

Station Analysis

12415135 ST JOE RIVER AT RAMSDELL NR ST MARIES ID

Analysis Period: 12/11/2012 to 10/21/2013

Analysis Notes:

LOCATION.--Lat 47°21'08", long 116°40'32" referenced to North American Datum of 1983, in SW 1/4 NE 1/4 NE 1/4 sec.11, T.46 N., R.3 W., Benewah County, ID, Hydrologic Unit 17010304, Benewah Lake quad., on left bank, 4 miles west of St. Maries in Heyburn State Park, 1 mi upstream from Mission Point, and at mile 7.4.

EQUIPMENT.--A Sutron 8210 datalogger with a SATLINK transmitter, Sutron ACCUBAR pressure sensor and a conoflow gas system are housed in a 42-inch CMP shelter located on the left bank. A Sontek SL ADVM is installed on a sliding mount streamward of the gage and uses acoustic beams to measure velocity. The stage parameter of the datalogger is referenced to a series of RP's. RP3 is located 35 ft streamward of the gage shelter. For periods of lower stage, the datalogger is referenced to RP2. RP2 is located downstream of RP3 about 50 ft and is anchored to a two foot high piling. A CSG is mounted near RP3. A 12-volt battery and solar panel are used to power the equipment. Discharge measurements are made near the site using a boat and ADCP.

HYDROLOGIC CONDITIONS.--The gage is in backwater from Coeur d'Alene Lake at all stages. The elevation of Coeur d' Alene Lake is regulated by the Post Falls dam at Post Falls, Idaho, operated by Avista Corp.

GAGE HEIGHT RECORD.--For the period the datalogger with a 15 minute recording interval furnished a complete and reliable record of stage except for one small period from Nov. 15-16. The missing data of this period was only five hours worth and the computed daily discharge was used as computed for these days.

GAGE HEIGHT CORRECTIONS.--For the period, no corrections were applied to the stage record.

DATUM CORRECTIONS.--Levels were run Jul 11, 2013 and all were found with limits.

STAGE-AREA RATING.-- For the period, stage-area Rating 1.0 was used. The channel consists of sand, silt and mud with some rock. Both banks are covered with grass and brush. The channel is somewhat diked by Hwy 3 on the right bank and by steeper banks on the Left bank side.

Stage-area rating No. 1, developed using the USGS program AreaComp and cross-section field data collected on Mar. 15, 2010, was used for the period. The standard cross-section extends from the OSS and up the Left bank and over to the right bank to a fence post high upon the Hwy 3 embankment. Elevations from the level set were entered into AreaComp to the nearest .1 ft. After the Excel stage-area rating was made, input points were entered into ADAPS every .5 ft. from 12.00 ft to 39.00 ft. The top of the rating, and the last entry point, was at 39.09 ft. so the 39.5 ft. mark was not entered.

The standard cross-section was checked again on Sep. 14, 2012. No significant change to the channel geometry was seen and Stage-Area Rating 1.0 was continued in use throughout the period. Stage-area check files have been archived. (\\Igswwfs001\SiteData\Surface Water\12415135\Analyses\Other\SA Rating\AreaComp_Checks\Rating_1.0\12415135_20110420_SACheck.act) Cross-section checks are now on a three year interval as it has been proven stable. Standard x-section checks will be done sooner if the need arises.

VELOCITY RECORD.--Index velocities are obtained by a Sontek SL (Side looking) ADVM. The frequency of the SL is 500 kHz. Five cells are activated and the range averaged velocity is used to obtain the index velocity. With the surging velocities of this site at lower flows, it was decided that this was the best data to use for the index.

For the period, velocity data supplied by the ADVN looked complete and reliable. In looking at the .ARG files for the period of about June 10 to the end of the record, it was noticed that the beams were affected more than usual by what seems to be aquatic growth drifting in and out of the beams. Cleaning of the ADVN has not resolved this and it is thought that a good Spring flush may clear things out.

The Beam checks and .ARG files are always screened for boundary issues at the time of each measurement and between visits. Only one measurement was made during a time when the traces of the SNR plots were a bit "fuzzy" or suffering from intermittent boundary issues. This measurement, measurement 33 made on June 27 called for a -.05 shift. ...odd because one would think that a boundary problem would bias velocities low. For this reason the boundary issues were thought not to affect velocities to the degree where record needed to be estimated. Instead the period of record from June 10 to Oct. 21, 2013 daily discharge record should be downgraded to poor and used as computed.

VELOCITY SHIFTS.-- For the period, two velocity shifts were applied to Index Velocity Rating 2.0. The velocity shift IVS1 (Index Velocity Shift 1) was developed using measurements 30-32. It represents the flushing of dead aquatic growth piled around the banks from the previous summer blooms as flows increase. When the area the water travels through is increased from this flushing the water velocity measured in front of the ADVN is slowed. This is why the +.05 and +.06 are added. For the correction curve the lower point uses .26 fps with no correction and the mid and upper points use the mean index velocities for measurements 31 and 32 with a +.05 and +.06 respectively as corrections. IVS1 is held to the peak for the year on May 13. From here a -.05 correction found with measurement 33 is prorated in using IVS2.

IVS2 and its -.05 represents the increase in growth at the bank edges which in turn decrease the area the water can travel through. This causes increased velocities in the measured zone of the range averaged cell of the ADVN and requires a slight correction that takes velocity away from the recorded index velocities. The lower point of IVS2 uses the same lower input point of .26 with no correction. The midpoint uses the index velocity of .48 found on measurement 33 and applies a -.05 correction. The -.05 is held as a constant in an open ended manner with the upper input point of 1.69 and a correction of -.05. The 1.69 was used as the upper point as to try and shift truly by time as aquatic growth is thought to be a time oriented event tied to the warmer days of spring and summer. Corrections for higher velocities were not an issue as index velocities were all lower than .60 after measurement 33.

From measurement 33 made on June 27 IVS2 was prorated back to the rating direct with Measurement 34 made on Oct. 21, 2013. It would have been good to measure at the end of August to further define the Aquatic growth shift. This was not done and the shift placed on June 26 had to be run to the next known defined shift which was Oct. 21. The return to the rating represents the decline in aquatic growth concentrations with the cooler months of September and October. A velocity corrections table follows:

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Rating VELO # 2.0 2013 Water Year
DD 1, Discharge (ft3/s)
STARTS          INPUT  SHIFT      INPUT  SHIFT      INPUT  SHIFT
2012/02/24 12:17:00  0.26  0.00      3.10  0.00      4.78  0.00
  Meas. # 24.
1 2012/10/09 12:00:00  0.26  0.00      3.10  0.00      4.78  0.00
  Meas. #028.Rated poor.
2 2012/12/11 11:38:00  0.26  0.00      3.10  0.00      4.78  0.00
  Meas. 029.
3 2013/02/06 11:49:00  0.26  0.00      3.10  0.00      4.78  0.00
  Meas. # 030 use 0.00 shift @ +2.5%.
4 2013/02/27 09:00:00  0.26  0.00      1.01  0.00      1.69  0.00
  Before the increase in flows.
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5	2013/03/19	10:34:00	0.26	0.00	1.01	0.05	1.69	0.06
	Meas. # 31.							
6	2013/04/19	11:05:00	0.26	0.00	1.01	0.05	1.69	0.06
	Meas. # 32.							
7	2013/05/13	17:45:00	0.26	0.00	1.01	0.05	1.69	0.06
	Peak...end positive shift and prorate to negative one							
8	2013/06/27	11:11:00	0.26	0.00	0.48	-0.05	1.69	-0.05
	Meas. # 33.							
	2013/10/21	10:33:00	0.26	0.00	0.48	0.00	1.69	0.00
	Meas. # 34.							

INDEX-VELOCITY RATING.-- The channel consists of sand, silt and mud with some rock. Both banks are covered with grass and brush. The channel is somewhat diked by Hwy 3 on the right bank and by steeper banks on the Left bank side.

Index Velocity Rating No.2.0, a linear equation, was started on Jan. 11, 2011 at 22:00 hrs. and has continued in use through this period and into the next. It uses the eight measurements from Rating 1.0 (7-13, 15) and includes eight more that were made this period. (measurements 16-23) The measurements cover a range in stage of 24.36 ft (No. 8) to 32.78 ft.(No. 18) They cover a range of measured discharge of 211 cfs (No. 13) to 18400 cfs (No. 18) The range in velocities during the measurements at the standard cross-section range from .04 ft/sec to 2.67 ft/sec. (Meas. No's. 13 and 15)

The rating equation for Rating 2.0 follows:

$$\text{Rating No. 2: } V = (V_i * 0.889) + 0.009$$

V = mean channel velocity

V_i = velocity Range cell of the ADVM

For the period, IV rating 2.0 was checked with five measurements. (Meas. Nos. 30-34) Measured discharges were between 432 cfs (No.34) and 9,510cfs (No. 32). Percent differences were from -10.8% with measurement 33 to +4.8% with measurement 31.

New measurements were added to the set of measurements that make up the equation for Rating 2.0. This was done to see if the rating could be improved. No improvements were evident. Rating 2.0 is still valid.

DISCHARGE RECORD.--For the period, stage from the Accubar pressure transducer was applied to Stage-Area Rating 1.0 to compute area. Index velocity Rating 2.0 run directly and with applied shifts was used to compute the rated velocity. Rated area and rated velocity were then multiplied together to obtain discharge.

For the Period of Dec. 11, 2012 to Oct. 21, 2013 measured discharges range from 432 cfs(Meas. No. 34) to 9,510 cfs (Meas. No. 32) while mean daily flows ranged from 432 cfs to 12,500 cfs. There were no estimated days this period.

REMARKS.-- Discharge records are considered fair except for days when the index velocities approach .45 fps and lower and or the ADVM beams are affected by boundary issues. These days are poor. Water quality samples were collected for the U.S. Environmental Protection Agency (EPA) Basin Environmental Monitoring Program (BEMP) of the Spokane River Basin. Computations for the raw Index-Velocity equation and the applied shifts are found in the archived active master workbook.

2013 WATER-YEAR SUMMARY.-- For the 2013 water-year, Computed discharge is to be considered fair except for days when the index velocities approach .45 fps and lower or boundary issues cause

velocity biases. These days should be considered poor. Poor record starts at the beginning of the water year and extends through December. Record improves as velocities increase through the spring and into the start of June. From about June 10 a combination of low velocities and backwater coupled with slight boundary issues affect computed discharge accuracy and cause the record to be considered poor. Poor record extends to the end of the Water year and the period.

Hydrographic comparison is done with a combination of two upstream sites: St. Joe River at Calder, ID (12414500) and St. Maries River near Santa, ID (12414900). For the 2013 water-year, measured discharge ranged from 181 cfs (Meas. No.028) to 9,510 cfs. (Meas. No. 032)

Extremes for the current record were: max. daily discharge, 12,500 cfs May. 14; max gage height, 29.61 ft, Apr. 10; min. daily discharge, 432 cfs Oct. 12; min gag height 22.79, Jan. 23.

Analysis notes for this period last updated 1/13/2014 4:50:27 PM by mswood

Worked By: pselliot

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