Salmon Creek Gaging Station near Juneau, Alaska

Station Description for the 2018 Water Year

LOCATION.—Lat 58°19'57", long 134°27'57" referenced to North American Datum of 1927, and Lat 58°19'56", long 134°28'04"referenced to World Geodetic System 1984. Gage is located on the left bank (when facing downstream), about 0.3 mi upstream from the mouth and 2.5 mi northwest of Juneau.

DRAINAGE AREA.—Drainage area 9.69 mi^2 as reported by the USGS, discharges are regulated.

ESTABLISHMENT AND HISTORY.—Gage established on April 27, 2016 at the same location and datum of U.S. Geological gaging station number 15051010.

GAGE.—A Campbell Scientific CS450 vented and temperature compensated transducer is coupled to a Campbell Scientific CR6 data logger and records stage data in 15 minute intervals. The transducer is housed in 1 inch galvanized pipe and set and referenced to vertical datum established by the U.S. Geological Survey (see reference marks). Additional equipment is housed in a gage house on left bank.

CONTROL.—Low flow control is a boulder/cobble riffle immediately below the orifice and staff gage. The channel is the control at medium and high stages. Shifting from the rating is possible at all stages as the gage reach can be alternately scoured and filled.

DISCHARGE MEASUREMENTS.—Measurements are made by wading in the vicinity of the gage. High flow measurements can be measured from a bridge approximately 0.25 mi downstream.

FLOODS.—U.S. Geological Survey recorded a maximum discharge of 2110 ft^3/s, Nov. 22, 2005 and gage height 4.20 ft. Minimum discharge recorded by the U.S. Geological Survey was 3.5 ft^3/s, March 17-20, 2006.

WINTER FLOW.—The stage-discharge relationship will be periodically affected by ice during cold periods during most winters.

REGULATION AND DIVERSIONS.—Flow is regulated by Salmon Creek Reservoir located 2 miles upstream. Diversion upstream for off-stream hydropower plant; outflow from the plant goes into Gastineau Channel and is not included in the discharge records. There is a supplemental water valve tapped off of the penstock at the base of the dam to supply additional water to Salmon Creek during periods of low flow. The valve discharges water directly into the natural channel. Operation of the valve is performed remotely by the AEL&P System Operator who also has real-time indication of the streamflow. When the flow drops to 9 ft^3/s, an alarm is generated and the Operator opens the valve and logs the operation.

ACCURACY.— Accuracy of the discharge records should be fair to good with the exception of ice affected record which will be fair to poor.

REFERENCE MARKS.—The gage is referenced to several vertical reference marks (RMs) established by the U.S. Geological Survey to accurately track vertical datum for the gage. The existing gage continues to reference these RMs to maintain accurate vertical datum.

RM 1 – Brass cap anchored in concrete 2 feet shoreward of the orifice on left bank, elevation 2.64 feet. This RM is the base RM from which to begin level surveys.

RM 4 – Lag bolt driven in 3 foot diameter spruce tree 20 feet from the left edge of water and 30 feet upstream of the orifice and outside staff gage, elevation 10.82 feet.

RP 1 – ¼ inch anchor bolt drilled in concrete block 1 foot upstream of orifice, elevation 2.44 feet.

RM 5 – ¼ inch lag bolt on upstream side of two foot diameter cottonwood 25 feet from left edge of water and 12 feet downstream of the orifice, elevation 8.574 feet.

RM 6 – ¼ inch lag bolt on upstream side of 1 foot diameter spruce tree, 15 feet from the left edge of water and 15 feet upstream of the orifice, elevation 7.774 feet.

2018 WATER YEAR STATION ANALYSIS

GAGE HEIGHT RECORD.—The gage height record is complete for the 2018 water year with no periods of missing record. The gage height record was periodically subject to backwater due to ice during which periods the discharges were estimated. Gage height record was subject to backwater during the following dates:

Nov. 18-21, 2017; Dec. 29, 2017-Jan. 3, 2018; Jan. 9-14, 2018; Jan. 31-Mar. 11, and Mar. 26, 2018.

GAGE HEIGHT CORRECTIONS.—Gage height corrections to the recorder are used to adjust for differences between the recorded values and readings of the outside reference gage during site visits. Corrections ranged from -0.15 to +0.07 ft for the 2018 water year. A plot of corrected gage heights and measured field values of gage height is shown below in figures 1 and 2.

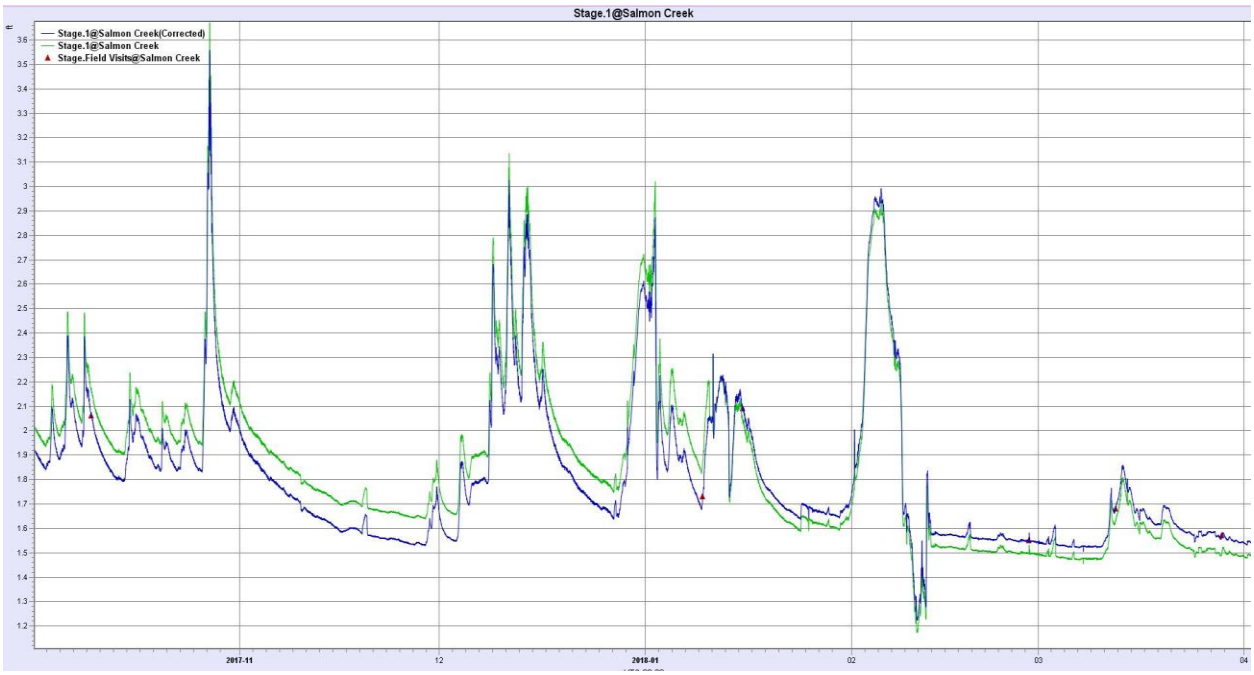


Figure 1. Stage data from Salmon Creek gaging station showing raw and corrected recorded values and field readings from the outside reference gage (Oct. 2017 to April 2018).

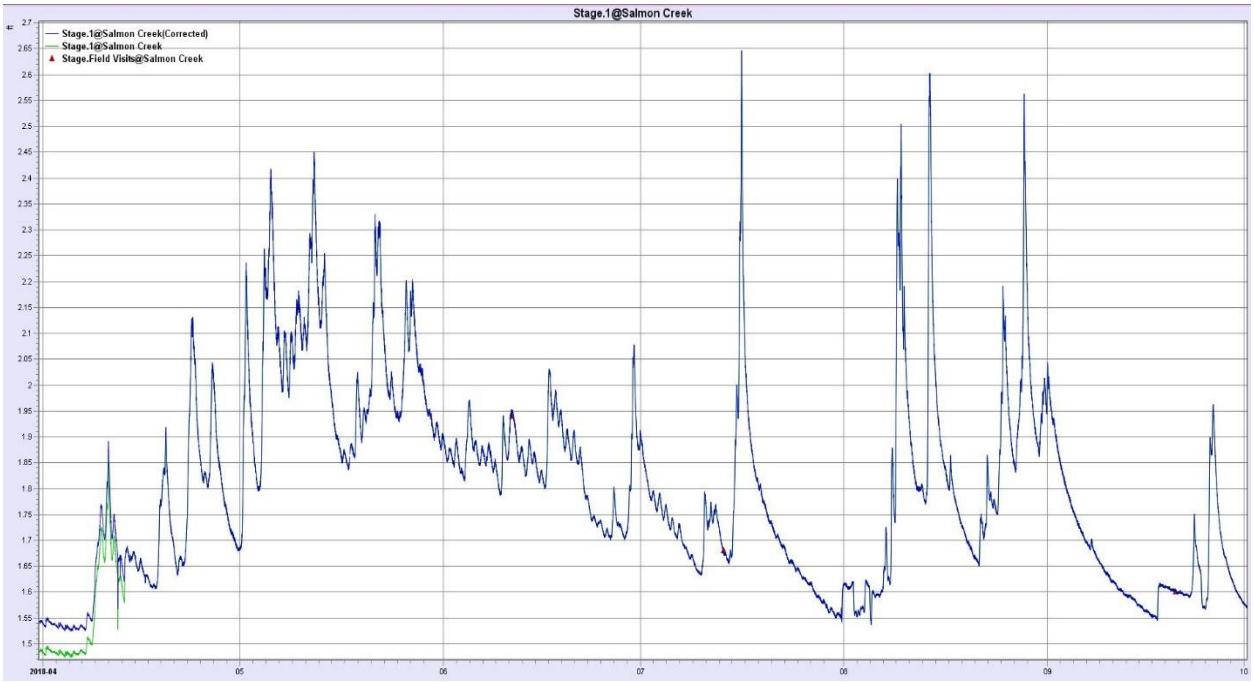


Figure 2. Stage data from Salmon Creek gaging station showing raw and corrected recorded values and field readings from the outside reference gage (April 2018 t0 October 2018).

DATUM CORRECTIONS.— A complete level survey conducted on May 22, 2016. No datum corrections were needed. A partial level survey was conducted on April 12, 2018 to determine a proper gage height following winter ice conditions. No datum corrections were needed based on this survey.

RATING.—Rating 1 was developed by the USGS and continued in use with two stage variable shifts until Feb. 5, 2018. Discussion and description of rating 1 is covered in the 2017 water year station analysis report. Rating 2 was put into use on Feb. 5, 2018 and continued in use through the remainder of the water year. Rating 2 was developed to account for consistent scour conditions relative to rating 1 in lower to mid-range stages as defined by the more recent measurements 8-19. The changes from rating 1 provide better definition of low to mid-range discharges without the need for application of stage variable shifts. Since the primary function of this gage is to alert AELP to flows less than 9 CFS so that supplemental water can be added to the stream, rating 2 was developed to eliminate the need for stage variable shift adjustments to the rating.

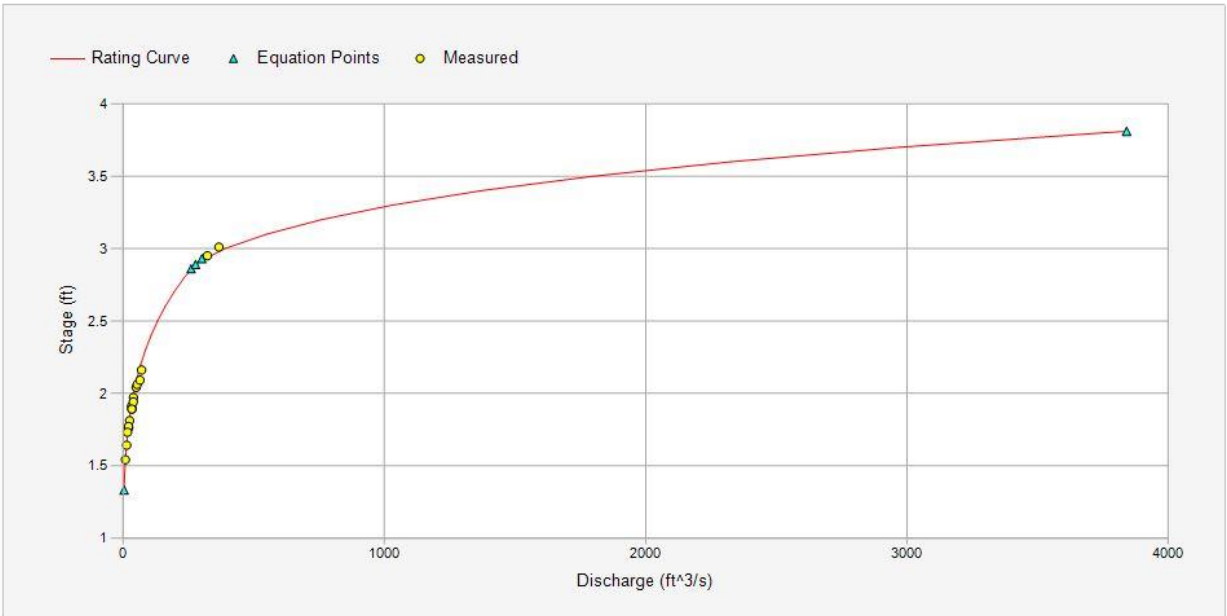
The gage reach is under section control at low to midrange discharges and channel control at greater discharges. The gage reach is subject to scour and fill during peak flows and during lower discharges when salmon spawn throughout the gage reach. Ten discharge measurements (numbers 10-19) were conducted during the 2018 water year. Eight of the measurements were used for rating analysis and two measurements were conducted under backwater conditions due to ice formation. The eight measurements used in rating analysis were all within 6% of the rated flow for rating 2. Discharge measurements ranged from 8.4 to 63.8 ft^3/s. Rating curve and rating equation points for both ratings are shown below:

Rating Curve

Salmon Creek Rating #1 2018 Water Year - Used to compute discharge with two stage variable shifts.

Label: Salmon Creek
Description: Site ID-Salmon Creek

Curve on: January 27, 2018 Curve Start Date: April 20, 2015 Location: Salmon Creek Juneau



Rating Curve

Salmon Creek Rating #1 2018 Water Year - Used to compute discharge with two stage variable shifts.

Label: Salmon Creek
Description: Site ID-Salmon Creek
Curve on: January 27, 2018 Curve Start Date: April 20, 2015 Location: Salmon Creek Juneau

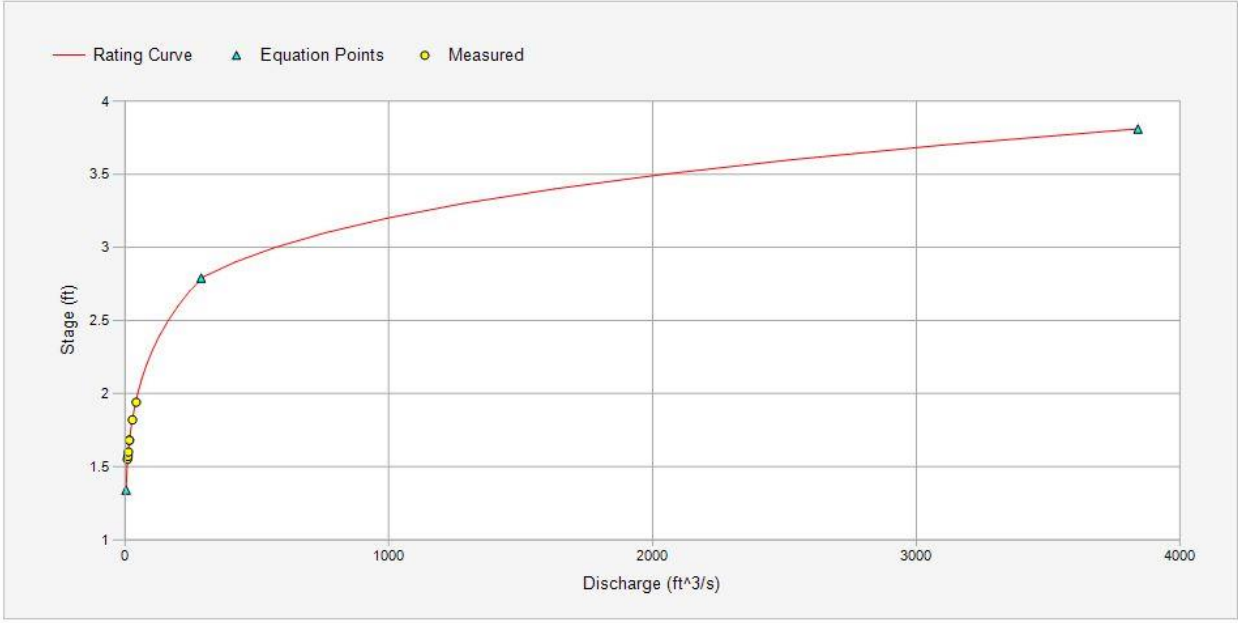
Stage (ft)	0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1.00	0.00	0.00	0.00	0.00	4.41	7.00	10.59	15.39	21.66	29.65
2.00	39.66	51.99	66.97	84.96	106.32	131.45	160.76	194.69	233.68	282.63
3.00	389.17	550.06	760.28	1,030.42	1,372.48	1,799.96	2,327.99	2,973.35	3,754.63	3,841.00

Figure 3. Salmon Creek Rating 1 used through Feb. 5, 2018 shown in graphic and tabular formats.

Rating Curve

Salmon Creek Rating #2 2018 Water Year - Used to compute discharge directly.

Label: Salmon Creek
Description: Site ID-Salmon Creek
Curve on: February 6, 2018 Curve Start Date: February 5, 2018 Location: Salmon Creek Juneau



Rating Curve

Salmon Creek Rating #2 2018 Water Year - Used to compute discharge directly.

Label: Salmon Creek
Description: Site ID-Salmon Creek
Curve on: February 6, 2018 Curve Start Date: February 5, 2018 Location: Salmon Creek Juneau

Stage (ft)	0	.1	.2	.3	.4	.5	.6	.7	.8	.9
1.00	0.00	0.00	0.00	0.00	4.27	7.19	11.36	17.09	24.69	34.52
2.00	46.96	62.40	81.27	104.03	131.14	163.11	200.45	243.70	298.43	417.14
3.00	568.77	759.10	994.41	1,281.51	1,627.72	2,040.90	2,529.43	3,102.24	3,768.81	3,841.00

Figure 4. Salmon Creek Rating number 2 in effect from Feb. 5, 2018 shown in graphic and tabular formats.

DISCHARGE RECORD.—Rating number 1 was used to compute discharge from the beginning of the 2018 water year through Feb. 5, 2018. Rating number 1 was used with two stage variable shifts (fig. 5) to adjust for slight scour conditions. The shifts were defined by measurements 7-10 (shift 1) and measurement 12 (shift 2) measurement 11 generally fit well with shift 1 but was subject to backwater from ice and as such, the stage assigned to measurement 11 was questionable with respect to rating analysis. The two shifts are quite similar and both reflect minor scour conditions. The shifted rating is

shown below. The stage variable shifts were in effect below stages of 3.08 feet. From Feb. 6, 2018 rating 2 was used direct without the need for stage variable shifts,

Stage record was subject to backwater from ice from Nov. 18-21, 2017; Dec. 29, 2017 - Jan. 3, 2018; Jan. 9-14, 2018 and Jan. 1 – Mar. 11, and Mar. 26, 2018. Discharges during periods of ice were estimated from examination of the stage record, comparison with Juneau weather records and hydrographic comparison with the Mendenhall River near Juneau. Hydrographic comparison with the Mendenhall is poor.

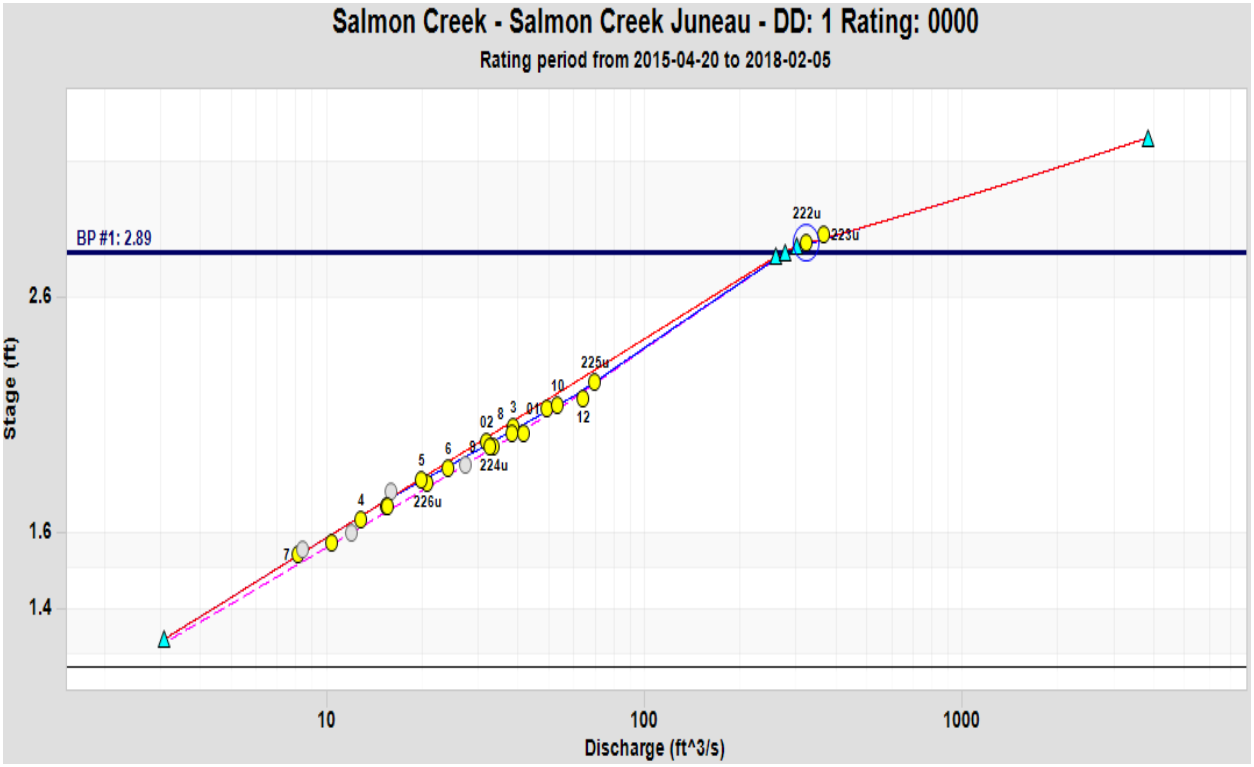


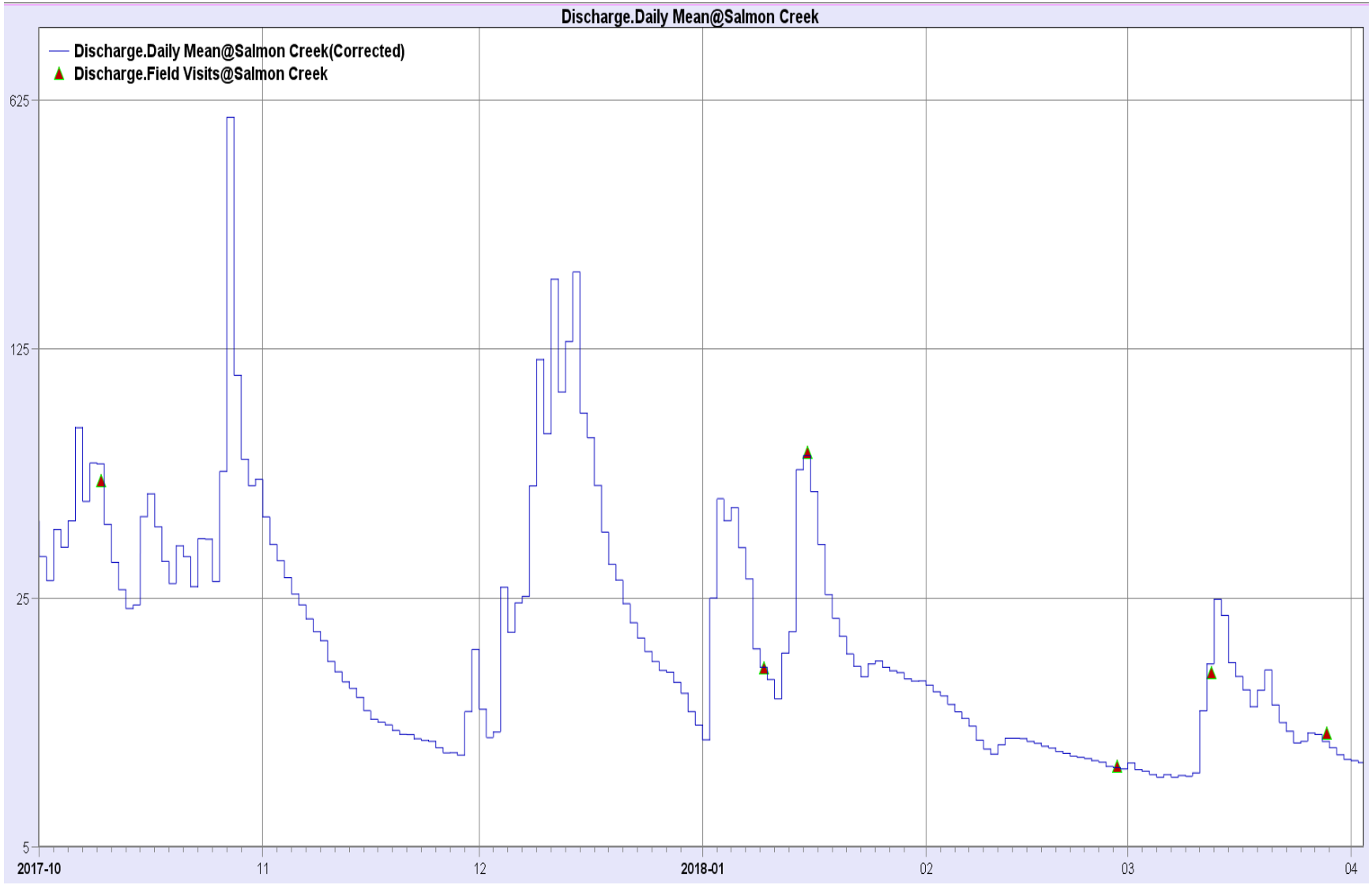
Figure 5. Salmon Creek rating number one (log scale) shown with stage variable shifts used to compute discharge through Feb. 5, 2018.

REMARKS.— Records of discharge are complete. Discharge records are fair due to drift in stage recordings and the relatively poor gage reach and lack of cross sections available to consistently make good discharge measurements. Discharges estimated due to backwater from ice are poor.

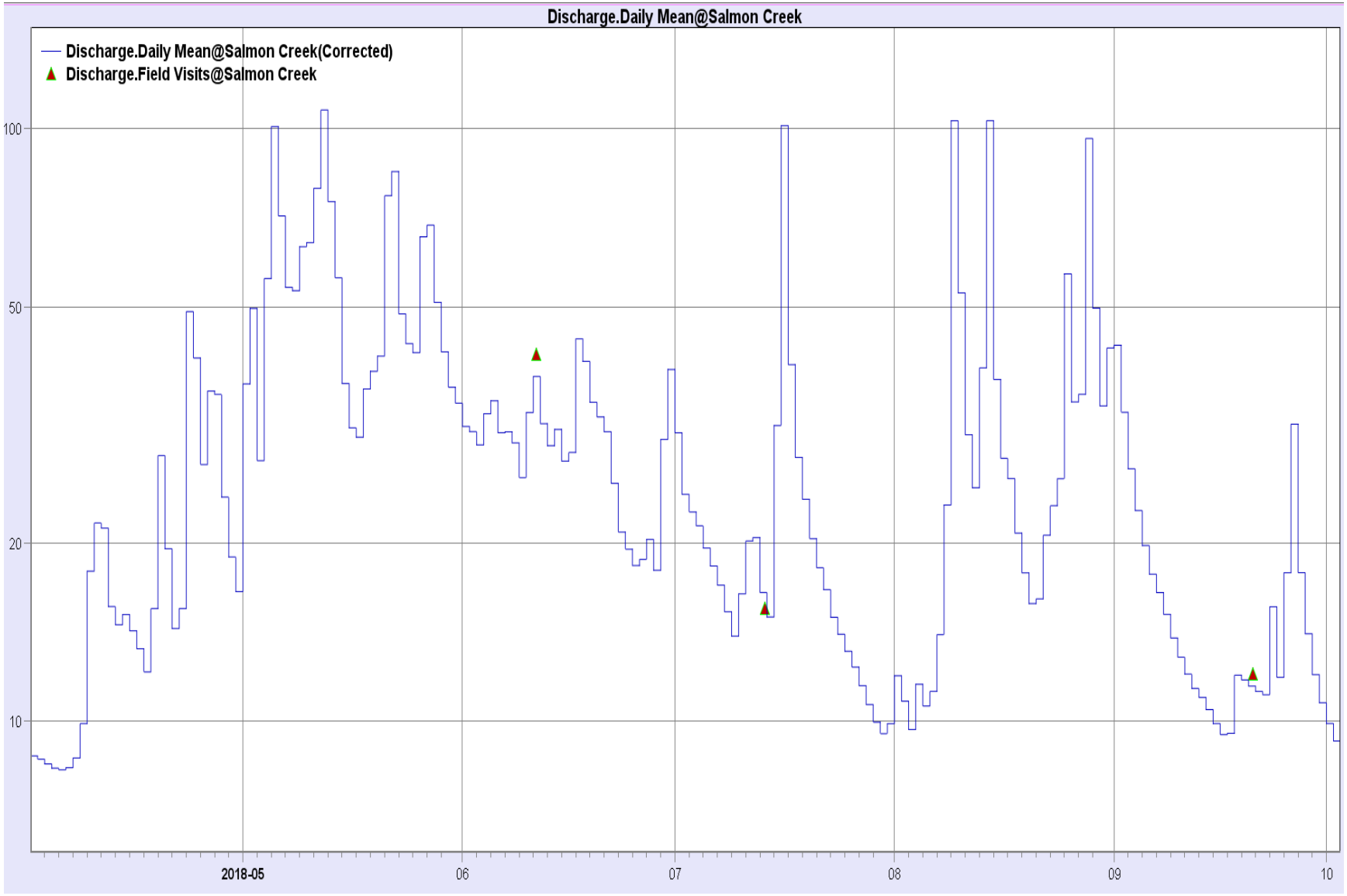
The following files were included as an attachment to this document:

Salmon Creek 15 min. 2018 Final.

Salmon Creek Daily Mean 2018 WY Final.



Computed daily mean discharge and field measurements for Salmon Creek near Juneau, Alaska from October 2017 to April 2018.



Computed daily mean discharge and field measurements for Salmon Creek near Juneau, Alaska from April 2018 to October 2018.

Daily Mean by Year

- Daily Mean Discharge 2018 Water Year-Salmon Creek near Juneau

Identifier: Discharge.Daily Mean@Salmon Creek
Location: Salmon Creek Juneau
Units: ft^3/s
Filter: None

Year: 2017 **Aggr:** 28 **Min:** 7.8 **Max:** 210

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	33	42	12	10	14	8.6	8.7	37	31	31	12	43
2	28	35	10	25	14	8.2	8.6	50	31	24	11	33
3	39	32	11	48	13	8.2	8.5	28	29	23	9.7	27
4	35	29	27	41	13	8.0	8.3	56	33	21	12	23
5	41	26	20	45	12	7.8	8.3	100	35	20	11	20
6	75	24	24	35	11	8.0	8.4	71	31	18	11	18
7	47	22	25	28	11	7.8	8.7	54	31	17	14	16
8	60	20	52	18	10.0	7.9	9.9	53	29	15	23	15
9	60	19	120	16	9.4	7.9	18	63	26	14	100	14
10	40	17	72	15	9.1	8.1	22	64	33	16	53	13
11	31	16	200	13	9.7	12	21	79	38	20	30	12
12	26	15	95	18	10	16	16	110	32	20	25	11
13	23	14	130	20	10	25	15	75	29	16	39	11
14	24	13	210	57	10	22	15	56	31	15	100	10
15	42	12	83	63	9.9	16	14	37	27	32	38	9.9
16	49	11	70	50	9.8	15	13	31	28	100	28	9.5
17	40	11	52	35	9.6	14	12	30	44	40	26	9.5
18	32	11	38	26	9.5	12	16	36	40	28	21	12
19	27	11	31	22	9.3	14	28	39	35	24	18	12
20	35	10	28	20	9.2	16	20	41	33	20	16	11
21	33	10	24	17	9.0	13	14	77	31	18	16	11
22	27	10	21	16	8.9	11	15	85	25	17	21	11
23	37	10.0	19	15	8.9	11	49	49	21	15	23	16
24	37	9.9	18	16	8.7	9.8	41	43	20	14	26	12
25	28	9.5	17	17	8.7	9.9	27	42	18	13	57	18
26	57	9.2	16	16	8.4	10	36	66	19	12	35	32
27	560	9.2	15	16	8.4	10	36	69	20	11	36	18
28	110	9.1	14	15	8.3	9.9	24	51	18	11	96	14
29	61	12	14	15		9.5	19	42	30	10.0	50	12
30	52	18	12	15		9.1	17	37	39	9.5	34	11
31	54		11	15		8.8		34		9.9	43	
Aggr	59	17	48	25	10	11	19	55	30	21	33	16
Min	23	9.1	10	10	8.3	7.8	8.3	28	18	9.5	9.7	9.5
Max	560	42	210	63	14	25	49	110	44	100	100	43

Date Processed: November 29, 2018 10:01

AQUARIUS TIME-SERIES™ SOFTWARE