INSTALLATION OF THE SALMON CREEK STREAM GAGE, JUNEAU, ALASKA.

PREPARED FOR ALASKA ELECTRIC LIGHT AND POWER BY ED NEAL OF ALASKA HYDROSCIENCE, SEPTEMBER OF 2016

Cover Photo: Showing the orifice line containing the pressure sensing transducer and the and the stream gage reach just below the gage.

1 INTRODUCTION

In 2015 Alaska Hydroscience was asked by Alaska Electric Light and Power (AEL&P) to establish a streamflow gaging station at Salmon Creek in Juneau, Alask. The gage is needed to support their Stream Flow monitoring plan as part of the Federal Energy Regulatory Commission (FERC) license granted for the Salmon Creek Project in 1988.

2 STREAM GAGE LOCATION

The Salmon Creek stream gage was located in the same gage reach used by the U.S. Geological Survey (USGS). Both the new gage installation and the USGS gage have been operating concurrently since the new gage was installed in April, 2016. The gage location is approximately 0.3 miles upstream of the Egan Expressway bridge and below the first impassable barrier falls on Lower Salmon Creek. Figure 1 shows aerial imagery of Salmon Creek and stream gage location.

3 STREAM GAGE STATION DESCRIPTION

The stream gage consists of a pressure transducer and data logger that measures and records stage in 15 minute time steps. The transducer elevation is referenced the the existing USGS datum and associated surveyed reference marks. The transducer is mounted in a one inch galvanized pipe (figure 2) and linked to a data logger housed in a small building on the left bank of Salmon Creek just downstream of the gage (figures 3 and 4). A detailed station description is provided as an appendix to this document.

Salmon Creek stage data is stored on the data logger and transferred in real-time to AEL&P's Supervisory Control and Data Acquisition (SCADA) system. The data are transferred hourly to AEL&P's Lemon Creek Operations Center where it is archived and published to www.aelp.com/sc. Agencies as well as the public have access to the data from the website in a CSV format. The National Weather Service (NWS) will grab the data once per hour and ingest it into their system so the hydrograph can be displayed in graphical format on the NWS AHPS page.

4 STREAMFLOW COMPUTATIONS

The data collection and methods used to generate streamflow data for this project will be in accordance with USGS policy and procedure which is recognized as the industry standard in the collection of hydrologic data. Streamflow measurements will be conducted with reference to Rantz and others (1982) and computation of continuous record of streamflow will follow procedures outlined in Kennedy (1983). Stream flow data will be compiled and computed with Aquatic Informatics' Aquarius software. This is the same software selected by the USGS for the storage, processing, and publication of hydrologic data.

Continuous streamflow data collected at the Salmon Creek gage since its installation to August 18 is shown in figure 4. Several calibration measurements are shown. Three measurements were taken by the USGS on May 6 and June 27, 2016. Two additional measurements were taken by Alaska Hydroscience on May 11 and August 3. Calibration discharge measurements and stage verification measurements all suggest the gage is functioning properly.

REFERENCES

Kennedy, E.J., 1983. Computation of continuous records of streamflow. U.S. Geological Survey Techniques of Water-Resources Investigations, Book 3, Chapter A13. 53 p.

Rantz, S.E., and others, 1982. Measurement and Computation of Streamflow Volume 1. Measurement of Stage and Discharge: U.S. Geological Survey Water Supply Paper 2175, 284 p.

Rantz, S.E., and others, 1982. Measurement and Computation of Streamflow Volume 2. Computation of Discharge: U.S. Geological Survey Water Supply Paper 2175, 285-631 p.

Figure 1. Showing the stream gage location and the Salmon Creek drainage basin.

Figure 2. Showing USGS staff plate and orifice line containing the transducer.

Figure 3. Showing the streamgage data logger and transmitter.

Figure 4. Showing the building housing the gage electronics located on the south bank just downstream of the pressure transducer.

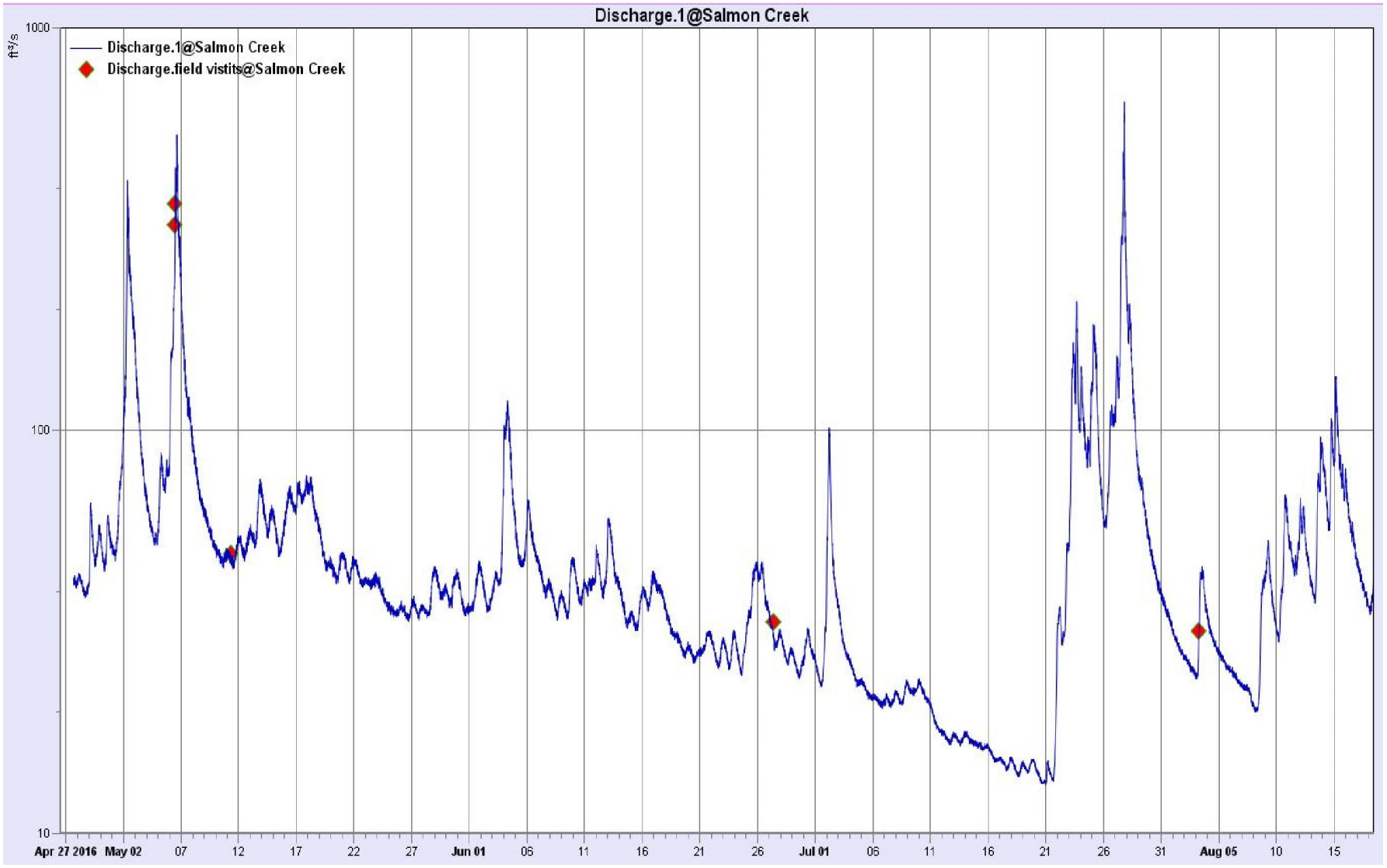

Figure 4. Showing Salmon Creek streamflow data collected at the AEL&P gaging station from April 28 to August 18, 2016 and discharge measurements taken by Alaska Hydroscience and the USGS.

Salmon Creek Gaging Station near Juneau, Alaska
Station Description

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, flows are regulated.
ESTABLISHMENT AND HISTORY.—Gage established on April, 2016 at the location 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 small shelter 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 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.
ACCURACY.— Accuracy of the discharge records should be 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 will continue 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 2.44 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.