



Weiser Cove Water Quality Monitoring Report Year 2 April 2002 through March 2003

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Introduction

This report presents the second year (2002-2003) of results for Weiser Cove water quality monitoring conducted by the Idaho State Department of Agriculture (ISDA). Monitoring was conducted to support the Weiser Soil Conservation District (SCD), Weiser Technical Advisory Group (TAG), and the Weiser Watershed Advisory Group (WAG) in the Total Maximum Daily Load (TMDL) process. This program was made possible by state funding that allows ISDA to support the Soil Conservation Commission (SCC) and the local Soil Conservation Districts (SCDs) with the implementation phase of the TMDL process. This monitoring program will assist in understanding the source and transport of contaminants from various agricultural practices. In addition, information gathered will help fill data gaps, help with pollutant load allocations and insure that Best Management Practices (BMPs) are established in areas of need and functioning properly for pollutant reductions. The data and final report will also be provided to the Idaho Department

of Environmental Quality (IDEQ) to help with the development of the TMDL for the listed pollutants and water bodies.

Background

The Weiser Cove area encompasses five creeks and one reservoir that are listed for TMDL development in 2003. The listings and pollutants of concern are as follows: Mann Creek (sediment), Cove Creek (nutrients, sediment), Crane Creek (bacteria, nutrients, sediment), North Crane Creek (Bacteria, flow alteration, nutrients, sediment, and temperature) and South Crane Creek listed for unknown pollutants. Crane Creek Reservoir was listed for TMDL development in 2003. Currently Crane Creek is listed for sediment and nutrients. All of these water bodies reside within hydrological unit code (HUC) 17050124. Mann Creek, originating from Mann Creek Reservoir, Cove Creek, and Crane Creek all confluence with the Weiser River. North Crane Creek and South Crane Creek discharge into Crane Reservoir (Figure 1).

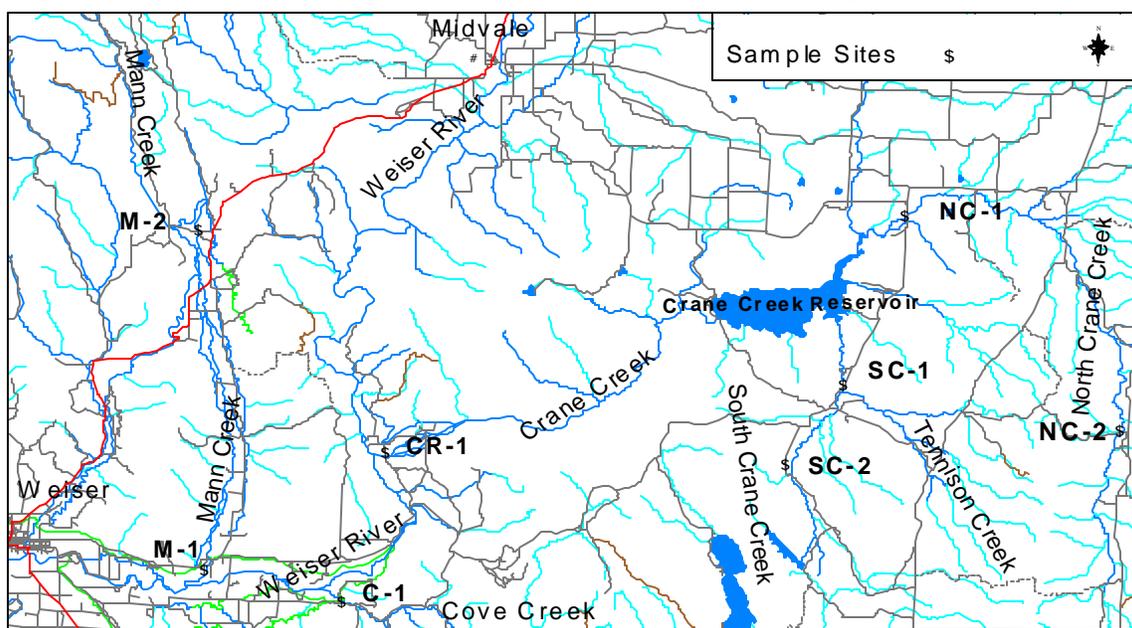


Figure 1. Weiser Cove Site Map

Program Objectives

ISDA worked in cooperation with the Natural Resources Conservation Service (NRCS), Idaho Association of Soil Conservation Districts (IASCD), SCC and IDEQ to complete the following objectives:

- Evaluate the water quality and discharge rates at various locations within each subwatershed.
- Determine which areas contribute the greatest level of pollutant loading.
- Attempt to relate pollutant loading to areas that may require BMP implementation under the TMDL process.
- Provide pre-BMP (background) water quality data for data comparison after implementation.
- Use this data for public information and education.

Monitoring Schedule and Site Description

Monitoring was conducted on a bi-weekly schedule during the months of April through October 2002 and once a month during the late fall and winter months (November 2002 through March 2003).

Field parameters collected during this program were dissolved oxygen, temperature, percent saturation, conductivity, total dissolved solids, pH, and discharge (Appendix A). Analytical testing consisted of total suspended solids (TSS), nitrate + nitrite (NO₃-N+NO₂-N), total phosphorus (TP), ortho-phosphorus (OP), and Escherichia Coli (*E.coli*).

ISDA attempted to establish two water quality monitoring sites per creek. Mann Creek had two sites including an upper site (M-2) just below Mann Creek Reservoir, and a lower site (M-1) just before Mann Creek enters the Weiser River. We were unable to establish two sites on Cove Creek so only the lower site (C-1) was monitored. Only one site was established on lower Crane Creek (CR-1) prior to its confluence with the Weiser River. North Crane Creek had both an upper site NC-2 and a lower site NC-1. South Crane Creek had a lower site SC-1 and upper site SC-2 (Figure 1).

For the second year of monitoring only 2 creeks (Mann, and Crane) had continuous discharge in their lower reaches throughout the year. The remainder of the creeks dried up during the summer months and resumed discharge sometime during the winter months. Table 1 lists the station identifications and the periods of discharge for each creek.

Table 1. 303(d) listed creeks discharge periods

Site Identification	Periods of Discharge
Mann Creek Downstream (M-1)	April 2002 through March 2003
Mann Creek Upstream (M-2)	April through October 2002 Irrigation Season
Cove Creek Downstream (C-1)	April through August 8, 2002 Again October 2002
Crane Creek Downstream (CR-1)	April 2002 through March 2003
South Crane Creek Downstream (SC-1)	April through June 26, 2002, again December 2002
South Crane Creek Upstream (SC-2)	April through May 16, 2002 again January 2003
North Crane Creek Downstream (NC-1)	April through June 12, 2002 again December 2002
North Crane Creek Upstream (NC-2)	April through July 11, 2002 again January 2003

General Results

Potential pollutant reductions within Weiser Cove will be allocated based on the final approved Weiser River TMDL. The proposed Snake River-Hells Canyon TMDL (SR-HC TMDL) estimates the load reduction for phosphorus within the Weiser River, to be approximately 62%.

The SR-HC TMDL proposed concentration for total phosphorus for May through September is 0.07 mg/L. This phosphorus target is estimated to result in >50% reduction in algae growth within the Snake River and Hells Canyon reach. The SR-HC sediment target (protective of fish) proposes no greater than 50 mg/L monthly average, not to exceed 80 mg/L for greater than 14 days (Table 2).

Table 2. Weiser Cove yearly average TP and TSS concentrations

Site Identification	n	*Total-P mg/L	**TSS mg/L
M-2 Mann Creek Up	11	0.06	2.9
M-1 Mann Creek Down	20	0.22	21.6
C-1 Cove Creek Down	16	0.32	12.1
CR-1 Crane Creek Down	20	0.20	15.4
SC-2 South Crane Creek Up	6	0.13	3.2
SC-1 South Crane Creek Down	10	0.12	2.9
NC-2 North Crane Creek Up	10	0.06	4.4
NC-1 North Crane Creek Down	10	0.08	10.6

* SR-HC TMDL proposed TP concentration = 0.07 mg/L

** SR-HC TMDL proposed TSS concentration no greater than 50 mg/L monthly average, not to exceed 80 mg/L for greater than 14 days

Total Suspended Solids (TSS)

Development of the TMDL for the Weiser River and its associated tributaries will follow the same guidance found within the SR-HC TMDL. The pollutant loading for TSS proposes no greater than 50 mg/L monthly average, not to exceed 80 mg/L for greater than 14 days. These requirements are established for the 303(d) listed creeks on a year around basis. Average TSS concentrations for the second year of monitoring never exceeded the proposed SR-HC value of 50 mg/L monthly average or the 80 mg/L criteria (Table 2).

The highest average TSS concentration was recorded at station M-1 (21.6 mg/L) followed by station CR-1 (15.4 mg/L). The average TSS concentrations varied somewhat from year to year (Table 3).

Table 3. Mean TSS values for year 1 (2001-2002) and year 2 (2002-2003).

Sites Weiser Cove	n	Year 2 (2002-2003) Mean TSS	n	Year 1 (2001-2002) Mean TSS
M-2 Mann Creek Up	11	2.9	12	2.9
C-1 Cove Creek Down	16	12.1	7	6.5
CR-1 Crane Creek Down	20	15.4	19	15
SC-2 South Crane Creek Up	6	3.2	5	5.0
SC-1 South Crane Creek Down	10	2.9	8	6.4
NC-2 North Crane Creek Up	10	4.4	11	5.4
NC-1 North Crane Creek Down	10	10.6	8	7.2

As with the 2001-2002 monitoring period the largest load recorded for 2002-2003 season was at CR-1 (4777 lbs/day) followed by 3940 lbs/day at NC-1. The majority of the TSS load at CR-1 occurs when supplemental irrigation water is released from Crane Reservoir. At these 2 locations, higher loads were a result of higher average discharge rates not higher TSS concentrations.

Total Phosphorus (TP)

There are several EPA guidelines for phosphorus concentrations within surface water systems. One guidance states that TP should not exceed 0.05 mg/L for streams entering reservoirs or 0.025 mg/L within a lake or reservoir. TP concentrations should not exceed 0.10 mg/L for streams or flowing waters not discharging directly into lakes or reservoirs (EPA, 1987).

The proposed TP concentration for the SR-HC TMDL is not to exceed 0.07 mg/L during the critical months (May through September). This targeted TP concentration will probably be applied to the Weiser River and its 303(d) listed tributaries. Table 4 lists the average concentrations for TP during the critical period along with the percent reduction required to meet the proposed 0.07 mg/L TP target. Table 5 compares year one to year two TP levels for the critical months of May through September.

Table 4. Mean TP concentrations (critical months) and estimated reductions to meet 0.07 mg/L criteria.

Sites Weiser Cove	n	Critical Months Mean Total-P	% Reduction 0.07 mg/L target
M-2 Mann Creek Up	10	0.06	0
M-1 Mann Creek Down	10	0.22	68%
C-1 Cove Creek Down	7	0.34	80%
CR-1 Crane Creek Down	10	0.23	70%
SC-2 South Crane Creek Up	1	0.18	61%
SC-1 South Crane Creek Down	4	0.12	42%
NC-2 North Crane Creek Up	4	0.04	0
NC-1 North Crane Creek Down	5	0.06	0

Table 5. Mean TP concentration comparison from year 1 and year 2 of monitoring.

Sites Weiser Cove	n	Year 2 (2002-2003) Critical Months Total-p mg/L	n	Year 1 (2001-2002) Critical Months Total-p mg/L
M-2 Mann Creek Up	10	0.06	10	0.05
M-1 Mann Creek Down	10	0.22	11	0.22
C-1 Cove Creek Down	7	0.34	11	0.29
CR-1 Crane Creek Down	10	0.23	11	0.22
SC-2 South Crane Creek Up	1	0.18	1	0.13
SC-1 South Crane Creek Down	4	0.12	4	0.13
NC-1 North Crane Creek Down	4	0.06	3	0.07
NC-2 North Crane Creek Up	5	0.04	5	0.06

At the majority of the sites the phosphorus concentration is not in the particulate form. On average, 75% of the phosphorus concentrations consisted primarily of ortho-phosphorus (Figure 2).

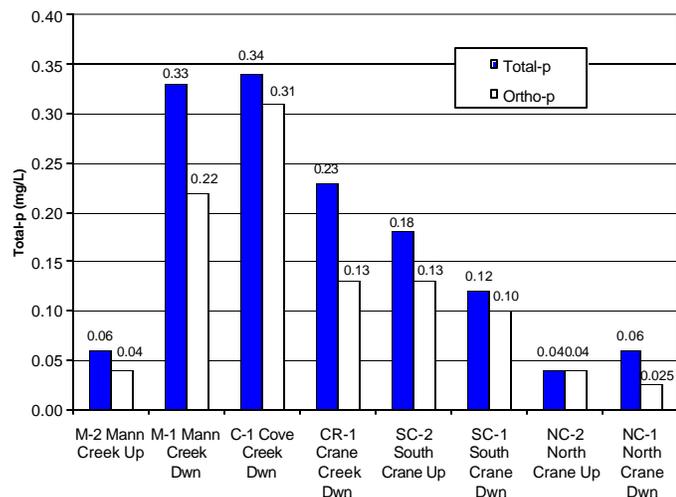


Figure 2. Year 2 TP and OP concentrations (mg/L)

As with the first year of the study, the 2nd year at Crane Creek below Crane Reservoir (CR-1), shows the lowest percentage of OP (56%) of all the sites. Approximately one-half of the TP at CR-1 is bound to the fine sediment that occurs during the irrigation season when releases of water occur from Crane Reservoir.

Nitrate + Nitrite as Nitrogen

Literature values indicate that NO₃ + NO₂-N should be limited to 0.30 mg/L or less to avoid degradation of water quality (Cline 1973). Only site M-1 on Lower Mann Creek had an average concentration of 0.33 mg/L during the critical months (May through September 2002) that exceeded this recommended threshold. The nutrient load reduction for the Weiser River, based on the SR-HC TMDL, only addresses phosphorus. Therefore, nitrogen will not require a load reduction for these 303(d) listed streams.

Bacteria

Of the five creeks monitored within Weiser Cove only Crane Creek and North Crane Creek are listed on the Idaho 303 (d) list as having excessive bacteria that may impair beneficial uses. The state standard for Escherichia Coli (*E.coli*) bacteria (IDAPA 58.01.02 sect, 251) is 406 CFUs (colony forming units) detected at any one time. Of the two listed creeks only Crane Creek (CR-1) discharged throughout the year. North Crane (both NC-1 and NC-2) went dry in early July and stayed dry throughout the summer and fall months. North Crane Creek (NC-1) had two

out of ten samples (20%) exceed the 406 CFU standard. Crane Creek (CR-1), which discharged throughout the year exceeded the bacteria standard 15% of the time. Mann Creek (M-1) and Cove Creek (C-1) had the highest number of exceedances with 35% and 44 % respectively (Table 6).

Table 6. Weiser Cove *e.coli* results (Colony Forming Units)

Date	M-2	M-1	C-1	CR-1	SC-2	SC-1	NC-2	NC-1
4/9/2002	<10	210	440	80	60	>2500	520	600
4/24/2002	<10	360	100	20	30	40	<10	120
5/15/2002	<10	210	60	>2500	170	180	30	200
5/29/2002	<10	50	1100	350	dry	30	10	110
6/12/2002	50	650	310	360		<10	470	200
6/26/2002	<20	>2500	>2500	>2500		<10	450	1600
7/11/2002	20	820	80	240		dry	20	dry
7/24/2002	<20	>5000	520	520			dry	
8/8/2002	<20	380	500	<10				
8/21/2002	<20	1100	dry	80				
9/5/2002	<10	460		180				
9/19/2002	dry	330		250				
10/3/2002		220		210				
10/17/2002		70	230	270				
10/31/2002		50	70	80				
11/20/2002		120	<10	140				
12/18/2002		230	<10	60		30		10
1/23/2003		40	420	20	140	130	20	60
2/20/2003		120	400	10	10	40	20	40
3/19/2003		1200	510	130	100	<10	10	10
% Over 406 CFU	0	35	44	15	0	10	30	20

* Gray shaded areas indicate exceedance of IDAPA 58.01.02, sect., 251.

Conclusions

The majority of sediment transport within Weiser Cove appears to occur during major runoff events which often occur in early spring or late fall. The two years of monitoring (2001-2003) occurred during low water years.

The TSS in the water column is low for all locations and well below the SR-HC TMDL goal of no greater than 50 mg/L monthly average. Two of the five creeks (South Crane and North Crane) go dry during the summer months and lack the ability to transport any sediment load except during major rain/snow events. Both M-1 and C-1 have very low discharge during the critical months (May through September) which limits their ability to transport large volumes of sediment. CR-1 receives Crane Reservoir water during irrigation season that increases the creeks discharge and sediment load.

The SR-HC TMDL proposes a 62% reduction in nutrients for the Weiser River in order to meet the 0.07 mg/L con-

centration of TP proposed for the Lower Snake River and Hells Canyon complex. North Crane Creek, both the upstream (NC-2) and the downstream (NC-1) site, went dry by early July. North Crane Creek, which flows into Crane Reservoir, had an average TP concentration of 0.04 mg/L at NC-2 and 0.06 mg/L at NC-1. North Crane Creek may require some minor reductions in TP to achieve the proposed EPA guideline concentration of 0.05 mg/L for streams entering reservoirs or lakes (EPA, 1987).

South Crane Creek, which also flows into Crane Reservoir has an average TP value of 0.12 mg/L and would require a 42% reduction to meet the proposed SR-HC TMDL value of 0.07 mg/L. To achieve the EPA recommended guideline of 0.05 mg/L a reduction of approximately 58% would be required.

The three creeks that discharge directly to the Weiser River (Mann, Cove and Crane) have average TP concentrations of (0.22, 0.34, and 0.23 mg/L) respectively. The percent reduction to reach the 0.07 mg/L TP goal would be Mann Creek (68%), Cove Creek (80%), and Crane Creek (70%). The majority of the phosphorus load is not in the particulate form, which will make reductions on these systems more difficult.

Mann Creek upper station (M-2) which originates from Mann Creek Reservoir would not require any reduction in TP while the lower station (M-1) would require a 68% reduction (from 0.22 mg/L to 0.07 mg/L).

Crane Creek and North Crane Creek are listed on the state 303(d) list as having bacteria as a pollutant of concern. North Crane went dry by late June early July and had two samples that exceeded the state *e-coli* standard (406 CFU). Crane Creek discharged throughout the year and had three samples that exceeded the state standard. Cove Creek had the highest percentage of exceedances (44%) followed by Mann Creek (35%).

Recommendations

To determine potential sources and their contributions to water quality impairment of Weiser Cove area streams ISDA recommends:

- The Weiser SCD work with the local landowners, NRCS, SCC, and ISDA staff to identify problems within Weiser Cove.
- Evaluation of stream bank conditions for severe down cutting, sloughing, and loss of riparian function.
- Assessment of impacts by large animal operations, either confined or otherwise, and their potential impacts on these systems.

- Identification of critical areas or critical activities best addressed by implementation of BMPs.
- The SCD, NRCS, SCC, and ISDA work with landowners and cooperators to fund and implement projects that will improve the overall water quality within the watershed.
- ISDA will continue to work with all interested parties to evaluate water quality and BMP effectiveness within the watershed.

References

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- United State Geological Survey. Crane Creek at Mouth NR Weiser Idaho. http://waterdata.usgs.gov/id/nwis/uv?site_no=13265500

Appendix A

Site Data

