        | 51.89        | 46.97        |
| 5              | 41.51        | -            | 36.51        | 35.07        | 36.44        | 35.58        | 36.13        | 43.13        | 46.76        | 43.96        | 53.22        | 43.91        |
| 6              | 41.27        | -            | 35.68        | 35.96        | 36.83        | 35.24        | 36.42        | 43.67        | 47.85        | 50.21        | 49.89        | 46.34        |
| 7              | 42.50        | -            | 34.95        | 34.55        | 36.91        | 38.44        | 35.64        | 43.76        | 45.52        | 51.33        | 49.24        | 47.12        |
| 8              | 42.36        | -            | 34.92        | 34.87        | 35.22        | 38.68        | 37.26        | 43.80        | 46.34        | 50.94        | 49.59        | 50.59        |
| 9              | 42.88        | -            | 35.27        | 34.32        | 35.57        | 38.49        | 38.91        | 43.99        | 44.76        | 52.13        | 48.69        | 49.84        |
| 10             | 42.80        | -            | 36.47        | 34.46        | 36.01        | 36.11        | 38.12        | 43.62        | 46.19        | 50.82        | 49.09        | 49.97        |
| 11             | 42.58        | -            | 35.84        | 33.70        | 35.59        | 38.09        | 39.32        | 42.61        | 42.11        | 49.74        | 47.96        | 49.35        |
| 12             | 41.22        | -            | 36.06        | 33.59        | 36.63        | 37.44        | 37.52        | 39.28        | 41.93        | 44.76        | 49.17        | 50.12        |
| 13             | 42.17        | -            | 35.11        | 33.29        | 37.10        | 36.83        | 34.98        | 38.94        | 44.06        | 50.84        | 49.57        | 47.60        |
| 14             | 43.10        | -            | 35.29        | 33.32        | 36.36        | 37.72        | 38.84        | 41.64        | 45.45        | 51.40        | 47.20        | 47.98        |
| 15             | 45.87        | -            | 34.22        | 34.22        | 38.04        | 38.05        | 37.46        | 40.31        | 48.07        | 51.59        | 45.55        | 46.55        |
| 16             | 44.76        | -            | 34.34        | 34.75        | 36.85        | 36.57        | 37.86        | 44.36        | 47.60        | 49.98        | 47.97        | 44.67        |
| 17             | 41.40        | -            | 33.88        | 35.18        | 35.81        | 35.20        | 38.48        | 39.66        | 44.85        | 50.28        | 48.65        | 44.00        |
| 18             | 43.89        | -            | 33.62        | 35.23        | 36.44        | 36.61        | 38.33        | 40.50        | 45.18        | 51.03        | 49.40        | 45.89        |
| 19             | 43.73        | -            | 33.94        | 35.35        | 36.67        | 35.55        | 37.58        | 40.07        | 41.72        | 52.60        | 49.57        | 49.15        |
| 20             | 40.62        | -            | 34.33        | 35.64        | 35.88        | 36.29        | 39.67        | 45.96        | 40.79        | 52.94        | 49.05        | 48.04        |
| 21             | 39.19        | -            | 35.31        | 35.49        | 34.71        | 34.45        | 39.47        | 40.02        | 43.35        | 52.85        | 48.08        | 48.13        |
| 22             | 37.37        | -            | 35.79        | 35.55        | 34.09        | 36.64        | 41.99        | 38.61        | 45.21        | 52.49        | 46.78        | 43.27        |
| 23             | 39.11        | -            | 34.91        | 35.70        | 33.58        | 38.62        | 40.62        | 37.86        | 42.41        | 52.94        | 49.82        | 43.39        |
| 24             | 38.86        | -            | 34.68        | 35.82        | 35.81        | 37.34        | 43.48        | 40.85        | 41.71        | 52.62        | 49.04        | 45.57        |
| 25             | 40.05        | -            | 33.85        | 36.25        | 34.21        | 39.05        | 44.05        | 41.26        | 42.18        | 51.94        | 45.46        | 44.09        |
| 26             | 38.26        | -            | 34.92        | 35.86        | 35.16        | 38.38        | 43.66        | 44.00        | 43.24        | 52.17        | 47.00        | 46.15        |
| 27             | 38.25        | -            | 34.55        | 35.21        | 36.76        | 37.68        | 38.88        | 39.63        | 42.55        | 50.98        | 48.14        | 42.18        |
| 28             | 40.77        | 37.72        | 34.54        | 33.65        | 34.62        | 38.04        | 39.89        | 41.14        | 47.81        | 51.21        | 46.90        | 44.64        |
| 29             | -            | 38.06        | 34.47        | 34.12        | ---          | 41.99        | 38.12        | 39.11        | 49.63        | 51.77        | 45.30        | 41.82        |
| 30             | -            | 38.30        | 33.69        | 35.49        | ---          | 41.82        | 40.27        | 41.09        | 48.82        | 51.82        | 49.58        | 41.38        |
| 31             | -            | ---          | 34.37        | 36.01        | ---          | 41.64        | ---          | 44.89        | ---          | 48.52        | 50.42        | ---          |
| <b>Minimum</b> | <b>37.37</b> | <b>37.72</b> | <b>33.62</b> | <b>33.29</b> | <b>33.58</b> | <b>34.45</b> | <b>34.98</b> | <b>37.86</b> | <b>40.79</b> | <b>42.95</b> | <b>42.88</b> | <b>41.38</b> |
| <b>Mean</b>    | <b>41.63</b> | <b>38.02</b> | <b>35.15</b> | <b>34.87</b> | <b>35.99</b> | <b>37.50</b> | <b>38.97</b> | <b>41.94</b> | <b>44.97</b> | <b>50.46</b> | <b>48.31</b> | <b>46.56</b> |
| <b>Maximum</b> | <b>45.87</b> | <b>38.30</b> | <b>37.64</b> | <b>36.25</b> | <b>38.04</b> | <b>41.99</b> | <b>44.05</b> | <b>45.96</b> | <b>49.63</b> | <b>52.94</b> | <b>53.22</b> | <b>50.59</b> |

## Appendix C: WY2013 air temperature data tables

**Note:** The air temperature sensor had equipment failure between November 23, 2012 at 21:45 and November 27, 2015 at 15:45. Because of the outage, values in Appendixes C-1 to C-3 are not reported for the time period between November 23, 2012 and November 27, 2012.

**Appendix C-1:** Minimum daily air temperature (in degrees Fahrenheit) recorded at the Longmire Stream Gage during water year 2013.

| Date           | Oct          | Nov          | Dec          | Jan          | Feb          | Mar          | Apr          | May          | Jun          | Jul          | Aug          | Sep          |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1              | 43.60        | 40.49        | 35.23        | 24.38        | 29.73        | 31.57        | 33.37        | 29.19        | 40.83        | 51.57        | 51.23        | 52.75        |
| 2              | 40.18        | 39.50        | 31.31        | 25.80        | 28.91        | 29.40        | 35.20        | 34.31        | 44.41        | 51.85        | 50.00        | 54.15        |
| 3              | 34.71        | 41.55        | 32.23        | 25.59        | 28.15        | 26.85        | 31.89        | 35.63        | 39.57        | 49.38        | 50.17        | 55.91        |
| 4              | 39.25        | 43.19        | 34.90        | 30.10        | 31.30        | 24.76        | 35.70        | 37.88        | 41.90        | 50.55        | 51.49        | 50.92        |
| 5              | 39.51        | 38.89        | 31.33        | 30.12        | 30.69        | 28.87        | 34.80        | 43.24        | 46.40        | 49.40        | 53.84        | 50.96        |
| 6              | 39.34        | 38.72        | 30.58        | 29.89        | 30.45        | 30.33        | 33.27        | 42.47        | 46.35        | 48.97        | 52.96        | 48.32        |
| 7              | 41.32        | 31.30        | 29.11        | 30.11        | 26.96        | 29.52        | 30.64        | 42.04        | 47.14        | 49.34        | 53.12        | 47.25        |
| 8              | 42.16        | 30.26        | 28.80        | 30.28        | 24.39        | 27.32        | 30.60        | 44.93        | 46.75        | 53.96        | 55.18        | 48.53        |
| 9              | 41.09        | 27.35        | 29.85        | 28.37        | 28.72        | 26.74        | 30.31        | 42.29        | 47.14        | 50.89        | 54.97        | 50.22        |
| 10             | 41.47        | 24.59        | 30.74        | 26.59        | 29.54        | 29.15        | 33.79        | 43.19        | 45.00        | 51.39        | 54.96        | 52.28        |
| 11             | 39.33        | 25.04        | 30.24        | 22.49        | 29.71        | 32.35        | 31.03        | 46.85        | 44.32        | 49.38        | 57.82        | 54.69        |
| 12             | 41.17        | 32.02        | 28.37        | 20.64        | 31.62        | 33.05        | 30.61        | 43.87        | 42.87        | 49.13        | 53.89        | 55.30        |
| 13             | 45.63        | 33.29        | 26.42        | 18.41        | 31.66        | 32.96        | 27.48        | 39.33        | 43.33        | 42.80        | 51.48        | 54.26        |
| 14             | 45.78        | 31.45        | 27.40        | 21.14        | 29.97        | 33.65        | 30.01        | 37.15        | 43.39        | 47.24        | 54.18        | 53.42        |
| 15             | 45.33        | 30.15        | 25.72        | 24.38        | 29.50        | 33.40        | 28.09        | 38.49        | 42.22        | 48.80        | 54.19        | 55.45        |
| 16             | 37.37        | 32.47        | 28.90        | 26.21        | 29.78        | 28.81        | 27.70        | 39.76        | 47.02        | 51.85        | 50.15        | 51.85        |
| 17             | 35.15        | 32.22        | 27.68        | 28.04        | 28.36        | 27.92        | 28.68        | 42.94        | 48.31        | 52.79        | 55.29        | 46.72        |
| 18             | 35.89        | 31.81        | 28.73        | 27.66        | 26.69        | 28.95        | 32.46        | 41.05        | 47.23        | 46.27        | 51.91        | 46.14        |
| 19             | 40.21        | 34.89        | 28.48        | 27.64        | 27.47        | 27.71        | 33.52        | 42.32        | 45.20        | 48.44        | 53.94        | 41.56        |
| 20             | 31.71        | 34.40        | 29.27        | 28.84        | 28.43        | 27.40        | 35.43        | 38.14        | 43.00        | 52.58        | 55.09        | 46.06        |
| 21             | 31.97        | 30.76        | 28.01        | 28.04        | 29.54        | 27.38        | 34.25        | 36.72        | 42.88        | 56.85        | 49.38        | 49.22        |
| 22             | 31.30        | 29.65        | 30.12        | 27.80        | 28.18        | 27.33        | 31.21        | 32.19        | 42.51        | 54.04        | 53.72        | 45.33        |
| 23             | 32.33        | -            | 29.68        | 30.42        | 27.64        | 26.68        | 31.00        | 35.46        | 46.62        | 52.09        | 57.87        | 44.47        |
| 24             | 32.74        | -            | 28.39        | 28.33        | 28.85        | 25.93        | 31.51        | 37.14        | 44.97        | 52.95        | 54.92        | 40.87        |
| 25             | 33.82        | -            | 28.28        | 29.26        | 28.60        | 27.77        | 33.90        | 38.41        | 44.92        | 52.65        | 50.70        | 42.12        |
| 26             | 33.87        | -            | 29.55        | 28.45        | 28.58        | 31.40        | 35.49        | 39.45        | 44.54        | 51.99        | 51.05        | 40.22        |
| 27             | 36.38        | -            | 30.06        | 29.46        | 29.97        | 32.29        | 36.13        | 40.34        | 45.17        | 51.32        | 52.63        | 38.77        |
| 28             | 39.37        | 33.34        | 28.52        | 29.13        | 30.51        | 32.19        | 36.67        | 41.07        | 45.49        | 53.69        | 53.93        | 42.81        |
| 29             | 41.39        | 37.38        | 27.26        | 29.96        | ---          | 32.28        | 32.41        | 40.64        | 48.77        | 52.97        | 53.13        | 41.00        |
| 30             | 41.45        | 37.69        | 24.40        | 30.11        | ---          | 31.79        | 30.96        | 38.85        | 48.30        | 52.21        | 51.75        | 38.08        |
| 31             | 41.70        | ---          | 24.58        | 31.25        | ---          | 32.79        | ---          | 40.70        | ---          | 55.17        | 49.78        | ---          |
| <b>Minimum</b> | <b>31.30</b> | <b>24.59</b> | <b>24.40</b> | <b>18.41</b> | <b>24.39</b> | <b>24.76</b> | <b>27.48</b> | <b>29.19</b> | <b>39.57</b> | <b>42.80</b> | <b>49.38</b> | <b>38.08</b> |
| <b>Mean</b>    | <b>38.60</b> | <b>33.70</b> | <b>29.17</b> | <b>27.38</b> | <b>29.07</b> | <b>29.63</b> | <b>32.27</b> | <b>39.55</b> | <b>44.88</b> | <b>51.05</b> | <b>53.05</b> | <b>47.99</b> |
| <b>Maximum</b> | <b>45.78</b> | <b>43.19</b> | <b>35.23</b> | <b>31.25</b> | <b>31.66</b> | <b>33.65</b> | <b>36.67</b> | <b>46.85</b> | <b>48.77</b> | <b>56.85</b> | <b>57.87</b> | <b>55.91</b> |



**Appendix C-2:** Mean daily air temperature (in degrees Fahrenheit) recorded at the Longmire Stream Gage during water year 2013.

| Date           | Oct          | Nov          | Dec          | Jan          | Feb          | Mar          | Apr          | May          | Jun          | Jul          | Aug          | Sep          |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1              | 53.59        | 42.08        | 36.60        | 26.50        | 31.24        | 32.49        | 40.87        | 39.30        | 49.48        | 62.95        | 54.80        | 61.81        |
| 2              | 49.39        | 41.80        | 33.31        | 27.36        | 30.72        | 32.40        | 38.01        | 44.90        | 48.30        | 61.06        | 51.44        | 62.21        |
| 3              | 45.58        | 43.41        | 34.15        | 27.90        | 30.36        | 29.46        | 38.27        | 46.54        | 50.12        | 58.91        | 57.06        | 59.45        |
| 4              | 47.59        | 45.38        | 36.30        | 30.39        | 32.52        | 31.00        | 37.00        | 50.23        | 54.05        | 52.97        | 61.83        | 57.70        |
| 5              | 48.10        | 45.87        | 32.63        | 30.43        | 31.68        | 31.05        | 35.76        | 53.84        | 56.08        | 52.13        | 63.82        | 54.58        |
| 6              | 49.00        | 43.00        | 31.38        | 30.73        | 31.64        | 30.77        | 34.72        | 53.27        | 56.32        | 56.57        | 64.04        | 51.26        |
| 7              | 51.09        | 36.32        | 30.26        | 30.47        | 30.84        | 32.18        | 32.02        | 51.99        | 52.34        | 58.20        | 64.10        | 54.89        |
| 8              | 50.67        | 32.19        | 29.52        | 30.82        | 28.08        | 32.25        | 32.24        | 52.52        | 54.58        | 60.79        | 63.11        | 58.47        |
| 9              | 49.52        | 31.21        | 30.26        | 29.97        | 29.62        | 33.02        | 34.09        | 52.94        | 51.95        | 61.49        | 62.44        | 60.21        |
| 10             | 49.16        | 27.04        | 31.90        | 27.64        | 30.53        | 32.13        | 35.82        | 54.05        | 50.62        | 59.88        | 62.08        | 61.94        |
| 11             | 48.50        | 29.52        | 30.83        | 25.34        | 30.79        | 33.80        | 35.18        | 54.69        | 46.38        | 55.78        | 60.86        | 63.96        |
| 12             | 45.10        | 33.75        | 30.73        | 22.88        | 32.98        | 33.90        | 33.11        | 47.60        | 46.06        | 52.20        | 61.11        | 64.84        |
| 13             | 46.68        | 35.82        | 28.54        | 21.49        | 32.82        | 34.22        | 29.47        | 43.88        | 46.58        | 54.19        | 62.56        | 62.26        |
| 14             | 47.29        | 36.40        | 29.70        | 23.80        | 31.25        | 35.03        | 32.03        | 44.28        | 48.07        | 59.08        | 61.49        | 63.51        |
| 15             | 46.97        | 32.68        | 28.09        | 26.73        | 32.64        | 36.37        | 32.02        | 43.45        | 53.63        | 59.91        | 57.80        | 60.64        |
| 16             | 40.80        | 35.39        | 29.76        | 27.86        | 32.07        | 32.94        | 31.75        | 46.68        | 55.12        | 59.86        | 59.87        | 53.55        |
| 17             | 40.12        | 36.90        | 29.15        | 29.38        | 29.85        | 29.11        | 32.85        | 43.96        | 55.72        | 56.30        | 61.06        | 49.86        |
| 18             | 43.97        | 34.09        | 29.08        | 29.25        | 29.48        | 31.01        | 34.52        | 43.32        | 52.41        | 57.67        | 61.63        | 49.81        |
| 19             | 45.58        | 37.11        | 29.36        | 29.53        | 30.81        | 30.18        | 36.00        | 44.30        | 47.65        | 59.95        | 61.73        | 51.47        |
| 20             | 34.41        | 36.57        | 30.01        | 30.23        | 30.46        | 30.95        | 37.26        | 48.72        | 44.84        | 61.59        | 61.53        | 53.80        |
| 21             | 34.50        | 32.51        | 29.53        | 29.61        | 29.94        | 28.60        | 36.61        | 42.35        | 46.37        | 63.26        | 61.13        | 52.92        |
| 22             | 33.51        | 31.62        | 30.73        | 30.32        | 29.92        | 28.79        | 38.61        | 35.38        | 50.18        | 61.75        | 62.25        | 47.19        |
| 23             | 34.87        | -            | 30.46        | 31.40        | 29.00        | 30.83        | 37.47        | 37.67        | 48.97        | 63.07        | 61.99        | 45.59        |
| 24             | 34.78        | -            | 29.76        | 30.46        | 30.15        | 30.52        | 40.99        | 40.32        | 48.26        | 63.71        | 59.68        | 44.75        |
| 25             | 35.62        | -            | 29.18        | 31.37        | 29.71        | 33.03        | 43.87        | 42.32        | 47.87        | 63.39        | 55.89        | 43.43        |
| 26             | 35.93        | -            | 30.22        | 29.94        | 30.26        | 34.00        | 44.84        | 44.60        | 48.23        | 63.35        | 55.62        | 44.21        |
| 27             | 37.76        | -            | 30.42        | 29.99        | 31.22        | 33.80        | 40.44        | 43.25        | 48.18        | 60.59        | 56.82        | 42.03        |
| 28             | 41.90        | 36.16        | 29.48        | 29.68        | 31.04        | 33.96        | 40.00        | 43.91        | 54.76        | 59.45        | 58.05        | 44.96        |
| 29             | 43.31        | 37.97        | 28.67        | 30.57        | ---          | 36.89        | 35.57        | 41.85        | 58.48        | 59.76        | 54.99        | 41.74        |
| 30             | 42.94        | 38.45        | 26.02        | 31.80        | ---          | 37.94        | 35.19        | 42.07        | 60.81        | 61.09        | 58.19        | 39.74        |
| 31             | 43.79        | ---          | 27.06        | 32.07        | ---          | 38.89        | ---          | 45.70        | ---          | 60.08        | 59.99        | ---          |
| <b>Minimum</b> | <b>33.51</b> | <b>27.04</b> | <b>26.02</b> | <b>21.49</b> | <b>28.08</b> | <b>28.60</b> | <b>29.47</b> | <b>35.38</b> | <b>44.84</b> | <b>52.13</b> | <b>51.44</b> | <b>39.74</b> |
| <b>Mean</b>    | <b>43.61</b> | <b>36.53</b> | <b>30.42</b> | <b>28.90</b> | <b>30.77</b> | <b>32.63</b> | <b>36.22</b> | <b>45.80</b> | <b>51.08</b> | <b>59.39</b> | <b>59.97</b> | <b>53.43</b> |
| <b>Maximum</b> | <b>53.59</b> | <b>45.87</b> | <b>36.60</b> | <b>32.07</b> | <b>32.98</b> | <b>38.89</b> | <b>44.84</b> | <b>54.69</b> | <b>60.81</b> | <b>63.71</b> | <b>64.10</b> | <b>64.84</b> |

**Appendix C-3:** Maximum daily air temperature (in degrees Fahrenheit) recorded at the Longmire Stream Gage during water year 2013.

| Date           | Oct          | Nov          | Dec          | Jan          | Feb          | Mar          | Apr          | May          | Jun          | Jul          | Aug          | Sep          |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1              | 74.17        | 43.61        | 38.47        | 29.44        | 34.03        | 34.75        | 59.31        | 56.96        | 62.21        | 80.30        | 56.79        | 78.40        |
| 2              | 56.34        | 45.67        | 35.91        | 29.97        | 34.25        | 36.08        | 43.57        | 64.81        | 54.51        | 76.00        | 52.84        | 77.13        |
| 3              | 67.38        | 45.56        | 35.77        | 30.10        | 32.72        | 33.58        | 49.69        | 65.63        | 64.62        | 71.82        | 68.27        | 68.49        |
| 4              | 69.37        | 48.09        | 37.98        | 31.24        | 34.80        | 47.38        | 38.39        | 68.69        | 70.67        | 55.21        | 77.80        | 67.77        |
| 5              | 69.81        | 50.63        | 35.53        | 30.82        | 33.29        | 33.16        | 37.18        | 73.02        | 70.13        | 55.92        | 79.03        | 56.32        |
| 6              | 72.25        | 50.49        | 32.39        | 32.48        | 34.23        | 31.82        | 36.73        | 74.15        | 71.70        | 68.22        | 80.18        | 53.43        |
| 7              | 74.58        | 41.40        | 30.91        | 31.08        | 33.84        | 42.96        | 33.60        | 69.47        | 59.47        | 72.91        | 78.34        | 64.05        |
| 8              | 73.44        | 37.91        | 30.03        | 31.53        | 36.51        | 47.30        | 35.46        | 68.04        | 66.76        | 71.37        | 76.16        | 74.96        |
| 9              | 70.40        | 34.19        | 30.74        | 31.57        | 30.37        | 49.32        | 40.33        | 71.07        | 60.68        | 77.12        | 71.28        | 77.58        |
| 10             | 70.71        | 30.17        | 34.01        | 29.24        | 31.70        | 34.58        | 39.40        | 74.43        | 60.52        | 73.53        | 75.25        | 82.70        |
| 11             | 72.25        | 32.29        | 31.81        | 27.05        | 32.53        | 36.53        | 42.89        | 70.48        | 50.58        | 65.59        | 67.09        | 86.13        |
| 12             | 48.08        | 37.29        | 32.10        | 25.87        | 35.08        | 35.37        | 37.25        | 52.00        | 53.31        | 55.84        | 74.10        | 85.68        |
| 13             | 48.25        | 40.06        | 30.57        | 25.61        | 35.34        | 36.42        | 30.73        | 50.97        | 52.48        | 68.48        | 77.97        | 78.74        |
| 14             | 49.84        | 40.74        | 30.29        | 26.26        | 32.50        | 39.52        | 37.73        | 55.29        | 55.58        | 74.99        | 74.46        | 84.46        |
| 15             | 49.68        | 37.97        | 29.70        | 29.47        | 43.51        | 47.95        | 37.86        | 48.97        | 69.56        | 74.17        | 60.48        | 66.84        |
| 16             | 49.53        | 37.96        | 30.22        | 30.19        | 34.77        | 35.22        | 37.61        | 58.88        | 68.79        | 77.28        | 76.26        | 55.45        |
| 17             | 54.03        | 39.86        | 30.22        | 31.79        | 31.12        | 30.65        | 38.83        | 45.87        | 64.33        | 59.81        | 70.33        | 51.71        |
| 18             | 53.00        | 36.48        | 29.66        | 31.58        | 32.31        | 36.71        | 39.02        | 46.31        | 59.74        | 72.58        | 75.98        | 59.43        |
| 19             | 47.87        | 39.74        | 30.04        | 32.69        | 36.27        | 32.18        | 39.75        | 47.13        | 49.94        | 75.36        | 75.42        | 72.47        |
| 20             | 39.90        | 39.68        | 30.22        | 33.13        | 32.54        | 35.23        | 40.27        | 63.32        | 46.65        | 75.72        | 74.61        | 67.30        |
| 21             | 39.97        | 34.80        | 30.73        | 32.71        | 30.23        | 29.93        | 40.56        | 47.86        | 50.71        | 76.92        | 76.45        | 61.17        |
| 22             | 35.93        | 33.39        | 32.43        | 32.90        | 30.46        | 33.19        | 52.98        | 39.26        | 59.65        | 75.00        | 78.34        | 50.32        |
| 23             | 39.16        | -            | 31.11        | 32.44        | 29.97        | 44.85        | 49.46        | 40.62        | 52.71        | 78.72        | 70.59        | 47.02        |
| 24             | 38.35        | -            | 30.77        | 31.71        | 32.52        | 36.87        | 60.29        | 43.73        | 52.10        | 79.03        | 71.37        | 50.55        |
| 25             | 39.92        | -            | 29.94        | 32.99        | 30.35        | 42.40        | 62.46        | 48.75        | 53.38        | 78.40        | 62.96        | 45.17        |
| 26             | 38.16        | -            | 30.89        | 31.52        | 32.90        | 37.05        | 64.82        | 51.55        | 53.81        | 78.47        | 62.47        | 53.26        |
| 27             | 39.10        | -            | 31.06        | 30.75        | 33.87        | 36.23        | 47.73        | 45.92        | 51.43        | 72.88        | 63.58        | 44.29        |
| 28             | 45.80        | 38.36        | 30.25        | 29.96        | 31.69        | 36.40        | 43.69        | 47.68        | 67.98        | 70.53        | 65.33        | 47.40        |
| 29             | 55.90        | 38.80        | 29.99        | 31.29        | ---          | 52.34        | 39.83        | 43.64        | 72.96        | 73.15        | 58.42        | 42.90        |
| 30             | 44.20        | 39.99        | 28.43        | 33.61        | ---          | 52.78        | 45.02        | 46.51        | 81.88        | 74.05        | 71.95        | 41.06        |
| 31             | 45.87        | ---          | 29.67        | 33.03        | ---          | 53.27        | ---          | 54.99        | ---          | 67.78        | 79.73        | ---          |
| <b>Minimum</b> | <b>35.93</b> | <b>30.17</b> | <b>28.43</b> | <b>25.61</b> | <b>29.97</b> | <b>29.93</b> | <b>30.73</b> | <b>39.26</b> | <b>46.65</b> | <b>55.21</b> | <b>52.84</b> | <b>41.06</b> |
| <b>Mean</b>    | <b>53.97</b> | <b>39.80</b> | <b>31.67</b> | <b>30.77</b> | <b>33.35</b> | <b>39.10</b> | <b>43.41</b> | <b>56.00</b> | <b>60.29</b> | <b>71.84</b> | <b>71.09</b> | <b>63.07</b> |
| <b>Maximum</b> | <b>74.58</b> | <b>50.63</b> | <b>38.47</b> | <b>33.61</b> | <b>43.51</b> | <b>53.27</b> | <b>64.82</b> | <b>74.43</b> | <b>81.88</b> | <b>80.30</b> | <b>80.18</b> | <b>86.13</b> |

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