Data Validation Report

Yellowstone National Park Water Quality Monitoring
Greater Yellowstone Inventory and Monitoring Network

Data Collected: January 2008 – December 2008

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Introduction

Data validation is the process used to qualify data, reject it, or accept it with no conditions or qualifications. During the validation review, any deviations from SOPs must be documented and their potential effect on the usability and quality of the monitoring data must be evaluated and discussed. This report provides a narrative evaluation and summary of the data collected during the 2008 calendar year at Yellowstone National Park and includes data for 19 stations, 186 site visits, 453 activities, and 5,309 results for drainages and stations specified below.

Madison River Drainage-	**Station ID**
Firehole River at Madison Junction – *Includes 12 visits, 15 activities, and 360 results*	YELL_FH001.8C
Gibbon River at Madison Junction – *Includes12 visits, 12 activities, and 312 results*	YELL_GB000.2M
Madison River at West Yellowstone – *Includes 12 visits, 15 activities, and 358 results*	YELL_MD133.2T
Yellowstone River Drainage-	
Gardner River at Rescue Creek trail crossing – *Includes 12 visits, 21 activities, and 441 results*	YELL_GN002.9M
Lamar River at Tower Junction – *Includes 12 visits, 12 activities, and 328 results*	YELL_LM000.5M
Soda Butte Creek near Silver Gate, MT – *Includes 16 visits, 29 activities, and 649 results*	YELL_SB015.7A
Soda Butte Creek at Buffalo Ranch – *Includes 12 visits, 12 activities, and 317 results*	YELL_SB001.5M
Pelican Creek at Lake – *Includes 11 visits, 14 activities, and 326 results*	YELL_PC000.4M
Yellowstone River at Fishing Bridge – *Includes 10 visits, 10 activities, and 220 results*	YELL_YS616.4M
Yellowstone River at Canyon – *Includes 11 visits, 11 activities, and 125 results*	YELL_YS600.5M
Yellowstone River at Corwin Springs – *Includes12 visits, 18 activities, and 404 results*	YELL_YS549.7M
Yellowstone Lake at Signal Point - *Includes 4 visits, 4 activities, and 52 results*	YELL_YL001.0M
Yellowstone Lake at Dot Island – *Includes 4 visits, 10 activities, and 91 results*	YELL_YL002.0M
Yellowstone Lake at West Thumb – *Includes 4 visits, 131 activities and 536 results*	YELL_YL003.0M
Yellowstone Lake at Stevenson Island – *Includes 4 visits, 7 activities, and 71 results*	YELL_YL004.0M
Yellowstone Lake at Mary Bay – *Includes4 visits, 4 activities, and 52 results*	YELL_YL005.0M
Yellowstone Lake at Southeast Arm – *Includes 4 visits, 4 activities, and 52 results*	YELL_YL006.0M
Yellowstone Lake at South Arm – *Includes 4 visits,116 activities, and 500 results*	YELL_YL007.0M
Snake River Drainage-	
Snake River at Flagg Ranch – *Includes 8 visits, 8 activities, and 95 results*	YELL_SN999.9M

Sample Collection and Handling Procedures

For all sites raw conductivity was not measured and reported. The Hydrolab multiparameter units are not able to capture both specific conductance and raw conductivity values; therefore raw conductivity was omitted from the data set. Deviations from the protocols were also recorded for all sites that are sampled from a bridge and include the Gibbon River, Pelican Creek, Gardner River, lower Soda Butte, Lamar River, and the 3 sites on the Yellowstone River. In these cases a 5 gallon plastic bucket was used to collect the water sample by being lowered down from the bridge. For each site visit the sample container was rinsed out several times with native stream water. The bucket was equipped with a screw-on lid (also washed with native stream water) so air-borne sample contamination was eliminated. The DH-81 sampler, as stated in the protocols, is not well suited for larger streams and rivers. A sampler that is better suited for larger, deeper rivers include the DH-59 or the DH-76. Incorporating these types of samplers should be investigated for use on the larger streams.

Field QA/QC Procedures and Results

A split sample was taken at a minimum of 10 percent of all samples collected during each sample week. The split sample is a collection of water that was split to provide 2 separate samples for analysis of selected water quality parameters. As far as chemical composition, split samples should be very similar, if not identical, to the routine sample. For QA/QC samples there is a requirement of a relative percent difference (RPD) of 15% or less for all chemical samples; that is 15% or less difference between the routine and split samples for a specific analysis. For the stream data all samples met the 15% criteria except the following: Regulatory samples – dissolved iron- 1 sample exceeded the RPD at SB015.7 A (16 Sep). Non-regulatory samples – 1) turbidity – 2 samples exceeded the RPD at YELL_SB015.7A (16 Sep), and YELL_YL004.0M (5 (Aug); 2) total suspended solids – nine samples exceeded the RPD value at YELL_FH001.8C (15 May), YELL_GN002.9M (17 Jan and 01 Oct), YELL_PC000.4M 10 Jul), YELL_SB015.7A (10 Jun and 16 Sep), YELL_YL002.0M (30 Sep), YELL_YL004.0M 5 Aug), and YELLYS549.7M 2 (Sep), 3) volatile suspended solids – four samples exceeded the RPD value at YELL_FH001.8C (15 May), YELL_GN002.9M (17 Jan and 1 Oct), YELL_YL004.0M 5 (Aug); 4) fixed suspended solids – eight samples exceeded the RPD value at YELL_FH001.8C (15 May), YELL_GN002.9M (17 Jan and 1 Oct), YELL_PC000.4M (10 Jul), YELL_SB015.7A (10 Jun and 16 Sep), YELL_YL002.0M (30 Sep), and YELL_YS549.7M (2 Sep); total phosphorus – nine samples exceeded RPD value at YELL_FH001.8C (15 May), YELL_GN002.9M 20 Mar and 1 Oct), YELL_MD133.2T (10 Dec), YELL_PC000.4M (10 Jul), YELL_SB015.7A (10 Jun and 7 Aug), YELL_YS549.7M 17 Apr and 2 Sep); chloride - one sample exceeded RPD value at YELL_GN002.9M (20 Mar); potassium – two samples exceeded RPD value at YELL_GN002.9M (17 Jan), and YELL_SB015.7M (7 Aug); sodium – one sample exceeded RPD value at YELL_GN002.9M (17 Jan); sulfate – one sample exceeded RPD value at YELL_GN002.9M (20 Mar); calcium – one sample exceeded RPD value at YELL_SB015.7A (7 Aug); and magnesium – 2 samples exceeded RPD value at YELL_GN002.9M (17 Jan), and YELL_SB015.7A (7 Aug).

Analytical Methods and Procedures
The analytical laboratory that was chosen to process water samples for chemical analysis was Environmental Testing and Consulting Inc., Memphis, TN. For testing metals in sediments the laboratory used method 6010B ICP-AES (Inductively Coupled Plasma – Atomic Emission Spectrometry); for testing metals in water the method used was 200.7 ICP-AES. Cations (calcium, potassium, magnesium, and sodium) were analyzed by method 200.7 ICP-AES; anions (chloride, nitrate, nitrite, orthophosphate, and sulfate) were analyzed by method 300.0(A) Inorganic Anions by Ion Chromatography; alkalinity (total alkalinity, bicarbonate, and carbonate) were analyzed by method 2320 Alkalinity in Water by Titration; ammonia was analyzed by method 350.3 ISE (Ion Specific Electrode); and total phosphorus was analyzed by method 365.2 Single Reagent Colorimetry.

Total suspended solids, and fixed and volatile solids were analyzed in-house using APHA, 1995. Method 2540D was used for total suspended solids analysis and method 2540-E was used for fixed and volatile solids.

Lab QA/QC Procedures and Results

Laboratory QA/QC procedures were provided to Yellowstone National Park by ETC. These procedures and results will be maintained by YELL staff and kept with original lab report data sheets. Electronic copies of all laboratory analysis were submitted to GRYN staff in Bozeman, MT for archiving.

Field Equipment Calibration and Calibration Records
Field equipment calibration log books and calibration records were maintained in its entirety and are currently housed in Yellowstone National Park, Yellowstone Center for Resources Aquatic Section. Any deviation from the calibration procedures were recorded on the original data sheets as they occurred and updated in the NPSTORET database.

Data Entry, Processing, Problems and Results
Field data sheets clear and complete. One hundred percent of the electronic data entries were checked and verified in NPSTORET. Any errors that detected were immediately corrected within the database.

Summary
All results collected at these stations during this time period have been validated. Details of all deviations may be found in the Data Verification Report. The Data Verification Report also contains recommendations for avoiding such deviations in the future.

Citation
American Public Health Association, 1995, Standard Methods for the Examination of Water and Wastewater, 19th edition.