



# Weiser Cove Water Quality Monitoring Report April 2001 through March 2002

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ISDA Technical Report Summary W-6

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## Introduction

This report represents the first year (2001-2002) 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 help 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 Idaho Department of Envi-

ronmental 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 that was listed for TMDL development in 2006 had the date changed to 2003 and it 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).

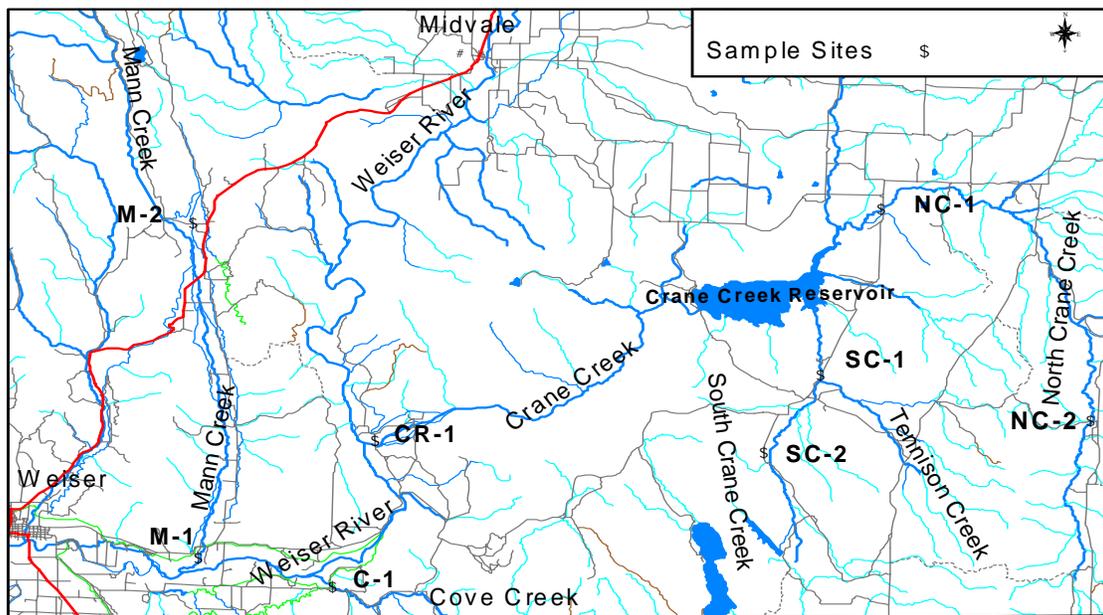


Figure 1. Weiser Cove Site Map

## 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 2001 and once a month during the late fall and winter months (November 2001 through March 2002).

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 ( $\text{NO}_3 + \text{NO}_2\text{-N}$ ), 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).

Three creeks (Mann, Crane, and Cove) 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 2000 through March 2001
Mann Creek Upstream (M-2)	April through October 2000 Irrigation Season
Cove Creek Downstream (C-1)	April 2000 through March 2001
Crane Creek Downstream (CR-1)	April 2000 through March 2001
South Crane Creek Downstream (SC-1)	April through June 2000, again December 2000
South Crane Creek Upstream (SC-2)	April through May 8th 2000, again February 2001
North Crane Creek Downstream (NC-1)	April through June 2000, again January 2001
North Crane Creek Upstream (NC-2)	April through June 2000, again December 2000

## 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 meet the SR-HC TMDL, will 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 average TP and TSS concentrations

Site Identification	n	*Total-P mg/L	**TSS mg/L
M-2 Mann Creek Up	12	0.046	2.9
M-1 Mann Creek Down	20	0.22	13.9
C-1 Cove Creek Down	17	0.29	6.5
CR-1 Crane Creek Down	19	0.17	15
SC-2 South Crane Creek Up	5	0.11	5
SC-1 South Crane Creek Down	8	0.15	6.4
NC-2 North Crane Creek Up	11	0.06	5.4
NC-1 North Crane Creek Down	8	0.07	7.2

\* 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)

The average TSS concentration of the creeks monitored were much less than the proposed SR-HC TMDL value of 50 mg/L monthly average (Table 2). The highest average concentration and largest load was recorded at CR-1 (15 mg/L and 4757 lbs/day respectively) figure 1 and 2. The majority of the load within CR-1 occurs once water is released from Crane Reservoir. Once releases occur very fine suspended colloidal/clay material becomes suspended in Crane Reservoir and is transported by Crane Creek to the Weiser River. This fine suspended material is very light, does not settle easily and quickly plugs a .45 µm filter after filtering approximately 20 milliliters. The larger load can be directly related to the increase in discharge rate at CR-1 once the reservoir release commences.

None of the creeks exceed the proposed SR-HC TMDL sediment criteria of no greater than 50 mg/L monthly average (Table 2).

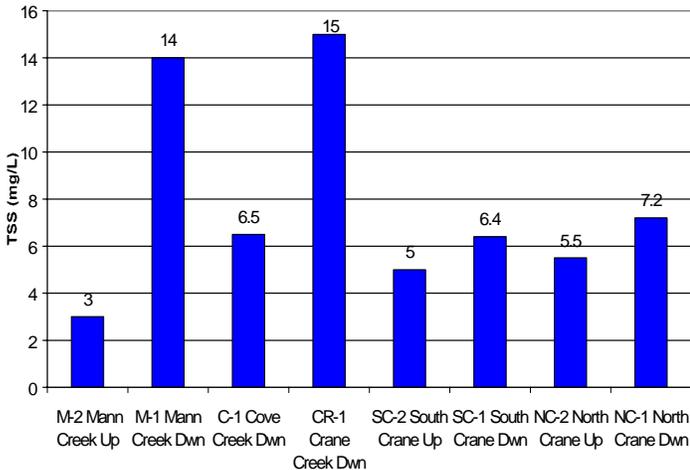


Figure 1. Weiser Cove average TSS concentrations

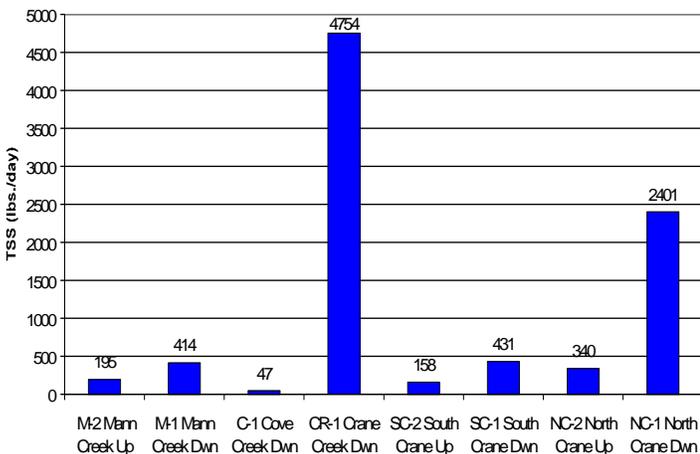


Figure 2. Weiser Cove TSS loads (lbs/day)

## 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.

The proposed TP concentration for the SR-HC TMDL is not to exceed 0.07 mg/L from May through September. M-2 exceeded the 0.07 mg/L concentration only 2 out of 10 samples collected during this period. M-1 and CR-1 exceeded the proposed TP concentration 100% of the time. CR-1 had one sample (0.07 mg/L) that equaled the proposed concentration out of a total of 11 samples. SC-2 only exceeded the 0.07 mg/L once on May 8, 2001 before going dry. SC-1 had four exceedances before it went dry in late June 2001. One sample from NC-1 exceeded 0.07 mg/L on June 28, 2001 before going dry. NC-2 never exceeded the 0.07 mg/L concentration. Refer to Appendix A for analytical data and on-site data.

The bulk of the phosphorus within these creeks appears to be dissolved. On average ortho-phosphorus made up 68% of the TP within the five creeks monitored (Figure 3). CR-1 had the highest average load of TP which correlates to the higher discharge recorded at this site (Figure 4). CR-1 had the lowest percentage of OP (53%) of all the sites. It appears that 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.

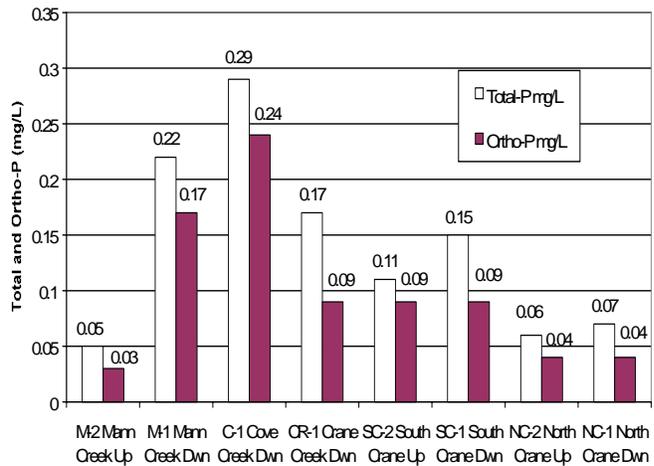


Figure 3. Weiser Cove average concentration TP and OP

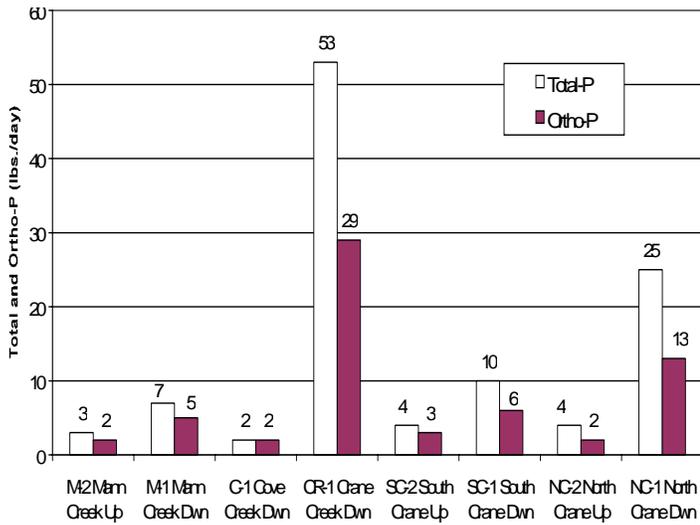


Figure 4. TP and OP load (lbs./day)

### Nitrate + Nitrite as Nitrogen

Literature values indicate that  $\text{NO}_3 + \text{NO}_2\text{-N}$  should be limited to 0.30 mg/L or less to avoid degradation of water quality (Cline 1973). Although some of the sites exceeded the 0.30 mg/L during individual sampling dates, only site M-1 on Lower Mann Creek had an average yearly concentration (0.57 mg/L) that exceeded this threshold (Figure 5).

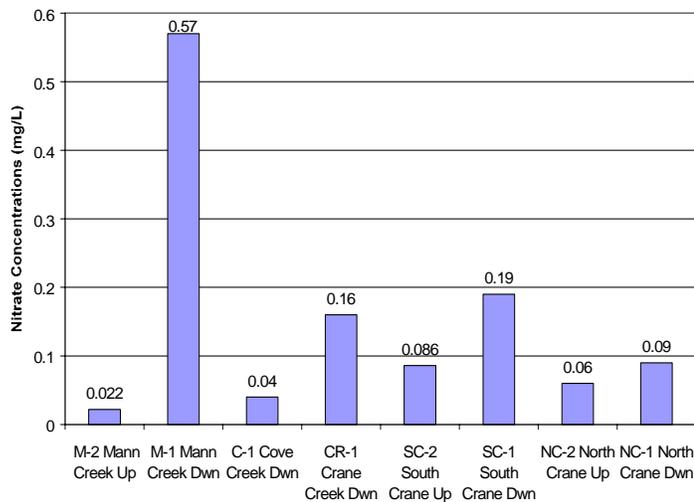


Figure 5. Average nitrate + nitrite concentrations

### Bacteria

Of the five creeks monitored within Weiser Cove only Crane Creek (CR-1) and North Crane Creek (NC-1 and NC-2) 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 June and stayed dry throughout the summer and fall months. NC-1 had two samples out of eight (25%) that exceeded the 406 CFU standard. NC-2, the upstream site, had only one out of eleven samples (9%) exceeded the standard (Table 3). Mann Creek (M-1) and Cove Creek (C-1), which flow year around, had 55% and 59% *E.coli* standard exceedance respectively (Table 3).

Table 3. 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
4/10/2001	NA	100	300	100	270		300	66
4/24/2001	NA	170	1500	870	1900		<33	66
5/7/2001	<30	40	2400	390	>2400	2400	9	23
5/22/2001	<30	750	1500	2400	dry	1500	40	430
6/5/2001	<33	2000	470	>6700		33	170	
6/19/2001	<33	700	400	500		33	100	930
6/28/2001	<30	>24000	430	150		dry	430	dry
7/17/2001	33	627	2300	270			dry	
8/1/2001	<100	1400		400				
8/15/2001	100	1800	900	200				
8/30/2001		600	2500	<100				
9/13/2001	200	700	1200	300				
9/27/2001	100	500	<100	1400				
10/10/2001	dry	300	1100					
10/25/2001		430	330	100				
11/27/2001		120	300	100				
12/19/2001		140	200	20		180	80	
1/23/2002		70		20		30	70	30
2/19/2002		120		120	210	190	80	80
3/27/2002		300	970	240	30	290	70	160
% Over 406 CFU	0	55	59	26	40	25	9	25

### Conclusions

The majority of sediment transport within Weiser Cove appears to occur during major runoff events as bed load sediment. 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 irrigation season and lack the ability to transport any sediment load except during major rain/snow events. Two creeks (M-1 and C-1) flow throughout the year but the low discharge during the critical months (May through September) 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 in order to meet the 0.07 mg/L concentration 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 mid June. North Crane Creek, which flows into Crane Reservoir, had an

average TP concentration of 0.06 mg/L at NC-2 and 0.07 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.

South Crane Creek, which also flows into Crane Reservoir has an average TP value of 0.15 mg/L and would require a 54% 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 66% would be required.

The three creeks that discharge directly to the Weiser River (Mann, Cove and Crane) have average TP concentrations of (0.22, 0.29, and 0.17 mg/L) respectively. The percent reduction to reach the 0.07 mg/L TP goal would be Mann Creek (68%), Cove Creek (76%), and Crane Creek (59%). Of the three creeks, Crane has the lowest percentage of average ortho-phosphorus (53%) with Cove Creek (83%) and Mann Creek (77%) having the highest ratio of OP to TP. 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 and had two samples that exceeded the state *e-coli* standard (406 CFU). Crane Creek discharged throughout the year and had five samples that exceeded the state standard. Mann Creek had the largest number of exceedances (11) followed by Cove Creek (10).

## Recommendations

To determine potential sources and their contributions to water quality impairment of Weiser Cover 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

- Cline, C., 1973. The effects of forest fertilization of the Tahuya River, Kitsap Peninsula, Washington. Washington State Dept. Ecology. 55p
- USEPA. U.S. Environmental Protection Agency. 1987. Quality Criteria for Water. EPA Publication 440/5-86-001. U.S. Gov. Printing Office, Washington D.C.
- (IDEQ) Idaho Department of Environmental Quality. 2002. Snake River-Hells Canyon TMDL, Public Comment Draft.
- United State Geological Survey. Crane Creek at Mouth NR Weiser Idaho. [http://waterdata.usgs.gov/id/nwis/uv?site\\_no=13265500](http://waterdata.usgs.gov/id/nwis/uv?site_no=13265500)

## **Appendix A**

Mann Creek Reservoir, Upstream

M-2

Date	D.O.	Temp	%Sat	Cond	TDS	pH	Discharge	NO3	Total-P	Ortho-P	TSS	E-coli
5/7/2001	8.27	8	69.8	148	77	7.95	24.3	0.02	<0.05	<0.05	<2	<30
5/22/2001	8.51	8.9	73.6	151	78	7.93	16.2	0.03	<0.05	<0.05	<2	<30
6/5/2001	8.31	10.1	73.8	151	77	7.76	27.5	0.02	0.05	<0.05	<2	<33
6/19/2001	7.75	13.8	68.1	150	74	8.06	21	0.03	<0.05	<0.05	3	<33
6/28/2001	7.54	14.9	64.1	153	77	7.77	30.5	0.04	0.07	<0.05	3	<30
7/17/2001	8.16	18.9	70.2	175	90	8.02	19.4	0.02	<0.05	<0.05	<2	33
8/1/2001	8.26	20.7	90.3	198	98	8.36	10.25	0.02	<0.05	<0.05	4	<100
8/15/2001	8.16	20.8	75.9	195	102	8.04	0.33	0.03	0.08	<0.05	5	100
8/30/2001	insufficient	water to	collect sample									NA
9/13/2001	7.5	16.9	78	191	100	na	0.37	0.02	0.06	<0.05	5	200
9/27/2001	8.8	13.9	85.5	186	96	8.14	0.146	0.04	0.08	0.05	3	100
10/10/2001	10.52	6.4	85.5	203	103	8.17	0.095	0.02	0.26	0.05	1	1800
10/25/2001	10.05	6.9	82.5	2033	100	7.27	0.063	0.04	0.06	0.05	1	170