

Rush Creek Final Report
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Project Summary & Recommendations

Based on biological, physical and water chemistry analyses, it is recommended that sediment, TSS, and degraded habitat be removed as impairments in Rush Creek. However, the stream does not meet the designated use as a coldwater stream in the impaired segment, because water temperatures collected during June and July exceed the sublethal standards for cold water in NR102. Temperatures are elevated due to the series of large spring ponds in the watershed that drain to the stream; some on a continuous basis and others during rain events only. This is a situation which cannot be rectified through changes in the sub-watershed, at least at this time, as these ponds were historically permitted by the Department, and are highly valued by the Rush Creek Hunt Club because they attract wildlife for hunting. Much of the sub-watershed has lands that are no longer in crop production, and animal grazing is not an issue. Fish, macroinvertebrates, habitat, and water quality evaluations collected during a period of seven years, with most information collected over a three year period, indicate Rush Creek appears to be in fair to good condition. Instantaneous water quality grab samples collected over a six month period indicate that the stream dissolved oxygen can support cold and cool-cold fish species, and that pH and conductivity are at acceptable levels. However, continuous temperature monitoring indicated that the stream often exceeds the maximum daily mean water temperature for cold water, in the segment downstream of Lower Wyoming Road. A series of large ponds, flush pond water to the stream, and increase stream temperatures. The segment of stream above these ponds has water temperatures cold enough to support cold water fishes, and the Fish and Aquatic Life segment is currently meeting the designation, with fish and macroinvertebrate data exhibiting good to excellent water quality. The median for suspended solids in the impaired segment was low at 28 mg/l, with the highest values occurring during June and July after rain events, which likely flushed solids from ponds to the stream. The median level of phosphorus in the stream, in the impaired segment was 60 ug/l, or below the standard set for streams of 75 ug/l. A single sample of ammonia, nitrate-nitrite, kjeldahl nitrogen and ortho-phosphate, showed low levels of those parameters, even after a rain event.

Introduction

Rush Creek (WBIC: 1240100) is a 10.45 mile long stream located in the Otter and Morrey Creeks watershed in the Lower Wisconsin River basin. The stream flows through Iowa County. Five miles of Rush creek are classified as class II trout waters. The segment beginning from the stream mouth and ending just above Weaver and Upper Wyoming Roads has a use designation of coldwater, while the remainder of the stream to the headwaters has a use designation of fish and aquatic life. The stream natural

community designations within the study area are cool-cold mainstem, for much of the stream, and coldwater in the upper stream reach. About Six miles of stream from the mouth to just above the junction of Weaver Road and Upper Wyoming Roads is listed as an impaired 303 (d) water with sediment/total suspended solids listed as the pollutant and the impairment listed as degraded habitat.

Study Sites and Methods

Fish were monitored in June 2010, using a towboat electroshocker in Rush Creek at three sites: Weaver Rd., Lower Wyoming Rd. St. 2, and Rush Creek Rd. St. 1. In addition to the latter sites, in 2007 DNR Fish Management monitored two other sites, at locations along Upper Wyoming Road (Table 1, Figure 1). Fish indices of biotic integrity (FIBI) were analyzed and scores for cold water were used at the uppermost site at Weaver Road, because the dominant fish were cold water species and the natural community designation is cold mainstem. For the remainder of the sites downstream, the cool-cold transition FIBI was used because the dominant fish captured were transitional eurythermal species, and the natural community designation was cool-cold transition mainstem.

Table 1. Rush Creek monitoring sites from upstream to downstream.

Swims			Natural Community	Segment
ID	Year	Location	Determination	Impaired?
10033902	2011	Weaver Rd.	Cold Main	Not listed
10022691	2007	Upper Wyoming Rd. St. 4	Cool-Cold Trans Main	Not listed
10022690	2007	Upper Wyoming Rd. St. 3	Cool-Cold Trans Main	Listed
10022679	2007	Lower Wyoming Rd. St. 2	Cool-Cold Trans Main	Listed
10022679	2011	Lower Wyoming Rd. St. 2	Cool-Cold Trans Main	Listed
10022678	2007	Rush Creek Rd. St. 1	Cool-Cold Trans Main	Listed
10022678	2011	Rush Creek Rd. St. 1	Cool-Cold Trans Main	Listed

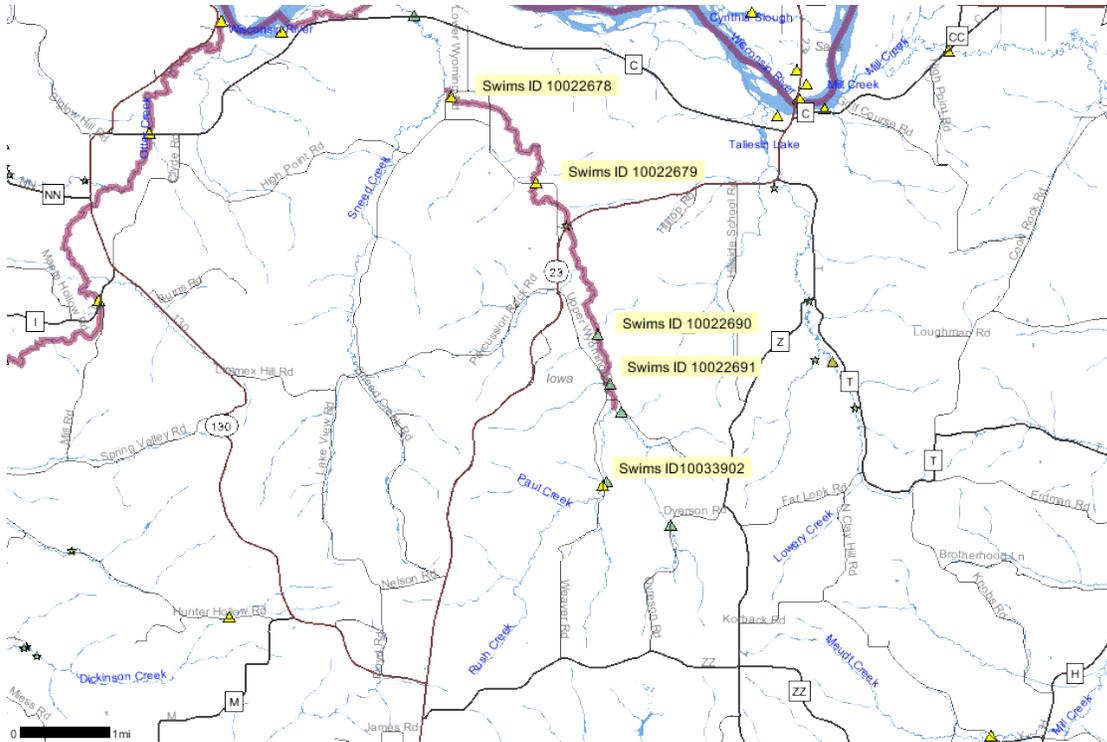


Figure 1 Rush Creek map with Swims station sampling locations.
 Note: Purple portion of the stream is impaired water.

Quantitative habitat was collected at three sites in June 2011; Weaver Road, Lower Wyoming Road St. 2, and Rush Creek Road St. 1. Habitat ratings and scores were calculated and evaluated. Macroinvertebrates were collected using a kick net in fall of 2011, from the same sites where habitat was collected sites.

Water chemistry was collected from only the Lower Wyoming Road St. 2 site between June and October. Samples were submitted to the state lab of hygiene for analysis. Water chemistry parameters collected monthly from June through October were total phosphorus and total suspended solids. Parameters collected just once in July include ammonia-nitrogen, nitrate-nitrite, kjeldahl-nitrogen, and orthophosphate. During monthly water chemistry collections, a YSI 566 meter and transparency tube were used to collect instantaneous water temperature, dissolved and saturated oxygen, pH, specific conductivity, and water transparency. Water temperature and dissolved oxygen was also collected during habitat evaluation at Weaver Rd, Lower Wyoming Rd. St. 2, and Rush Creek Rd. St. 1.

Fish IBI Results

FIBI was calculated for 5 different sites collected with 5 years, and two of those sites had repeated monitoring for FIBI within the impaired waters segment. Depending on the site, cold or cool-cold transition fish IBI was calculated, with an upper 67% confidence

interval included. Results indicate that at the two sites in the non-impaired stream segment, Weaver Road and Upper Wyoming Road St. 4, the ratings were good, while the remaining sites downstream in the impaired segment rated fair (Figure 2). Sites that were assessed in 2007 and again in 2011 had similar ratings of fair. When the data is reviewed for just the impaired waters segment, at least three of the five FIBI scores, there it is about an 83 percent certainty that the scores would be good, rather than fair.

Fish Stocking information shows that brown trout fingerlings have been stocked in the stream off and on since 1980, and since 1997 only feral brown trout fingerlings have been stocked. Stocking was done in years prior to collecting the FIBI information. In years 2005-2006 there were 4000 trout fingerlings stocked, and in years 2009-2010 there were 750 trout fingerlings stocked.

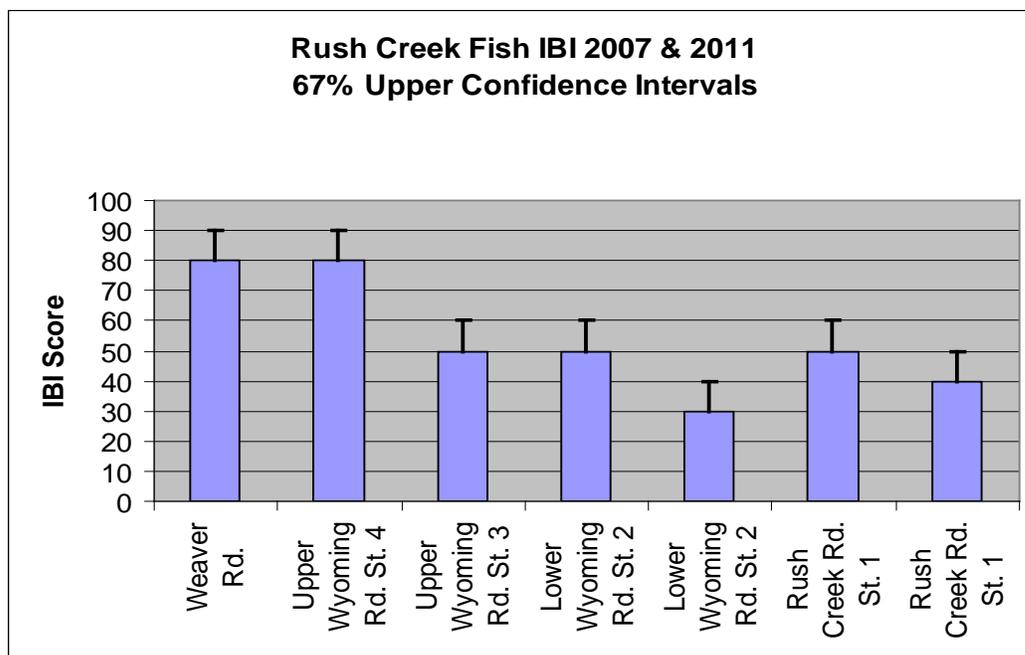


Figure 2. Rush Creek Fish IBI Scores & 67% Confidence Intervals.

Macroinvertebrate Results

Macroinvertebrate scores and ratings indicate the stream in the upper reaches has excellent water quality, while the lower reaches have fair to good water quality.

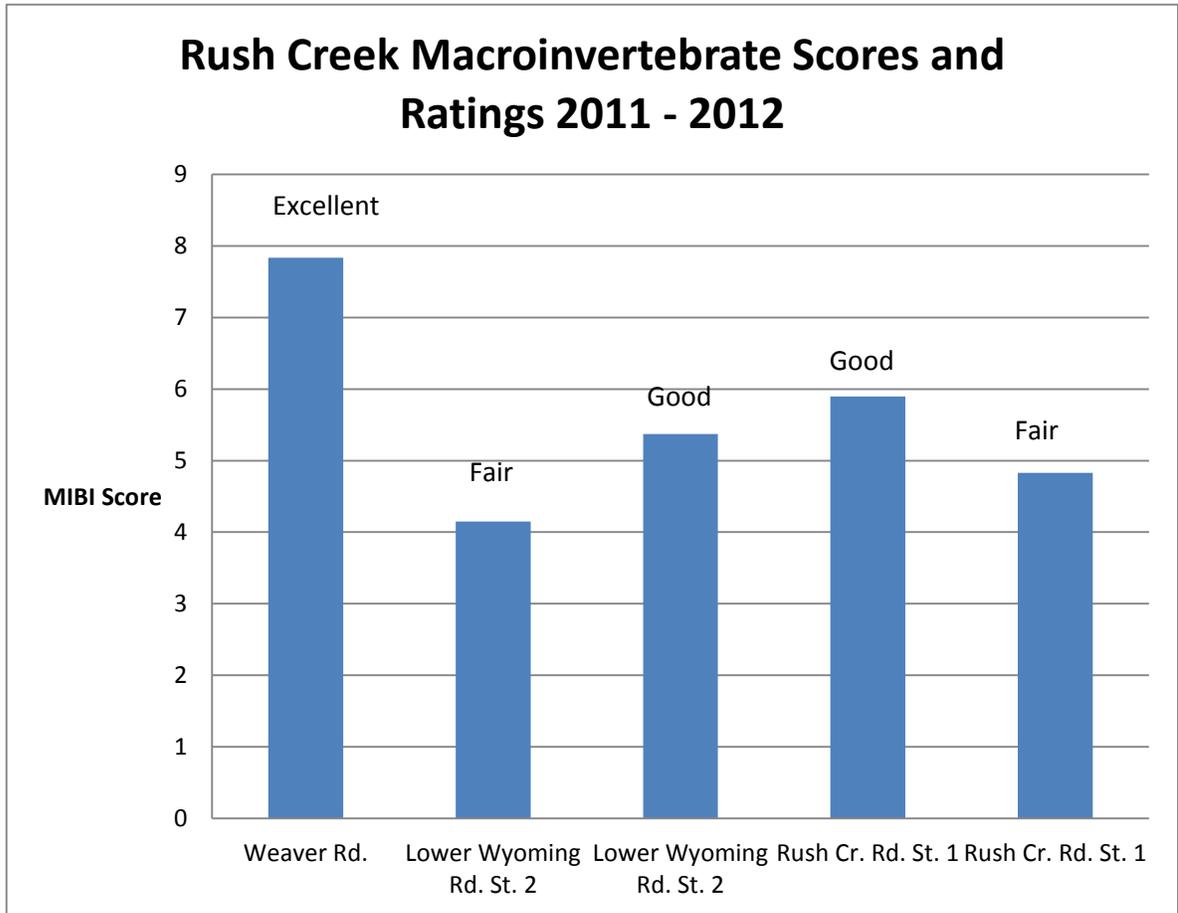


Figure 3. Rush Creek Macroinvertebrate Scores and Ratings.

Habitat Results

Quantitative habitat ratings indicate that Rush Creek has good habitat in the furthest upstream and downstream reaches, while the middle reach has fair habitat (Figure 3). Rush Creek at Weaver Road had the lowest vegetative buffer width because it was grazed the entire length of the station, but was the only site having low stream siltation, and good riffle habitat. For the two sites further downstream, there was some bank erosion and more fine sediments on the stream bottom, likely from row crops west of STH-23. In addition the stream in the vicinity of Lower Wyoming Road has ditches and drain tiles through wetlands, which also contributes to stream siltation. However stream width to depth ratios at all sites appeared to be good, but bends were lacking at the Lower Wyoming Road site. Fish cover scores appeared to be good at the Weaver and Lower Wyoming Roads sites, with plenty of aquatic vegetation or woody debris, while the Rush Creek Road site had less fish cover.

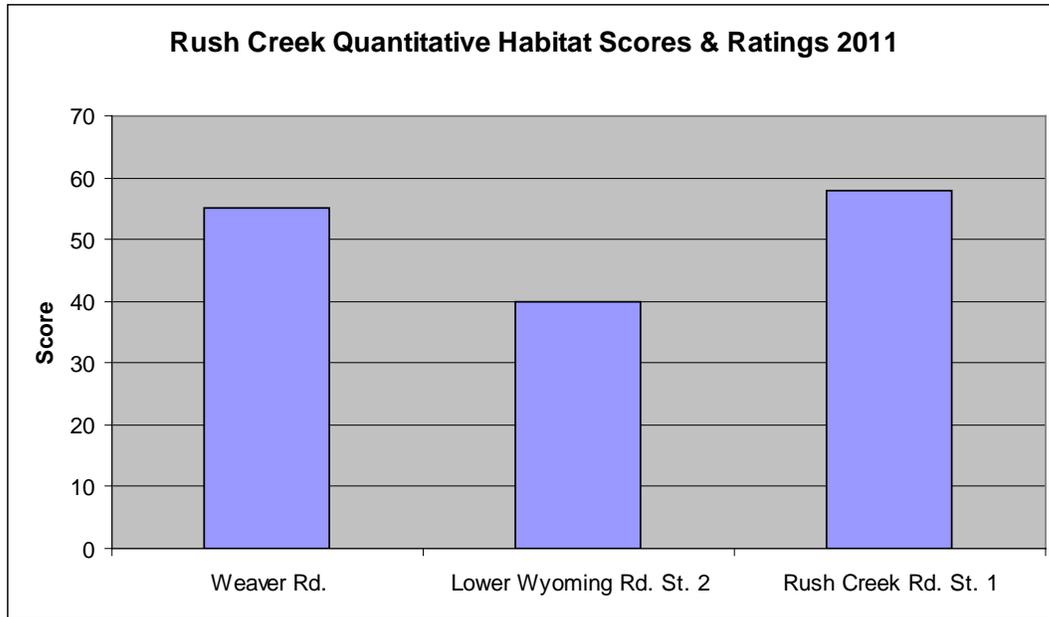


Figure 3. Rush Creek Quantitative Habitat Scores and Ratings.

Water Quality Results

Based on instantaneous data collected from June-October, dissolved oxygen is at acceptable levels in Rush Creek at Lower Wyoming Rd. St. 2 (Table 2). Dissolved oxygen (DO) ranged from 9.4-11.7 mg/l for the Lower Wyoming Rd. St. 2, and for all other sites never fell below a minimum daily mean of 6.0 necessary to support cold water fish. The pH levels were within the range of 6-9 at all sites. Specific conductivity at Lower Wyoming Road was in the same range of values found for long term trend sites in this region of the state. Continuous monitoring for water temperature, collected at the Lower Wyoming Road site indicated the stream often exceeded the maximum daily mean water temperature for a cool-cold mainstem natural community. This is due to the large connected pond just upstream.

Table 2. Water quality collected from Rush Creek, Lower Wyoming Road St. 2.

	Dissolved	DO		Specific
Date	Oxygen mg/l	% Saturation	pH (su)	Conductivity us/cm
6/1/2011	10.4	105	7.9	458
7/13/2011	9.4	96	8.3	
8/17/2011	11.7	110	8.0	512
9/20/2011	11.2	106	8.0	520
10/31/2011	Data not collected due to meter malfunction			
Median	10.8	105.6	8.0	512
Min	9.4	96	7.9	458
Max	11.7	110	8.3	520
Range	9.4-11.7	96-110	7.9-8.3	458-520

Total Suspended Solids (TSS) and Transparency (NTU): The median value for total suspended solids of 28 mg/l at the Lower Wyoming Road site was relatively low in Rush

Cr, compared to the median TSS values reported in 2007 for most other long term trend water quality sites in SW Wisconsin. The highest TSS of 47 was in spring (June 1 sample), and declined thereafter (Figure 4). The higher concentrations from June and July samples during or after rain events, suggest that the large pond upstream in the watershed, is contributing to higher TSS. Stream transparency was good, ranging from 10-15 NTU, suggesting the water is clear.

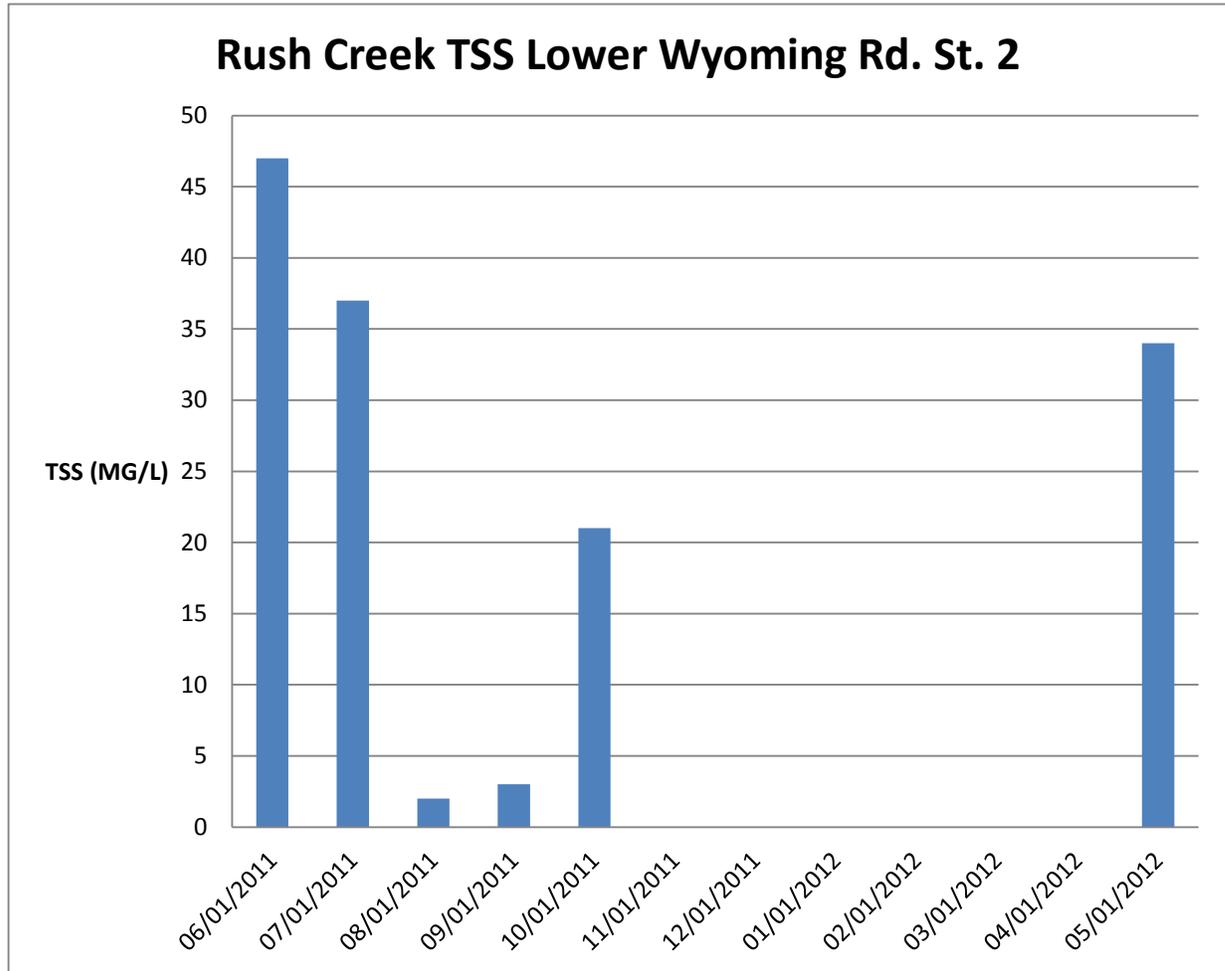


Figure 4. Rush Creek total suspended solids from Lower Wyoming Road St. 2.

Total Phosphorus: The median phosphorus was 60 ug/l, below the standard for streams of 75 ug/l (Figure 5). Phosphorus levels were highest in June and July of 2011, corresponding with rain events, suggesting that the large connected pond upstream in the watershed, is contributing to higher levels of phosphorus.

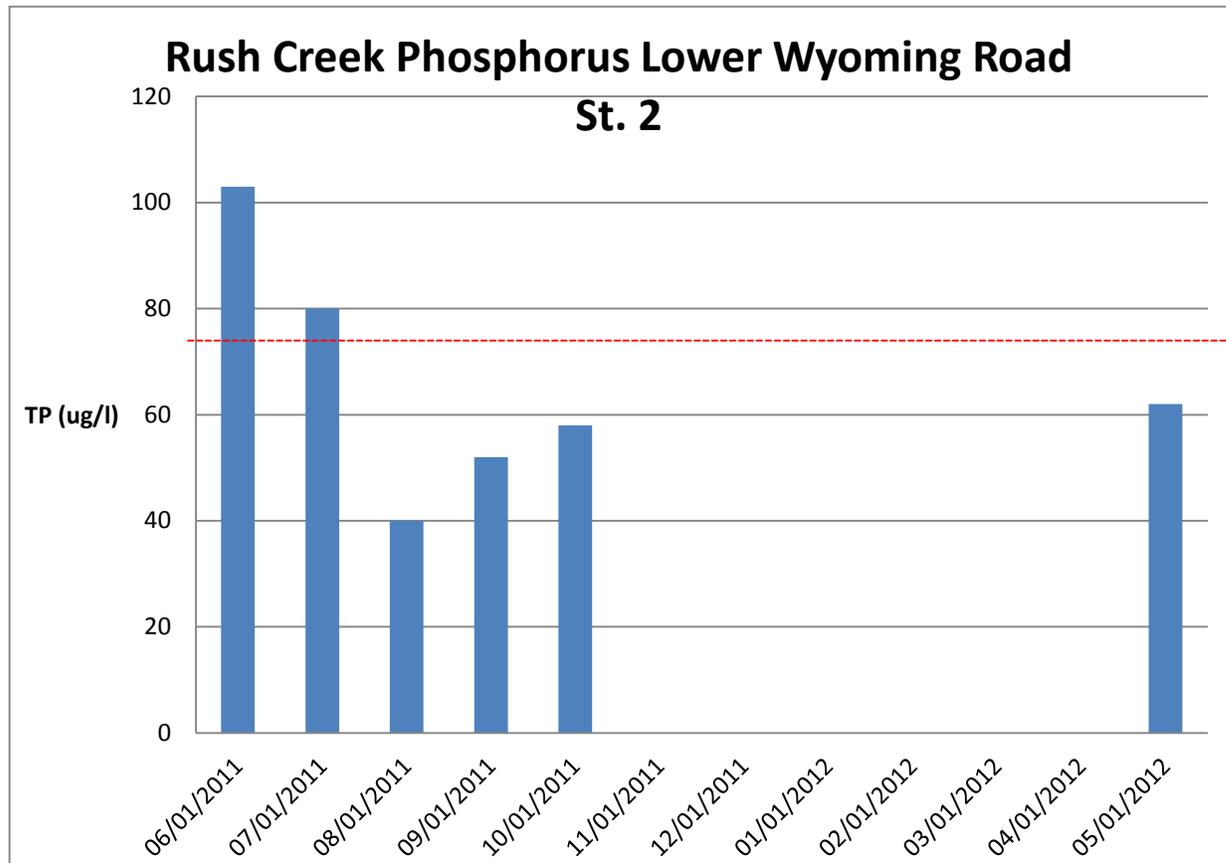


Figure 5. Rush Creek total phosphorus from Lower Wyoming Road St. 2.

Ammonia-Nitrogen, Nitrate-Nitrite, Kjeldahl- Nitrogen and Ortho-phosphate: A single sample of these water quality parameters was collected in July, coincidentally just after nearly a half an inch of rain fell in the area. This was the largest rain event that occurred prior to collection of any water quality samples from Rush Creek during the study. Concentrations of ammonia, nitrate-nitrites, kjeldahl-n, and orthophosphate were low (Table 3), suggesting there is not excessive agricultural runoff.

Table 3. Water chemistry collected on July 13, 2011 from Lower Wyoming Rd. Site 2.

Nitrate-Nitrite (mg/l)	Ammonia Nitrogen (mg/l)	Kjeldahl Nitrogen (mg/l)	Ortho-Phosphate (mg/l)
1.11	0.026	0.26	0.034

Temperature

Temperature was collected using a Hobo Pro-V2 during June, July and August, at Lower Wyoming Road Site 2 (SWIMS station10022679). More than 80% of the maximum daily stream temperatures exceeded the standard for sublethal temperatures for cold water in June and July. Therefore, it is recommended the stream be listed as impaired for temperature.