Paradise Creek
Monitoring Report 2002

Developed for:

Latah Soil and Water Conservation District
Paradise Creek Watershed Advisory Group
Idaho Soil Conservation Commission
Idaho State Department of Agriculture

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Acknowledgements

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Executive Summary

Water quality monitoring was conducted on nine sites on Paradise Creek by the Idaho Association of Soil Conservation Districts from November 2000 through June 2002. This monitoring was designed to collect baseline information on this stream as well as to be used to monitor the effectiveness of structural best management practices (water and sediment control structures) and changes in agronomic practices (conversion from conventional tillage to direct seeding rotations). This program monitored TMDL parameters of sediment, nutrients, and temperature.

Paradise Creek is an intermittent stream above the city of Moscow, which usually goes dry around late June. Dissolved oxygen and water temperature were observed to approach exceedance levels just before the stream went dry. These parameters were found within acceptable levels during periods when flow was present. No exceedance of pH was observed during this monitoring program. Total suspended solids and total phosphorus were observed to exceed TMDL targets at every monitoring site, but significantly lower concentrations were observed in 2002 compared with 2001 datasets at most sites in spite of significantly higher discharge in 2002. These data suggest that farming practices and structural BMPs are functioning in the Paradise Creek watershed to reduce sediment transport and nutrient levels.

Introduction

In 1997 the Paradise Creek TMDL was accepted by the EPA. It was concluded that Paradise Creek exceeded Idaho and Washington Water Quality standards. On the Idaho side, Paradise Creek has been determined to be water quality limited throughout its watershed; problems are excessive amounts of ammonia, nutrients (phosphorus and nitrogen), sediment, habitat modification, pathogens, flow alteration, and temperature. The Clean Water Act requires interstate waters, such as Paradise Creek to meet the receiving state's standards at the state line. Beneficial uses for Paradise Creek in Washington are salmonid spawning, primary contact recreation, and domestic water supply. The nonpoint sources are non-irrigated croplands, grazing lands, land development (construction activities), urban runoff, roads, and forestland harvest activities. Other significant impacts to Paradise Creek come from two permitted point-source discharges: the Moscow Wastewater Treatment Plant (MWWTP), and the University of Idaho's aquaculture facility (IDEQ 1997). Nonpoint source inputs to Paradise Creek that require reductions are sediment, phosphorus, and temperature. Monitoring for these inputs was conducted in this monitoring plan.

The Paradise Creek Implementation Plan (PCIP) was completed December 1999 (PCIP 1999). Eighteen water and control structures were installed fall 2001 and an additional six were completed spring 2002 (Dansart 2002). These 18 structures were re-examined in 2002 and were found to have prevented 1002 tons of sediment delivery to the Paradise Creek waterway (Dansart 2002). This exceeds the TMDL targeted reduction of 334 tons/year (Dansart 2002). Of the 8403 acres of nonirrigated cropland in the Paradise Creek watershed, 15-20% has been converted to direct seeding rotations (Ken Stinson, personal communication).

Monitoring Program

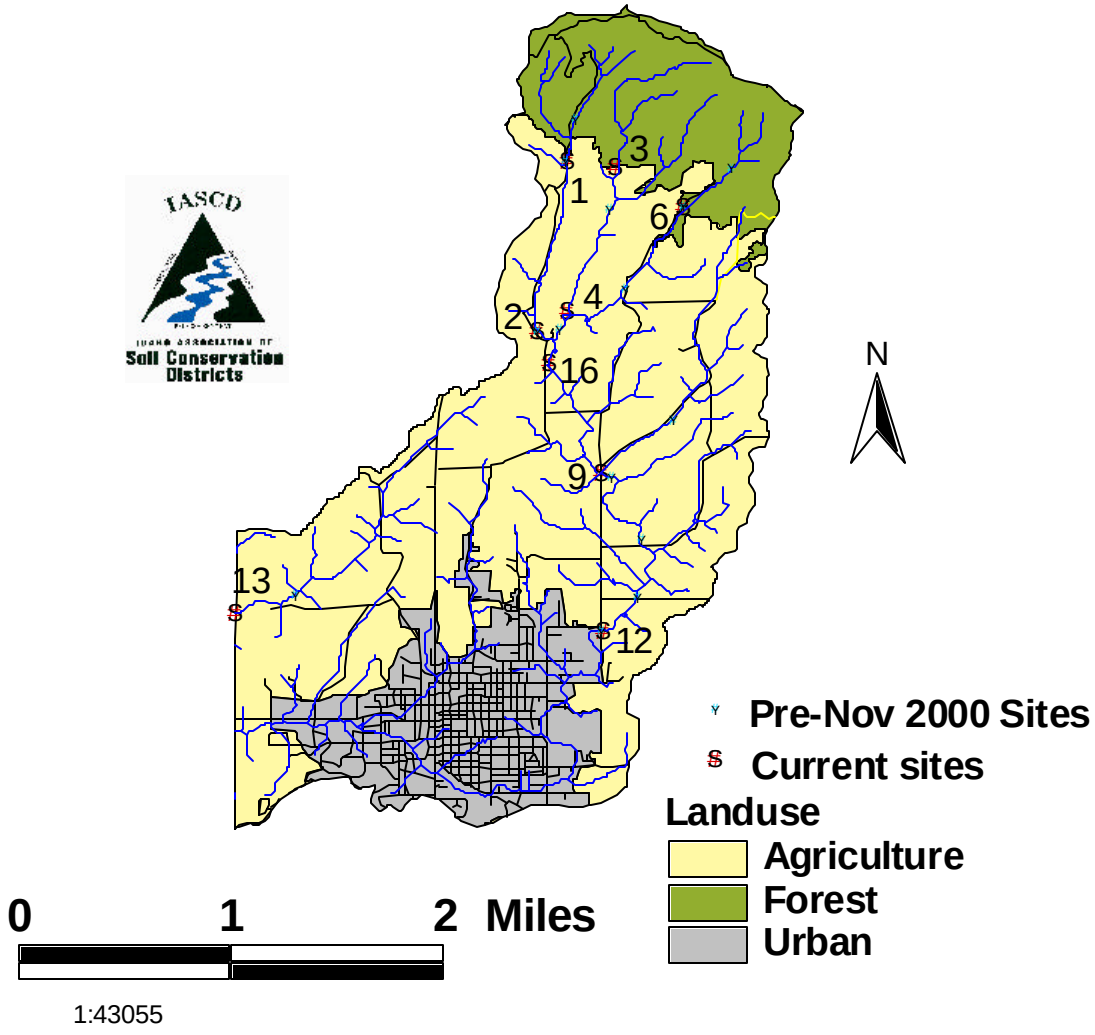
Water quality monitoring was performed on Paradise Creek (PC) by the Idaho Association of Soil Conservation Districts (IASCD) from November 27, 2000 to June 18, 2002. Nine monitoring sites were selected to represent watershed water quality. Sampling was performed every two weeks. Laboratory analysis of phosphorus (P), and total suspended solids (TSS) was performed by University of Idaho, Analytical Science Laboratories (UIASL). Parameters measured were total suspended solids (TSS), total phosphorus (TP) and ortho-phosphate (OP). Other measurements include flow, pH, specific conductance (Cond), total dissolved solids (TDS), dissolved oxygen (DO), % saturation (% Sat), turbidity (turb), and temperature (temp). The data generated from this monitoring program will be used by IASCD, Idaho Soil Conservation Commission (ISCC), Latah Soil and Water Conservation District (LSWCD), and the Paradise Creek Watershed Advisory Group (PCWAG) to provide a baseline and to determine effectiveness of best management practices (BMPs).

Site Descriptions

Monitoring site locations relative to the Paradise Creek watershed are shown in Figure 1.

PC-1 Below pond #9, for background levels on the main stem of Paradise Creek.
PC-2 Located near Foothill Road below CRP riparian forest buffer project.
PC-3 Site is located above CRP riparian forest buffer project on unnamed tributary near the forested/agricultural land use boundary.

Figure 1. Paradise Creek study site locations.



PC-4 Located just above unnamed tributary's (Morton's Creek) junction with Idler's Rest Creek below CRP riparian forest buffer project.
PC-6 Idler's Rest Creek at the Nature Conservancy area.
PC-9 Located along West Twin Road to monitor the contributions to Paradise Creek from the Twin Creeks subbasin.
PC-12 Located at Mountain View Park to monitor the level of pollutants as Paradise Creek enters the City of Moscow
PC-13 Monitoring site on Missouri Creek near Airport Road ¼-1/2 miles into Washington State.
PC-16 Monitoring site below confluence of Idler's Rest Creek and unnamed tributary (Morton's Creek).

Methods

Water Quality

A representative depth-integrated sample was collected at each site by collecting approximately 4 liters of stream water with a DH81 depth integrated sampler. Water samples were collected with a one-liter Nalgene bottle and transferred into a 2.5-gallon polyethylene churn sample splitter. The polyethylene churn splitter was thoroughly rinsed with ambient water at each location prior to sample collection. The resultant composite sample was thoroughly homogenized before filling the appropriate sample containers. Ortho-phosphate samples were filtered through a 0.45 µm GN-6 Gelman metricel filter. The resultant filtrate was transferred directly into appropriate sample bottles. The filtration unit was thoroughly rinsed with deionized water and equipped with a new 0.45 µm filter at each sampling location. Water samples requiring preservation (phosphorus) were transferred into preserved (H_2SO_4 pH <2) 500 mL sample containers. Water quality samples (TSS, TP, and OP) were analyzed at the UIASL in Moscow, Idaho.

A list of parameters, sample sizes, preservation, holding times, and analytical methods are displayed in Table 1. All sample containers were labeled with waterproof markers with the following information: station location, sample identification, date of collection, and time of collection. Samples were placed on ice and transported to the laboratory the same day as collection. Chain-of-custody forms accompanied each sample shipment.

Table 1. Water Quality Parameters

Parameters	Sample Size	Preservation	Holding Time	Method
Non Filterable Residue (TSS)	1L	Cool 4°C	7 Days	EPA 160.2
Total Phosphorus	100 mL	Cool 4°C, H_2SO_4 pH < 2	28 Days	EPA 365.4
Ortho Phosphorus	100 mL	Filtered , Cool 4°C	24 Hours	EPA 365.2

Field Measurements

At each location, field parameters for dissolved oxygen, specific conductance, pH, temperature, turbidity, and total dissolved solids were measured. Calibration of all field equipment will be in accordance with the manufacturer specifications. Field measurements, equipment and calibration techniques are shown in Table 2.

Table 2. Field Measurements

Parameters	Instrument	Calibration
Dissolved Oxygen	YSI Model 55	Ambient air calibration
Temperature	YSI Model 55	Centigrade thermometer
Conductance & TDS	Orion Model 115	Specific Conductance (25^{o}C standard)
pH	Orion Model 210A	Standard buffer (7,10) bracketing for linearity
Turbidity	Hach Model 2100P	Formazin Primary Standard

All field measurements were recorded in a field notebook along with any pertinent observations about the site, including weather conditions, flow rates, personnel on site, and any problems observed that might affect water quality.

Flow Measurements

Flow measurements were collected at each site using a Marsh McBirney Flow Mate Model 2000 flow meter. The six-tenths depth method (0.6 of the total depth from the surface of the water surface) was used. At each monitoring station, a transect line was established across the width of the creek at an angle perpendicular to the flow for the calculation of cross-sectional area. The discharge was computed by summing the products of the partial areas (partial sections) of the flow cross-sections and the average velocities for each of those sections. Stream discharge was reported as cubic feet per second (cfs).

Quality Assurance and Quality Control (QA/QC)

The UIASL utilizes methods approved and validated by the Environmental Protection Agency (EPA). A method validation process, including precision and accuracy performance evaluations and method detection limit studies, are required of UIASL Standard Methods. Method performance evaluations include quality control samples, analyzed with a batch to ensure sample data integrity. Internal laboratory spikes and duplicates are part of UIASL's quality assurance program. Laboratory QA/QC results generated from this project can be provided upon request.

QA/QC procedures from the field-sampling portion of this project included a duplicate and a blank sample (one set per sampling day). The field blanks consisted of laboratory-grade

deionized water, transported to the field and poured off into the appropriate sample containers. The blank sample was used to determine the integrity of the field teams handling of samples, the condition of the sample containers and deionized water supplied by the laboratory and the accuracy of the laboratory methods. Duplicates were obtained by filling two sets of sample containers with homogenized composite water from the same sampling site. The duplicate and blank samples were not identified as such to laboratory personnel to ensure laboratory precision.

Data Handling

All of the field data and analytical data generated from each survey was reviewed and submitted to ISDA for review. Each batch of data was reviewed to insure that all necessary observations, measurements, and analytical results have been properly recorded. The analytical results were evaluated for completeness and accuracy. Any suspected errors were investigated and resolved, if possible. The data was then be stored electronically and made available to any interested entity.

Results and Discussion

Descriptive data is presented in Table 3. This table includes maximum, minimum, and average values for each measured parameter as well as the number and percentage of sampling events that exceeded state water quality standards and EPA criteria.

Dissolved Oxygen

The State of Idaho standard for DO states that dissolved oxygen must exceed 6.0 mg/L for cold water biota at all times. Of the nine locations that were monitored only two (PC-12, PC-13) dropped below 6 mg/L during the two-year period (Figure 2, Table 3). Paradise Creek is an intermittent stream that goes dry around late June and DO was observed to drop at every site during this time period. During periods when flow was present DO concentrations were observed to be within the acceptable range.

Water Temperature

The State of Idaho water quality standard for temperature support of cold water biota is less than $22^{o}C$. At no time during the monitoring period was instantaneous water temperature observed above $22^{o}C$ at any Paradise Creek monitoring station (Figure 3, Table 3).

Specific Conductance and Total Dissolved Solids

No standards or criteria exist that set limits of conductance or TDS. Both conductance and TDS are within the normal range relative to other small streams in Idaho (Table 3).

pH

The State of Idaho water quality standard for pH states that H^{+} concentration must fall between 6.5 and 9.5. pH values at all sites were observed to be within acceptable standards for the monitoring period (Table 3).

Table 3. Maximum, minimum, median, and average values for each measured parameter at IASCD Paradise Creek Monitoring locations. # exceedance per year equals the number of sampling events when each respective value exceeded EPA or State of Idaho water quality standards and critera.
% exceedance equals the percentage of sampling events when each respective value exceeded EPA or State of Idaho water quality standards and critera.

PC-12	D.O. (mg/L)	% Sat (%)	Temp (°C)	Cond (µS/cm²@25°C)	TDS (mg/L)	pH (H^+)	Turbidity (NTU)	TSS (mg/L)	TP (mg/L)	OP (mg/L)	Flow (cfs)
Maximum	13.2	92%	17.7	487.0	438.0	8.6	194.0	120.0	0.5	0.2	68.3
Minimum	3.3	32%	0.1	104.0	52.0	6.9	7.3	6.0	0.1	0.0	0.0
Average	9.9	76%	5.0	226.5	121.0	7.6	51.1	33.6	0.2	0.1	7.8
Median	10.5	77%	3.7	198.8	98.5	7.5	29.9	21.0	0.2	0.1	2.9
# exceedance	1.0		0.0			0.0	20.0	2.0	26.0	7.0	
% exceedance	3.0%		0.0%			0.0%	60.6%	6.1%	78.8%	21.2%	

PC-9	D.O. (mg/L)	% Sat (%)	Temp (°C)	Cond (µS/cm²@25°C)	TDS (mg/L)	pH (H^+)	Turbidity (NTU)	TSS (mg/L)	TP (mg/L)	OP (mg/L)	Flow (cfs)
Maximum	13.1	90%	13.8	363.0	185.0	31.4	166.0	64.0	0.4	0.1	9.2
Minimum	6.7	66%	0.0	140.0	13.0	7.1	5.0	5.0	0.0	0.0	0.0
Average	10.6	81%	4.4	249.6	117.9	8.6	40.7	18.4	0.1	0.1	1.0
Median	10.7	80%	3.6	237.0	111.0	7.6	30.0	13.5	0.1	0.1	0.4
# exceedance	0		0			0	17	0	16	5	
% exceedance	0%		0%			0%	52%	0%	48%	15%	

PC-6	D.O. (mg/L)	% Sat (%)	Temp (°C)	Cond (µS/cm²@25°C)	TDS (mg/L)	pH (H^+)	Turbidity (NTU)	TSS (mg/L)	TP (mg/L)	OP (mg/L)	Flow (cfs)
Maximum	12.8	97%	11.5	292.0	146.0	9.6	53.0	26.0	0.3	0.1	3.9
Minimum	8.0	68%	1.6	46.5	23.0	7.1	4.2	0.1	0.1	0.0	0.0
Average	10.6	83%	4.9	103.6	51.8	7.7	17.0	9.4	0.1	0.1	0.6
Median	10.8	83%	4.0	76.3	39.0	7.6	14.7	8.0	0.1	0.1	0.2
# exceedance	0		0			0	6	0	22	2	
% exceedance	0%		0%			0%	18%	0%	67%	6%	

PC-16	D.O. (mg/L)	% Sat (%)	Temp (°C)	Cond (µS/cm²@25°C)	TDS (mg/L)	pH (H^+)	Turbidity (NTU)	TSS (mg/L)	TP (mg/L)	OP (mg/L)	Flow (cfs)
Maximum	12.8	108%	16.9	208.0	98.0	8.4	299.0	150.0	0.7	0.6	27.2
Minimum	7.5	71%	0.0	66.0	34.0	7.1	15.7	5.0	0.1	0.0	0.0
Average	10.6	86%	6.8	130.7	65.5	7.5	49.6	25.6	0.2	0.1	4.4
Median	11.0	86%	7.6	138.9	67.0	7.5	36.8	14.0	0.2	0.1	2.1
# exceedance	0		0			0	15	1	20	5	
% exceedance	0%		0%			0%	45%	3%	61%	15%	

PC-4	D.O. (mg/L)	% Sat (%)	Temp (°C)	Cond (µS/cm²@25°C)	TDS (mg/L)	pH (H^+)	Turbidity (NTU)	TSS (mg/L)	TP (mg/L)	OP (mg/L)	Flow (cfs)
Maximum	13.2	114%	20.5	219.0	116.0	8.2	348.0	450.0	0.6	0.2	8.7
Minimum	8.4	75%	0.1	54.9	28.0	7.0	11.2	5.0	0.1	0.0	0.0
Average	11.1	91%	7.3	116.2	57.5	7.6	52.8	43.0	0.2	0.1	1.7
Median	11.3	89%	6.4	113.1	57.0	7.6	30.0	14.0	0.1	0.1	0.8
# exceedance	0.0		0.0			0.0	16.0	1.0	18.0	2.0	
% exceedance	0.0%		0.0%			0.0%	48.5%	3.0%	54.5%	6.1%	

PC-2	D.O. (mg/L)	% Sat (%)	Temp (°C)	Cond (µS/cm²@25°C)	TDS (mg/L)	pH (H^+)	Turbidity (NTU)	TSS (mg/L)	TP (mg/L)	OP (mg/L)	Flow (cfs)
Maximum	13.0	101%	18.7	253.0	118.0	8.1	415.0	470.0	0.6	0.2	9.3
Minimum	6.2	58%	0.1	72.9	31.0	7.2	17.3	8.0	0.1	0.0	0.0
Average	10.5	85%	6.6	152.7	73.4	7.5	74.3	68.7	0.2	0.1	1.1
Median	11.0	88%	7.6	146.3	75.0	7.6	49.3	27.0	0.2	0.1	0.5
# exceedance	0		0			0	19	4	23	7	
% exceedance	0%		0%			0%	58%	12%	70%	21%	

PC-3	D.O. (mg/L)	% Sat (%)	Temp (°C)	Cond (µS/cm²@25°C)	TDS (mg/L)	pH (H^+)	Turbidity (NTU)	TSS (mg/L)	TP (mg/L)	OP (mg/L)	Flow (cfs)
Maximum	12.5	109%	11.2	89.4	43.0	8.8	75.0	130.0	0.3	0.1	2.5
Minimum	9.6	75%	0.0	40.8	20.0	7.0	16.6	4.0	0.1	0.1	0.0
Average	11.3	88%	4.9	53.0	26.0	7.5	28.5	24.2	0.1	0.1	0.5
Median	11.4	88%	4.5	49.7	24.0	7.4	26.0	10.0	0.1	0.1	0.1
# exceedance	0.0		0.0			0.0	12.0	1.0	19.0	0.0	

PC-1	D.O. (mg/L)	% Sat (%)	Temp (°C)	Cond (µS/cm²@25°C)	TDS (mg/L)	pH (H^+)	Turbidity (NTU)	TSS (mg/L)	TP (mg/L)	OP (mg/L)	Flow (cfs)
Maximum	12.7	104%	14.6	162.8	83.0	8.7	105.0	53.0	0.3	0.2	3.1
Minimum	7.0	69%	0.3	53.3	26.0	6.9	10.7	4.0	0.1	0.0	0.0
Average	10.9	84%	5.1	90.6	44.8	7.5	28.8	15.7	0.2	0.1	0.5
Median	10.9	84%	3.8	84.5	41.0	7.4	25.3	9.0	0.2	0.1	0.2
# exceedance	0		0			0	16	0	28	6	
% exceedance	0%		0%			0%	48%	0%	85%	18%	

PC-13	D.O. (mg/L)	% Sat (%)	Temp (°C)	Cond (µS/cm²@25°C)	TDS (mg/L)	pH (H^+)	Turbidity (NTU)	TSS (mg/L)	TP (mg/L)	OP (mg/L)	Flow (cfs)
Maximum	12.8	101%	19.0	690.0	330.0	8.4	199.0	140.0	0.6	0.3	8.7
Minimum	5.9	55%	0.0	211.0	107.0	6.7	4.2	5.0	0.1	0.0	0.0
Average	10.2	83%	7.5	346.3	173.0	7.6	47.3	35.7	0.2	0.1	0.9
Median	10.4	83%	9.0	311.5	161.5	7.6	25.4	19.0	0.2	0.1	0.4
# exceedance	1		0			0	12	1	21	13	
% exceedance	3%		0%			0%	36%	3%	64%	39%	

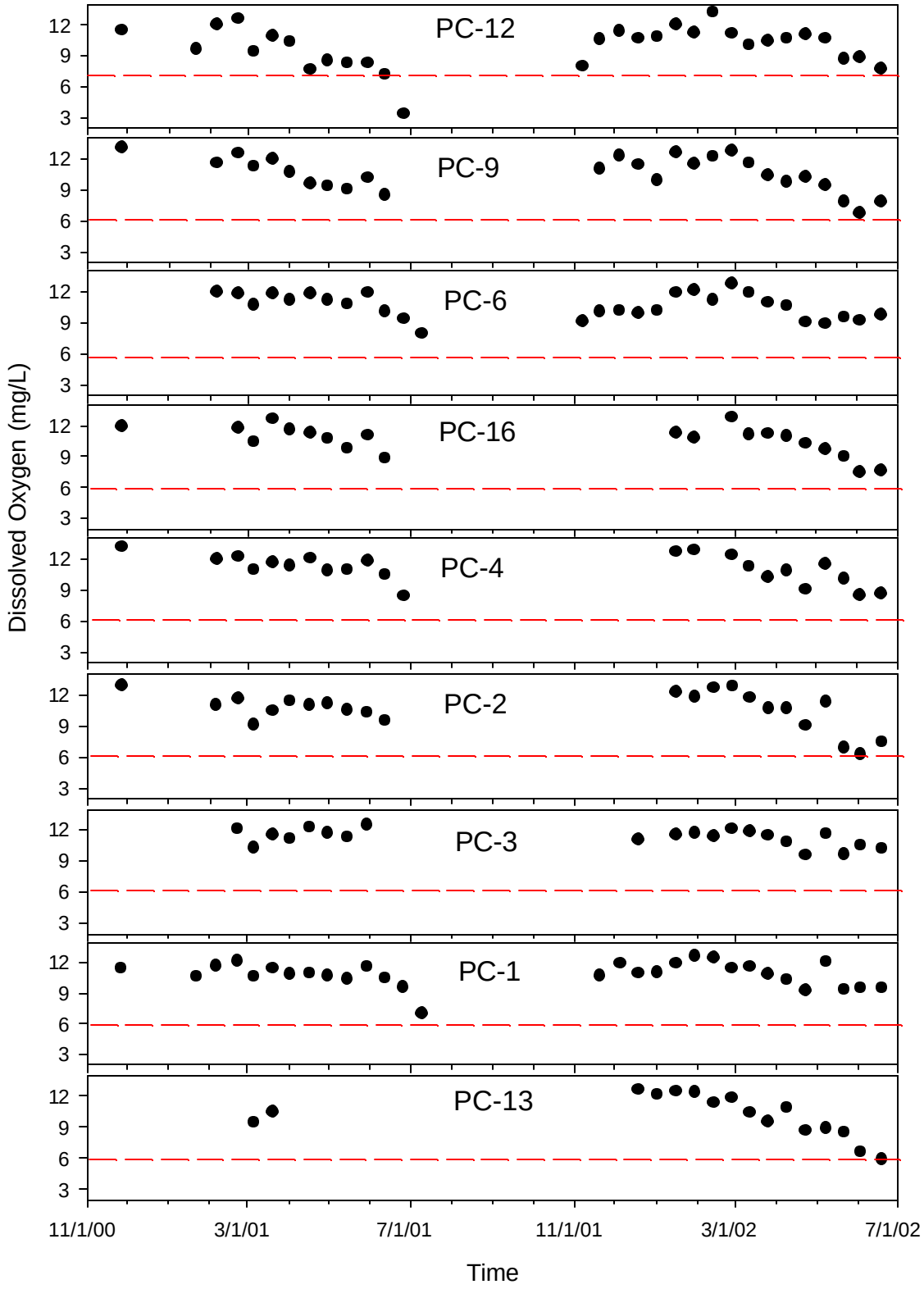


Figure 2. Dissolved oxygen concentrations collected at Paradise Creek monitoring sites from November 27, 2000 to June 19, 2002.

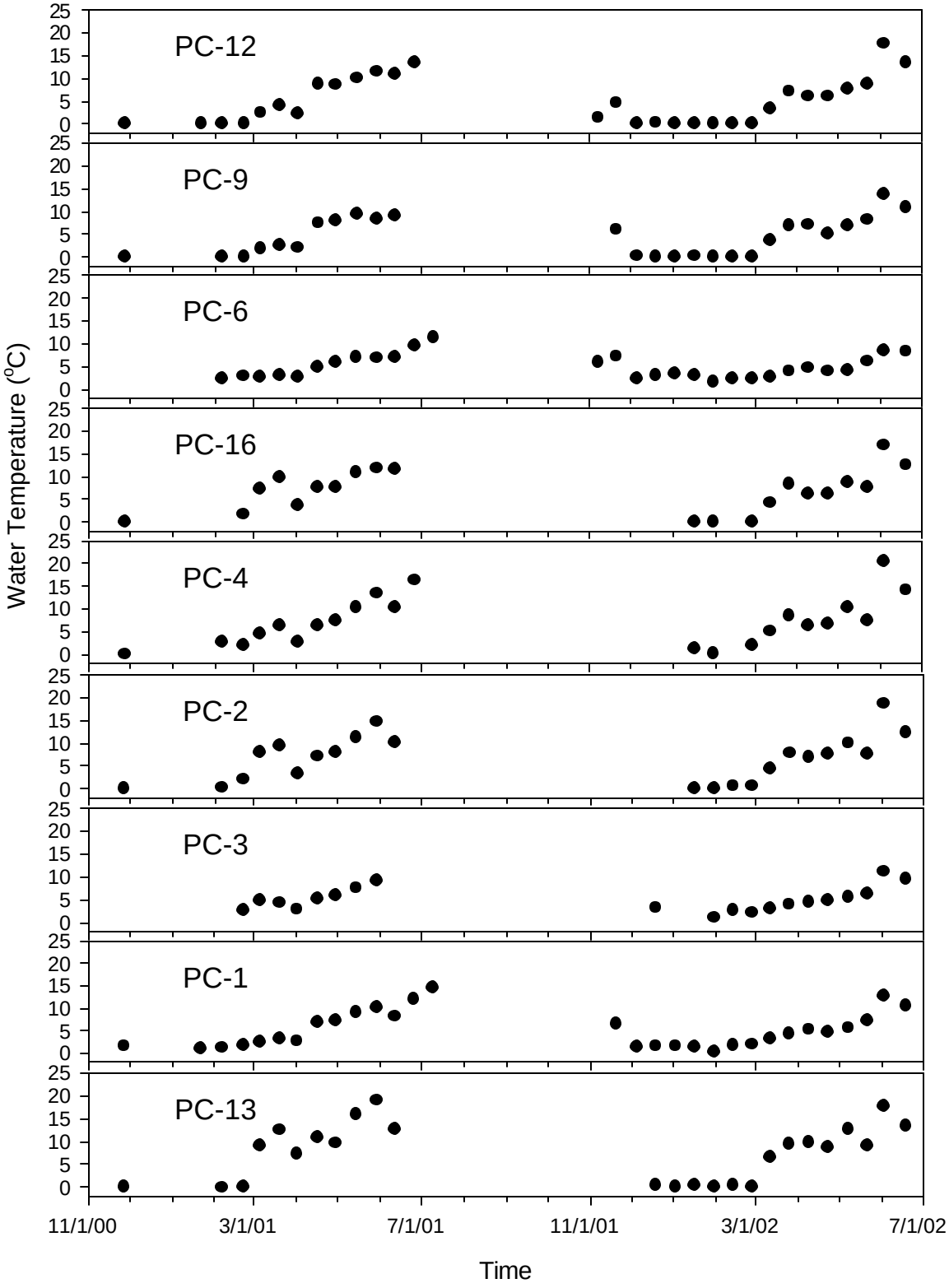


Figure 3. Instantaneous water temperature (solid black circles) for all Paradise Creek sites. The state instantaneous temperature standard is 22°C.

Turbidity and Total Suspended Solids

The State of Idaho water quality standard for Turbidity states that measurements should not exceed 25 NTU above background for more than 10 consecutive days. The Paradise Creek TMDL set an instream TSS target of 50 mg/L over background and an instantaneous target of 100 mg/L IDEQ 1997). TSS concentrations from all Paradise Creek monitoring sites combined were observed >100mg/L seven times in 2001 and only twice in 2002 in spite of significantly greater discharge that occurred in 2002 (Figure 4). The four exceedance values observed in 2001 at site PC-2 were probably elevated because the Palouse Clearwater Environmental Institute (PCEI) implemented constructed meanders about 500 yards upstream of this site (Figure 4). Overall TSS and turbidity were very low at all Paradise Creek monitoring stations during the monitoring period (Figure 4, Table 3). T-tests were used to compare 2001 data with 2002. Sites PC-12, C-9, PC-4, PC-2, PC-1, and PC-13 all had significantly lower TSS concentrations ($p<0.05$) in 2002 compared with 2001, in spite of significantly higher discharge in 2002.

Phosphorus (Total Phosphorus and Ortho-Phosphate)

Ortho-phosphate refers to the dissolved or soluble portion of particles less than 0.45 µm. Total phosphorus refers to the total amount of P suspended in the water column (<0.45 + >0.45). The EPA Gold Book criterion for total phosphorus concentrations is 0.10 mg/L for streams or rivers not discharging directly into lakes or reservoirs. The Paradise Creek TMDL set natural background and the target for total phosphorus at 0.136 mg/L, which applies during the growing season (May 15- Oct 15) (IDEQ 1997). All Paradise Creek monitoring stations exceeded the TP target (Figure 5, Table 3). TP concentrations exceeded the target through the year in 2001 at most PC sites but only exceeded during spring runoff in 2002 (Figure5). Since the TMDL TP target is only applicable May 15- Oct 15, total phosphorus concentrations were very close to compliance levels in 2002. Sites PC-12, C-9, PC-4, and PC-2 all had significantly lower TP concentrations ($p<0.05$) in 2002 compared with 2001 in spite of significantly higher discharge in 2002.

Conclusions

The monitoring program for Paradise Creek was successfully carried out as planned. Protocols were followed, QA/QC standards were met, and specific information per TMDL parameter for each subwatershed was collected. Dissolved oxygen concentrations and water temperature only approached exceedance levels just before Paradise Creek went dry in June. Paradise Creek is an intermittent stream above the city of Moscow and usually goes dry during June or July. DO and water temperature were observed to be within acceptable boundaries during periods when stream flow was present. No exceeedance of pH was observed at any Paradise Creek monitoring site during this monitoring period. TSS and turbidity levels were relatively low throughout the monitoring period. The total phosphorus target was exceeded at every monitoring location. TP exceedances in 2001 were scattered through the year at most sites, but in 2002 major exceedances only were observed during spring runoff, thus complying with the May 15-Oct 15 TMDL target during 2002. Most sites showed lower TSS and TP concentrations in 2002 than 2001 in spite of significantly greater

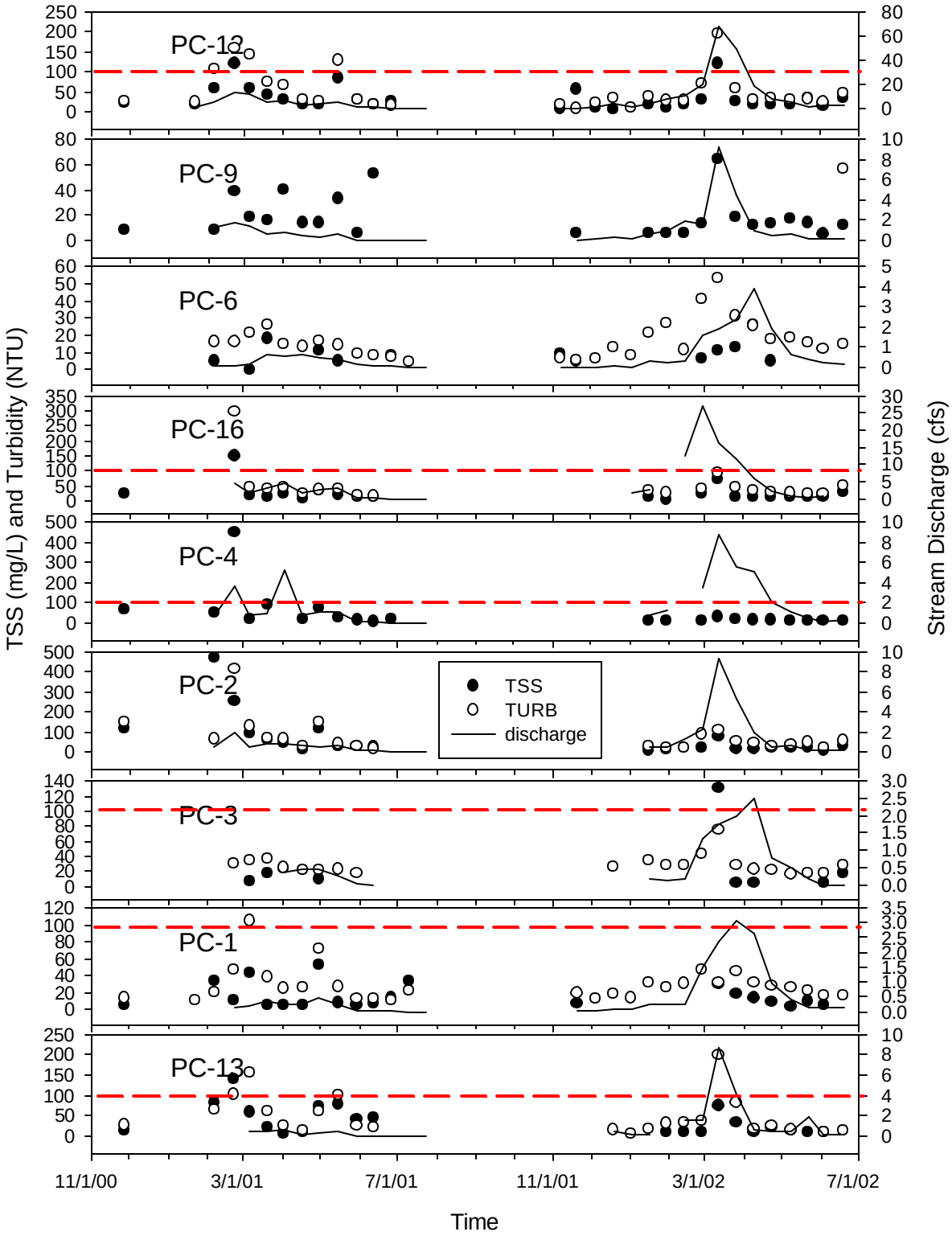


Figure 4. TSS, turbidity, and stream discharge for Paradise Creek monitoring sites. The red dashed line shows the instantaneous TSS taget of 100 mg/L.

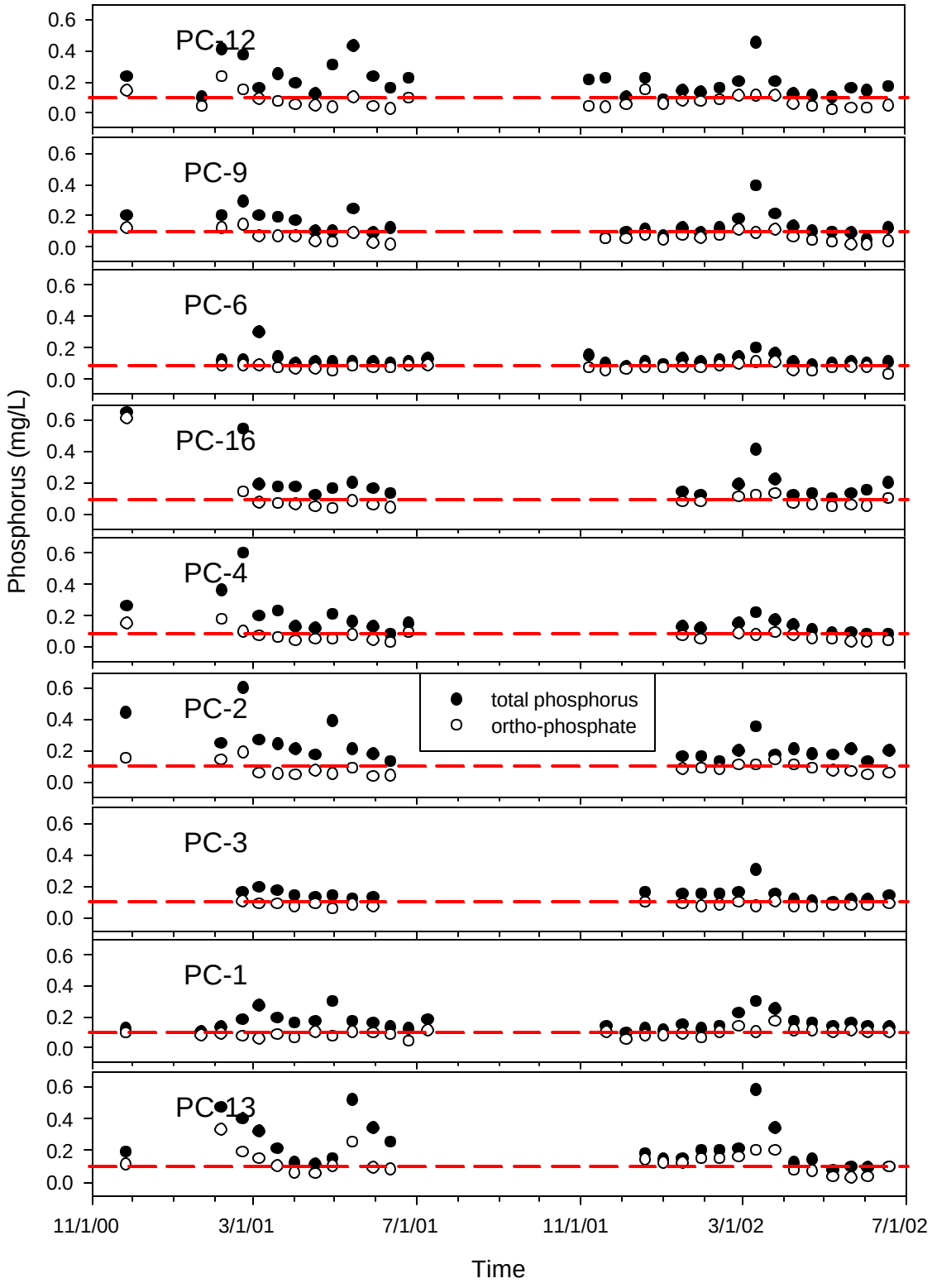


Figure 5. Total and ortho phosphorus plotted for Paradise Creek monitoring sites.

discharge. The data generated from this monitoring program support Dansart (2002) showing that structural BMPs and agronomic practices (direct seeding rotations) are functioning to reduce sediment transport in Paradise Creek to meet reductions required by the TMDL for sediment. Phosphorus levels were observed to slightly exceed target concentrations but these concentrations also were exceeded at reference sites (PC-1, PC-3, and PC-6), which are located upstream of agriculture with little or no urban influence.

Recommendations

I recommend that the LSWCD, the SCC, and the NRCS continue efforts to enable more farmers to convert tillage practices to direct seed and no-till technologies. Stream buffer strips would further protect Paradise Creek from erosion and excessive nutrient levels. The University of Idaho (UI) agricultural engineering section (Dr. Jan Boll) is monitoring discharge and turbidity continuously at three Paradise Creek locations to monitor BMP effectiveness in Paradise Creek. It is recommended that UI continue to collect data, which will prove valuable to BMP effectiveness determination for the long term. In addition it would be beneficial for IASCD personnel to return in five years to collect data for BMP effectiveness monitoring. Nitrogen (NO_3+NO_2) monitoring was abandoned in 2000 as a way of cutting monitoring costs. These values were slightly elevated (>8.0 mg/L at several PC sites during winter 2000) and potential nitrogen contamination of the groundwater could pose serious problems for the area. I recommend that seasonal testing of nitrates be conducted in Paradise Creek to ensure safety of the aquifer. In addition, nitrate monitoring in the groundwater also should be conducted in the Paradise Creek Watershed. Further studies might use Moscow Wastewater Treatment Facilities turbidity data to examine long term trends over time to see if sediment and nutrient reductions can be seen and tied into agriculture from their data.

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Appendix A

Paradise Creek
Raw Data
(Nov 99- July 2002)

Paradise Creek Station 12 (PC-12)

										T-P			
										EPA Criteria			
										0.100			
Date	**Time**	**D.O.**	**% Sat**	**Temp**	**Cond**	**TDS**	**pH**	**Turbidity**	**TSS**	**TP**	**OP**	**Flow**	**Observations:**
		(ppm)		(^{o}C)	(uS)	(mg)		(NTU)	(mg/L)	(mg/L)	(mg/L)	(cfs)	
11/27/00	8:00	11.49	78.9%	0.1	258.0	121.0	7.40	24.4	21.0	0.230	0.140	0.27	
12/11/00	8:50												frozen over
12/28/00													Flow probe down
1/15/01													frozen over
1/22/01	10:15	9.66	66.3%	0.1	212.0	100.0	7.77	23.1	19.0	0.100	0.039	0.48	clear H2O
2/6/01	11:35	12.04	82.4%	0.1	180.5	86.0	8.61	105.0	58.0	0.410	0.230	4.89	brown H2O
2/22/01	9:51	12.57	86.2%	0.1	203.0	97.0	7.65	158.0	120.0	0.370	0.150	13.53	brown H2O
3/6/01	8:32	9.37	71.9%	2.5	222.0	109.0	7.46	141.0	57.0	0.160	0.089	11.44	brown H2O
3/20/01	9:20	10.90	83.2%	4	183.4	90.0	7.18	74.7	43.0	0.250	0.074	4.84	brown H2O
4/2/01	9:00	10.37	75.7%	2.3	192.7	92.0	7.39	65.2	31.0	0.190	0.052	5.53	brown H2O
4/17/01	7:40	7.68	66.4%	8.9	161.3	82.0	7.33	28.5	19.0	0.120	0.045	2.66	cloudy
4/30/01	8:45	8.51	72.7%	8.6	174.2	89.0	7.45	24.4	19.0	0.310	0.035	2.90	cloudy/RAIN
5/15/01	9:04	8.30	73.5%	10.1	165.8	85.0	7.16	128.0	84.0	0.430	0.100	5.39	brown H2O
5/30/01	7:49	8.31	76.3%	11.5	225.0	107.0	7.42	28.7	30.0	0.230	0.039	0.29	dark
6/12/01	7:44	7.20	65.3%	10.9	230.0	118.0	7.63	17.3	17.0	0.160	0.026	0.23	cloudy/RAIN
6/26/01	8:05	3.30	31.8%	13.5	363.0	191.0	6.94	15.7	25.0	0.220	0.095	0.00	cloudy/barely flowing
7/10/01	7:19											0.00	no flow/standing H20 only
7/24/01	8:19											0.00	no flow/standing H20 only
11/7/01	8:44	7.97	56.8%	1.4	371.0	178.0	7.41	18.1	7.0	0.210	0.042	0.00	clear H2O
11/20/01	9:09	10.58	82.4%	4.7	360.0	178.0	7.26	7.3	56.0	0.220	0.034	0.03	dingy
12/5/01	11:01	11.42	78.2%	0.1	487.0	231.0	8.32	19.9	8.0	0.099	0.051	0.60	cloudy
12/19/01	10:50	10.65	73.7%	0.3	394.0	187.0	7.55	34.5	6.0	0.220	0.150	3.12	cloudy
1/2/02	10:50	10.80	74.0%	0.1	357.0	174.0	7.66	10.3	BDL	0.083	0.055	0.81	cloudy
1/16/02	11:00	12.03	82.6%	0.2	290.0	438.0	7.43	38.8	19.0	0.140	0.080	2.95	cloudy
1/30/02	11:00	11.21	77.4%	0.1	233.0	103.0	7.48	27.5	10.0	0.130	0.076	7.25	muddy
2/13/02	11:00	13.23	91.3%	0.2	212.0	104.0	6.90	27.4	16.0	0.160	0.083	10.67	cloudy
2/27/02	8:45	11.17	76.7%	0.1	156.0	76.0	7.60	69.1	31.0	0.200	0.110	19.22	muddy
3/12/02	10:30	10.03	75.4%	3.4	145.0	70.0	7.40	194.0	120.0	0.450	0.110	68.28	muddy
3/26/02	10:30	10.40	86.0%	7.2	123.0	63.0	7.60	56.3	27.0	0.200	0.110	48.54	muddy
4/9/02	9:00	10.69	86.2%	6.1	104.0	52.0	8.00	31.0	16.0	0.120	0.055	17.70	muddy
4/23/02	9:45	11.06	89.1%	6.1	107.7	54.0	7.90	34.6	17.0	0.110	0.041	7.97	cloudy
5/8/02	10:30	10.65	89.5%	7.8	140.0	71.0	8.10	28.8	17.0	0.100	0.022	4.40	cloudy
5/22/02	10:30	8.71	75.1%	8.8	171.2	87.0	7.80	31.6	33.0	0.160	0.032	1.39	clear H2O
6/3/02	10:30	8.85	92.3%	17.7	179.0	95.0	7.40	23.4	15.0	0.140	0.029	1.98	cloudy
6/19/02	9:00	7.72	74.7%	13.4	194.5	102.0	7.40	47.1	34.0	0.170	0.045	1.64	cloudy

Paradise Creek Station 9 (PC-9)

Date	Time	D.O. (ppm)	% Sat	Temp (^{o}C)	Cond (uS)	TDS (mg)	pH	Turbidity (NTU)	TSS (mg/L)	T-P EPA Criteria 0.10 TP (mg/L)	OP (mg/L)	Flow (cfs)	Observations:
11/27/00	14:40	13.07	89.5%	0.0	194.4	90.0	7.60	30.6	8.0	0.200	0.120	0.15	cloudy, frozen bottom
12/11/00	8:55												frozen over
12/28/00													Flow probe down
1/15/01													frozen over
1/22/01	10:20												frozen over
2/6/01	13:40	11.62	79.6%	0.0	238.0	111.0	7.64	55.6	8.0	0.200	0.120	1.19	brown H2O
2/22/01	10:53	12.56	86.1%	0.0	241.0	117.0	7.31	95.1	39.0	0.290	0.140	1.70	
3/6/01	9:08	11.26	80.9%	1.8	272.0	133.0	7.81	72.4	18.0	0.200	0.069	1.36	cloudy
3/20/01	9:50	11.97	88.3%	2.7	253.0	123.0	7.35	57.4	16.0	0.190	0.065	0.54	cloudy
4/2/01	9:20	10.71	78.0%	2.1	214.0	101.0	7.31	57.4	40.0	0.170	0.069	0.84	cloudy
4/17/01	8:05	9.62	80.2%	7.5	231.0	116.0	7.15	29.2	14.0	0.099	0.034	0.45	clear
4/30/01	9:00	9.35	79.1%	7.9	237.0	120.0	7.79	19.5	14.0	0.100	0.028	0.32	clear/Rain event
5/15/01	9:55	9.07	79.1%	9.5	213.0	110.0	7.65	61.6	33.0	0.240	0.089	0.61	cloudy/rain event
5/30/01	8:31	10.18	86.9%	8.3	350.0	180.0	7.74	9.1	6.0	0.090	0.024	0.00	clear
6/12/01	8:34	8.52	74.1%	9.2	363.0	185.0	7.46	22.0	53.0	0.120	0.014	0.00	clear/Rain event
6/26/01	9:00											0.00	bone dry
7/10/01	7:30											0.00	bone dry
7/24/01	8:22											0.00	bone dry
11/20/01	9:29	11.01	88.4%	6.0	346.0	175.0	7.59	5.0	6.0	0.058	0.049	0.01	clear
12/5/01	11:22	12.30	86.0%	0.2	344.0	165.0	8.20	14.3	BDL	0.094	0.051	0.04	clear
12/19/01	11:15	11.39	78.2%	0.1	349.0	168.0	8.18	19.5	BDL	0.110	0.079	0.22	clear
1/2/02	14:24	9.92	68.2%	0.1	355.0	168.0	8.31	8.9	BDL	0.068	0.045	0.17	cloudy
1/16/02	11:15	12.62	86.7%	0.2	332.0	157.0	8.28	40.1	6.0	0.120	0.071	0.61	cloudy
1/30/02	11:15	11.50	78.7%	0.1	218.0	104.0	7.58	26.1	6.0	0.087	0.058	0.94	cloudy
2/13/02	11:10	12.22	84.1%	0.1	215.0	102.0	7.11	24.8	6.1	0.120	0.072	1.88	muddy
2/27/02	9:00	12.78	87.7%	0.1	320.0	13.0	7.60	36.6	13.0	0.180	0.110	1.60	cloudy
3/12/02	10:45	11.61	87.9%	3.6	147.0	73.0	7.40	166.0	64.0	0.390	0.088	9.25	muddy
3/26/02	11:00	10.42	85.8%	6.9	140.0	71.0	7.60	57.8	18.0	0.210	0.110	4.41	muddy
4/9/02	9:30	9.73	80.2%	7.1	169.0	83.0	8.00	30.0	12.0	0.130	0.062	0.9724	cloudy
4/23/02	10:00	10.25	80.7%	5.2	181.0	91.0	7.80	26.7	13.0	0.098	0.039	0.43	cloudy
5/8/02	10:45	9.44	77.5%	6.9	196.8	100.0	31.40	31.4	17.0	0.094	0.030	0.60	cloudy
5/22/02	10:40	7.85	67.2%	8.2	243.0	125.0	7.80	22.6	14.0	0.088	0.016	0.13	cloudy
6/3/02	10:50	6.72	65.5%	13.8	174.0	93.0	7.60	21.5	5.0	0.044	0.014	0.14	clear
6/19/02	9:30	7.84	71.1%	11.0	204.0	108.0	7.60	56.8	12.0	0.120	0.034	0.14	clear

Paradise Creek Station 6 (PC-6)

										T-P			
										EPA Criteria			
										0.10			
Date	**Time**	**D.O.**	**% Sat**	**Temp**	**Cond**	**TDS**	**pH**	**Turbidity**	**TSS**	**TP**	**OP**	**Flow**	**Observations:**
		(ppm)		(^{o}C)	(uS)	(mg)		(NTU)	(mg/L)	(mg/L)	(mg/L)	(cfs)	
11/27/00	14:00												too low to measure
12/11/00	9:00												too low to measure
12/28/00													Flow probe down
1/15/01													too low to measure
1/22/01	10:40												too low to measure
2/6/01	12:45	11.97	81.8%	2.5	94.8	45.0	8.02	16.2	5.0	0.120	0.088	0.05	clear H2O
2/22/01	11:46	11.84	87.9%	2.9	96.4	47.0	*9.36?*	16.1	BDL	0.120	0.088	0.06	clear H2O
3/6/01	9:47	10.77	79.4%	2.7	83.1	40.0	7.34	21.5	0.1	0.300	0.089	0.14	clear H2O
3/20/01	10:13	11.85	88.3%	3.1	60.5	30.0	7.13	26.1	18.0	0.140	0.071	0.62	clear H2O
4/2/01	9:50	11.18	82.5%	2.7	56.2	26.0	8.50	14.40	BDL	0.1	0.066	0.55	clear H2O
4/17/01	8:32	11.86	93.0%	5	53.2	26.0	7.11	13.40	BDL	0.110	0.067	0.61	clear H2O
4/30/01	9:32	11.17	90.1%	5.9	55.2	27.0	7.66	16.30	11.0	0.110	0.053	0.48	clear H2O/Rain event
5/15/01	10:11	10.84	89.6%	7.1	63.3	32.0	7.52	14.3	5.0	0.110	0.081	0.38	clear H2O/Rain event
5/30/01	9:00	11.89	97.2%	6.9	76.3	39.0	9.58	9.1	BDL	0.110	0.074	0.11	clear
6/12/01	9:05	10.09	83.4%	7.1	88.7	44.0	7.33	8.2	BDL	0.100	0.074	0.06	clear H2O/Rain event
6/26/01	9:27	9.39	82.0%	9.5	138.6	71.0	7.29	7.4	8.0	0.110	0.088	0.03	
7/10/01	7:47	7.96	72.8%	11.5	157.2	82.0	7.38	4.2	BDL	0.130	0.089	0.01	clear
7/23/01												0.01	barely flowing No Meas
11/7/01	9:30	9.16	73.7%	5.9	292.0	146.0		6.8	9.0	0.150	0.074	0.00	clear
11/20/01	9:52	10.10	83.7%	7.2	283.0	144.0	7.16	5.5	5.0	0.098	0.056	0.00	clear
12/5/01	12:09	10.19	72.7%	2.5	251.0	119.0	7.75	6.1	BDL	0.078	0.061	0.01	clear
12/18/01	11:50	9.97	74.5%	3.1	174.8	85.0	7.90	12.7	BDL	0.110	0.079	0.07	clear
1/2/02	11:30	10.16	76.5	3.4	174	85	7.82	7.87	BDL	0.094	0.069	0.01	cloudy
1/16/02	11:45	11.92	88.5%	3	117.6	56.0	8.00	21.1	BDL	0.130	0.076	0.33	cloudy
1/30/02	11:43	12.20	87.5%	1.6	85.6	40.0	7.58	26.7	BDL	0.110	0.070	0.24	clear
2/13/02	11:40	11.19	81.8%	2.5	79.0	38.0	7.33	11.5	BDL	0.120	0.088	0.29	cloudy
2/27/02	10:00	12.76	93.6%	2.5	61.0	47.0	7.40	40.6	6.0	0.140	0.970	1.59	cloudy
3/12/02	11:13	11.96	88.6%	2.8	65.0	32.0	7.40	53.0	11.0	0.200	0.110	1.88	muddy
3/26/02	11:30	11.01	84.1%	4	56.0	28.0	7.40	31.1	13.0	0.160	0.110	2.39	cloudy
4/10/02	10:00	10.66	89.2%	4.7	49.0	24.0	7.10	25.4	26.0	0.110	0.057	3.90	milky
4/23/02	10:30	9.10	74.1%	4	46.5	23.0	7.60	17.2	5.0	0.087	0.052	1.92	cloudy
5/8/02	11:00	8.93	68.3%	4.1	51.2	25.0	8.30	18.2	BDL	0.096	0.071	0.58	clear
5/22/02	11:00	9.53	76.8%	6.1	57.0	29.0	7.90	15.5	BDL	0.110	0.079	0.3552	clear
6/3/02	11:30	9.25	79.1%	8.6	66.0	34.0	7.80	11.9	BDL	0.100	0.080	0.19	clear
6/19/02	10:00	9.80	83.5%	8.3	71.7	37.0	7.70	14.7	BDL	0.110	0.029	0.16	clear

Paradise Creek Station 16 (PC-16)

										T-P EPA Criteria 0.100			
Date	**Time**	**D.O.**	**% Sat**	**Temp**	**Cond**	**TDS**	**pH**	**Turbidity**	**TSS**	**TP**	**OP**	**Flow**	**Observations:**
		(ppm)		(^{0}C)	(uS)	(mg)		(NTU)	(mg/L)	(mg/L)	(mg/L)	(cfs)	
11/27/00	11:45	11.90	81.5%	0.0	182.8	86.0	7.20		23.0	0.650	0.610	0.12	turbid, icy
12/11/00	9:35												frozen over
12/28/00													Flow probe down
1/15/01													frozen over
1/22/01	10:55												frozen over
2/6/01	14:41												too much ice
2/22/01	14:20	11.80	84.4%	1.7	141.5	68.0	7.58	299.0	150.0	0.540	0.140	4.56	extremely dark water
3/6/01	11:48	10.40	86.6%	7.4	155.7	79.0	7.31	44.9	19.0	0.190	0.073	1.91	brown water
3/20/01	12:24	12.61	108.4%	9.8	118.1	60.0	7.08	40.4	13.0	0.170	0.067	3.01	cloudy
4/2/01	11:33	11.58	87.4%	3.6	138.9	67.0	7.10	47.3	25.0	0.170	0.060	4.46	cloudy
4/17/01	9:43	11.25	94.0%	7.6	112.0	57.0	7.30	22.1	8.0	0.120	0.049	1.90	clear
4/30/01	10:50	10.72	90.3%	7.8	128.3	65.0	7.57	37.4	33.0	0.160	0.035	2.92	cloudy/rain event
5/15/01	11:17	9.79	88.5%	10.9	142.0	73.0	7.61	41.1	21.0	0.200	0.085	3.03	dark, after rain
5/30/01	9:52	11.06	103.0%	11.8	169.1	88.0	7.48	17.4	14.0	0.160	0.057	0.29	clear
6/12/01	10:53	8.86	81.4%	11.6	183.3	95.0	7.76	15.7	13.0	0.130	0.041	0.22	cloudy
6/26/01	10:30											0.00	res pools only no flow
7/10/01	8:20											0.00	no water
7/24/01	8:32											0.00	bone dry
1/16/02	12:30	11.25	77.5%	0.2	208.0	98.0	8.40	36.1	13.0	0.140	0.080	1.90	cloudy
1/30/02	12:00	10.82	74.1%	0.1	162.1	76.0	7.42	26.3	5.0	0.120	0.076	2.8232	cloudy
2/12/02													frozen over
2/27/02	10:30	12.83	87.8%	0.1	100.0	47.0	7.40	40.6	23.0	0.190	0.110	12.73	cloudy
3/12/02	12:00	11.17	86.0%	4.3	91.0	45.0	7.40	95.0	73.4	0.410	0.120	27.15	muddy
3/26/02	12:00	11.22	95.5%	8.3	78.3	40.0	7.80	43.6	14.0	0.220	0.130	16.42	muddy
4/10/02	10:00	10.99	88.8%	6.2	67.3	34.0	7.30	33.2	12.0	0.120	0.069	11.60	cloudy
4/23/02	11:00	10.25	82.8%	6.3	66.0	37.0	7.60	29.3	11.0	0.130	0.063	5.92	cloudy
5/8/02	11:20	9.72	83.9%	8.9	95.7	49.0	7..8	26.1	13.0	0.100	0.046	2.20	cloudy
5/22/02	11:20	9.00	75.4%	7.6	114.2	58.0	7.60	24.1	12.0	0.130	0.056	1.02	cloudy
6/3/02	11:20	7.49	77.2%	16.9	140.0	74.0	7.50	21.6	15.0	0.150	0.051	0.55	cloudy
6/19/02	10:15	7.60	71.4%	12.6	150.2	79.0	7.50	50.9	27.0	0.200	0.100	0.81	cloudy

Paradise Creek Station 4 (PC-4)

Date	Time	D.O. (ppm)	% Sat	Temp (^{o}C)	Cond (uS)	TDS (mg)	pH	Turbidity (NTU)	TSS (mg/L)	T-P EPA Criteria 0.10 TP (mg/L)	OP (mg/L)	Flow (cfs)	Observations:
11/27/00	11:00	13.22	90.6%	0.1	143.9	68.0	7.60	98.4	62.0	0.260	0.150	0.04	turbid, icy
12/11/00	9:30												frozen over
12/28/00													Flow probe down
1/15/01													frozen over
1/22/01	11:05												frozen over
2/6/01	14:38	12.02	88.9%	2.8	130.3	63.0	8.17	102.0	51.0	0.360	0.180	0.52	brown H2O
2/22/01	13:25	12.27	89.3%	2.2	124.5	61.0	7.74	348.0	450.0	0.600	0.098	3.67	cloudy
3/6/01	10:44	10.96	85.0%	4.7	113.2	57.0	7.63	54.4	18.0	0.200	0.072	0.74	cloudy
3/20/01	11:10	11.67	94.7%	6.3	88.1	44.0	7.19	69.4	88.0	0.230	0.060	0.92	cloudy
4/2/01	10:33	11.35	84.2%	2.9	115.3	55.0	7.0	40.5	BDL	0.130	0.042	5.17	cloudy
4/17/01	9:09	12.09	97.9%	6.3	83.0	41.0	7.4	29.8	18.0	0.120	0.053	0.73	clear
4/30/01	10:00	10.89	90.6%	7.6	107.3	54.0	7.6	55.0	72.0	0.210	0.049	1.02	cloudy/Rain event
5/15/01	10:35	10.97	97.6%	10.3	113.1	58.0	7.5	36.3	26.0	0.160	0.074	1.03	cloudy/Rain event
5/30/01	10:21	11.84	113.5%	13.5	123.0	65.0	7.7	20.8	13.0	0.130	0.046	0.10	clear
6/12/01	9:55	10.49	94.0%	10.5	137.2	70.0	8.0	11.2	5.0	0.080	0.029	0.10	clear
6/26/01	10:15	8.40	85.8%	16.4	219.0	116.0	7.9	12.6	15.0	0.150	0.095	0.02	clear
7/10/01	8:35											0.00	no water
7/24/01	8:44											0.00	no water
1/16/02	13:15	12.68	90.3%	1.4	206.0	98.0	8.05	30.0	7.0	0.130	0.071	0.77	cloudy
1/30/02	13:00	12.87	88.4%	0.2	189.0	76.0	7.12	27.3	9.0	0.120	0.050	1.25	cloudy
2/12/02													frozen over
2/27/02	11:30	12.36	90.0%	2.2	81.0	38.0	7.4	46.2	11.0	0.150	0.089	3.49	muddy
3/12/02	12:30	11.27	88.8%	5.2	84.0	42.0	7.3	64.5	29.0	0.220	0.079	8.72	muddy
3/26/02	12:35	10.22	87.8%	8.7	67.0	34.0	7.5	37.90	16.0	0.170	0.095	5.54	cloudy
4/10/02	11:00	10.87	88.3%	6.4	54.9	28.0	7.5	27.8	12.0	0.140	0.078	5.11	milky
4/23/02	11:45	9.05	74.5%	6.8	62.0	31.0	7.6	27.7	13.0	0.110	0.054	2.04	cloudy
5/8/02	12:30	11.54	103.2%	10.5	82.2	42.0	7.9	22.3	9.0	0.085	0.048	1.13	cloudy
5/22/02	12:00	10.07	84.1%	7.5	97.3	49.0	7.8	19.8	8.0	0.095	0.036	0.37	clear
6/3/02	12:10	8.53	95.4%	20.5	109.1	58.0	7.7	16.0	7.0	0.081	0.036	0.18	clear
6/19/02	11:15	8.65	84.1%	14.2	142.9	75.0	7.6	17.0	7.0	0.083	0.038	0.32	cloudy

Paradise Creek Station 2 (PC-2)

										T-P			
										EPA Criteria			
										0.10			
Date	**Time**	**D.O.**	**% Sat**	**Temp**	**Cond**	**TDS**	**pH**	**Turbidity**	**TSS**	**TP**	**OP**	**Flow**	**Observations:**
		(ppm)		(^{o}C)	(uS)	(mg)		(NTU)	(mg/L)	(mg/L)	(mg/L)	(cfs)	
11/27/00	13:35	12.95	88.7%	0.1	173.6	80.0	7.60	146.0	120.0	0.440	0.150	0.09	turbid, icy
12/11/00	9:15												frozen over
12/28/00													Flow probe down
1/15/01													frozen over
1/22/01	10:50												frozen over
2/6/01	15:11	10.99	75.5%	0.3	194.2	90.0	8.12	64.7	470.0	0.250	0.140	0.57	brown, cloudy H2O
2/22/01	14:52	11.67	84.5%	2.1	178.3	85.0	7.42	415.0	250.0	0.600	0.190	1.93	chocolate H2O
3/6/01	11:16	9.10	76.8%	8	220.0	113.0	7.42	129.0	94.0	0.270	0.056	0.47	brown, cloudy H2O
3/20/01	11:40	10.42	94.3%	9.6	146.3	75.0	7.28	65.8	60.0	0.240	0.051	0.75	brown, cloudy H2O
4/2/01	11:05	11.42	85.9%	3.3	160.4	77.0	7.32	64.3	42.0	0.210	0.049	0.81	brown, cloudy H2O
4/17/01	9:25	10.98	90.8%	7.1	125.5	64.0	7.26	31.5	13.0	0.170	0.071	0.61	brown, cloudy H2O
4/30/01	10:30	11.20	94.7%	8	145.4	74.0	7.74	147.0	120.0	0.390	0.052	0.54	cloudy H2O/rain
5/15/01	10:50	10.52	96.0%	11.2	144.4	75.0	7.66	41.1	28.0	0.210	0.088	0.67	cloudy H2O/rain
5/30/01	10:53	10.27	101.3%	14.7	144.9	76.0	7.72	32.0	28.0	0.180	0.033	0.17	
6/12/01	10:30	9.48	87.2%	10.2	167.6	86.0	7.77	17.3	25.0	0.130	0.039	0.11	cloudy H2O/rain
6/26/01	10:30											0.00	no flow
7/10/01	8:23											0.00	no flow
7/23/01												0.00	no flow
1/16/02	13:00	12.30	84.3%	0.1	253.0	118.0	7.67	26.9	8.0	0.160	0.084	0.46	cloudy
1/30/02	12:30	11.79	80.8%	0.1	167.0	77.0	7.18	23.3	13.0	0.160	0.087	0.44	cloudy
2/12/02	12:00	12.70	88.6%	0.7	181.0	88.0	7.15	19.4	BDL	0.130	0.082	1.24	cloudy
2/27/02	11:00	12.84	89.4%	0.6	110.0	53.0	7.50	89.8	20.0	0.200	0.110	2.29	cloudy
3/12/02	12:30	11.69	89.9%	4.4	129.0	63.0	7.40	107.0	74.0	0.350	0.110	9.30	cloudy
3/26/02	12:20	10.71	90.3%	7.9	172.0	46.0	7.60	53.3	17.0	0.170	0.140	5.39	cloudy
4/10/02	10:30	10.70	87.9%	6.9	72.9	37.0	7.40	42.4	18.0	0.210	0.110	2.00	cloudy
4/23/02	11:30	9.01	75.5%	7.8	84.2	31.0	7.60	27.7	19.0	0.180	0.091	0.48	cloudy
5/8/02	11:40	11.32	100.3%	10	120.3	62.0	7.80	38.2	24.0	0.170	0.073	0.70	grassed in
5/22/02	11:40	6.90	57.5%	7.6	134.0	68.0	7.60	49.3	26.0	0.210	0.069	0.26	grassed in
6/3/02	12:30	6.23	65.6%	18.7	139.2	73.0	7.60	19.7	9.0	0.130	0.049	0.18	cloudy
6/19/02	10:45	7.45	69.6%	12.3	149.6	78.0	7.60	57.2	33.0	0.200	0.059	0.19	cloudy

Paradise Creek Station 3 (PC-3)

								T-P EPA Criteria 0.10				lbs/day tons/day	
Date	**Time**	**D.O.** (ppm)	**% Sat**	**Temp** (^{o}C)	**Cond** (uS)	**TDS** (mg)	**pH**	**Turbidity** (NTU)	**TSS** (mg/L)	**TP** (mg/L)	**OP** (mg/L)	**Flow** (cfs)	**Observations:**
11/27/00	9:30												No H2O
12/11/00	10:00												No H2O
12/28/00													Flow probe down
1/15/01													snow covered
1/22/01	11:40												snow covered
2/6/01	15:40												too minimal to measure
2/22/01	15:52	12.09	89.7%	2.9	55.5	27.00	8.84	29.5	BDL	0.160	0.100	0.04	clear H2O
3/6/01	13:32	10.31	79.4%	5	47.4	24.00	7.62	33.8	6.0	0.190	0.083	0.07	cloudy H2O
3/20/01	13:28	11.57	89.2%	4.4	43.3	22.00	7.30	36.4	17.0	0.170	0.088	0.48	cloudy H2O
4/2/01	13:00	11.17	83.0%	3	43.9	21.00	7.2	25.1	24.0	0.140	0.07	0.327	clear H2O
4/17/01	10:30	12.26	96.7%	5.2	44.1	22.00	7.3	22.1	BDL	0.130	0.085	0.436	clear H2O
4/30/01	12:00	11.70	94.4%	6.1	45.9	23.00	7.1	22.4	10.0	0.140	0.052	0.438	clear H2O
5/15/01	11:50	11.29	94.7%	7.6	60.3	26.00	7.4	22.7	BDL	0.120	0.079	0.242	clear H2O
5/30/01	11:39	12.53	108.7%	9.2	54.4	28.00	7.2	17.0	BDL	0.130	0.07	0.009	clear H2O
6/12/01	11:30											0	No H2O
6/26/01	11:00											0.00	bone dry
7/10/01	9:00											0.00	bone dry
7/23/01	9:58											0.00	bone dry
12/19/01	12:30	11.06	82.7%	3.3	88.0	43.00	8.36	26.0	BDL	0.160	0.098	0.05	clear H2O
1/2/02													No H2O
1/16/02	13:50	11.55	84.60	2.4%	89.4	43.0	8.35	33.7	BDL	0.150	0.086	0.141	cloudy H2O
1/30/02	14:30	11.72	83.6%	1.1	54.0	25.00	7.53	28.7	BDL	0.150	0.072	0.121	clear H2O
2/12/02	12:30	11.36	83.8%	2.8	61.5	30.00	7.18	28.3	BDL	0.150	0.082	0.17	cloudy H2O
2/27/02	12:00	12.08	87.9%	2.2	49.9	21.00	7.5	43.4	BDL	0.160	0.095	1.346	cloudy H2O
3/12/02	13:20	11.91	89.1%	3.2	49.7	24.00	7.3	75.0	130.0	0.300	0.068	1.727	muddy
3/26/02	13:15	11.44	81.3%	4	46.0	23.00	7.4	28.2	4.0	0.150	0.1	1.991	cloudy H2O
4/10/02	12:00	10.88	84.0%	4.5	42.400	22.00	7	22.8	5.0	0.110	0.072	2.472	milky
4/23/02	12:30	9.60	74.8%	4.8	40.800	20.00	8	22.1	BDL	0.099	0.065	0.755	clear H2O
5/8/02	13:40	11.65	93.0%	5.7	43.300	22.00	8	16.6	BDL	0.096	0.074	0.49	cloudy H2O
5/22/02	13:30	9.64	78.3%	6.4	45.300	23.00	7	17.5	BDL	0.110	0.077	0.145	clear H2O
6/3/02	13:40	10.52	95.7%	11.2	51.100	27.00	7	18.1	4.0	0.110	0.077	0	No H2O
6/19/02	11:30	10.18	90.1%	9.7	56.200	29.00	8	28.2	18.0	0.140	0.086	0	No H2O

Paradise Creek Station 1 (PC-1)

										T-P			
										EPA Criteria			
										0.100			
Date	**Time**	**D.O.**	**% Sat**	**Temp**	**Cond**	**TDS**	**pH**	**Turbidity**	**TSS**	**TP**	**OP**	**Flow**	**Observations:**
		(ppm)		(^{o}C)	(uS)	(mg)		(NTU)	(mg/L)	(mg/L)	(mg/L)	(cfs)	
11/27/00	10:10	11.43	81.8%	1.6	89.7	42.0	7.20	13.9	5.0	0.120	0.096		clear H2O
12/11/00	10:10												flow is too low, or frozen
12/28/00													Flow probe down
1/15/01													frozen over
1/22/01	12:15	10.66	75.2%	1.0	86.9	42.0	7.44	11.0	BDL	0.100	0.076	0.03	clear H2O
2/6/01	16:01	11.69	82.8%	1.2	89.8	41.0	7.64	21.1	34.0	0.130	0.087		cloudy H2O
2/22/01	16:12	12.20	88.0%	1.8	85.5	40.0	7.37	47.4	11.0	0.180	0.071	0.13	cloudy H2O
3/6/01	12:21	10.62	77.9%	2.5	83.2	41.0	7.32	105.0	43.0	0.270	0.055	0.18	cloudy H2O
3/20/01	12:50	11.46	85.9%	3.3	72.5	36.0	7.26	38.6	6.0	0.190	0.082	0.37	cloudy H2O
4/2/01	13:20	10.87	80.3%	2.7	78.0	37.0	7.41	25.1	6.0	0.160	0.062	0.26	clear H2O
4/17/01	11:00	10.98	89.9%	6.8	74.8	38.0	7.18	26.7	5.0	0.170	0.100	0.27	clear H2O
4/30/01	12:40	10.74	89.1%	7.3	73.9	37.0	7.07	72.3	53.0	0.300	0.071	0.49	cloudy H2O/Rain event
5/15/01	12:20	10.39	90.1%	9.1	85.5	44.0	7.47	27.3	8.0	0.170	0.100	0.27	cloudy H2O/Rain event
5/30/01	12:19	11.61	103.5%	10.3	93.6	49.0	7.47	13.2	5.0	0.160	0.094	0.05	clear H2O
6/12/01	11:42	10.45	88.8%	8.2	96.0	49.0	7.64	12.3	7.0	0.130	0.086	0.0507	clear H2O
6/26/01	11:37	9.57	88.8%	11.9	125.3	66.0	7.81	10.7	14.0	0.120	0.043	0.03	clear H2O
7/10/01	9:16	6.99	69.1%	14.6	136.8	72.0	7.68	23.0	34.0	0.180	0.110	0.00	clear H2O
7/23/01	10:10											0.00	bone dry
11/20/01	11:12	10.75	87.5%	6.5	162.8	83.0	7.08	19.5	7.0	0.140	0.100	0.01	clear
12/5/01	13:00	11.96	85.4%	1.5	146.3	71.0	8.68	12.4	BDL	0.095	0.053	0.03	clear
12/19/01	13:12	10.96	78.6%	1.6	82.5	41.0	7.25	18.1	BDL	0.120	0.080	0.06	clear
1/2/02	12:45	11.06	79.4%	1.6	131.9	62.0	8.29	13.8	BDL	0.110	0.076	0.07	cloudy
1/16/02	14:10	11.93	84.1%	1.3	127.5	60.0	7.36	31.9	BDL	0.150	0.09	0.24	milky
1/30/02	13:30	12.69	87.5%	0.3	100.1	47.0	6.93	25.5	BDL	0.120	0.060	0.26	clear
2/12/02	13:30	12.49	82.1%	1.8	89.7	43.0	7.05	30.7	BDL	0.140	0.099	0.26	clear
2/27/02	12:40	11.50	83.2%	2.0	74.0	35.0	7.40	46.8	BDL	0.220	0.140	1.49	cloudy
3/12/02	14:00	11.66	81.1%	3.1	65.0	32.0	7.20	32.0	30.0	0.300	0.100	2.38	cloudy
3/26/02	13:30	10.91	83.5%	4.2	55.0	27.0	7.10	44.4	19.0	0.250	0.170	3.09	milky
4/10/02	12:15	10.37	81.7%	5.3	53.3	26.0	7.40	31.5	14.0	0.170	0.110	2.64	milky
4/23/02	13:00	9.25	71.9%	4.7	57.5	28.0	7.40	27.6	9.0	0.160	0.110	0.97	cloudy
5/8/02	13:00	12.14	96.8%	5.6	66.8	34.0	7.80	25.9	4.0	0.140	0.100	0.41	clear
5/22/02	12:30	9.33	71.3%	7.2	76.0	39.0	7.70	22.6	10.0	0.160	0.110	0.1611	cloudy
6/3/02	14:00	9.52	89.9%	12.7	74.8	39.0	7.70	16.4	6.0	0.140	0.100	0.16	clear
6/19/02	12:00	9.54	85.8%	10.6	83.5	43.0	7.60	16.9	BDL	0.130	0.100	0.15	clear

Paradise Creek Station 13 (PC-13)
Missouri Creek

Date	Time	D.O. (ppm)	% Sat	Temp (^{o}C)	Cond (uS)	TDS (mg)	pH	Turbidity (NTU)	TSS (mg/L)	T-P EPA Criteria 0.100 TP (mg/L)	OP (mg/L)	lbs/day tons/day Flow (cfs)	Observations:
11/27/00	15:30	11.48	78.2%	0.1	302.0	140.0	7.50	26.6	13.0	0.190	0.110	0.02	fairly clear H2O, icy
12/11/00	10:29												frozen over
12/28/00													Flow probe down
1/15/01													frozen over
1/22/01	8:45												frozen over
2/6/01	16:45	12.45	85.2%	0	305.0	139.0	7.57	64.0	82.0	0.470	0.330	0.70	brown H2O
2/22/01	16:55	12.82	88.3%	0.1	358.0	168.0	8.18	102.0	140.0	0.400	0.190	1.19	brown H2O
3/6/01	14:14	9.46	82.1%	9	288.0	149.0	7.46	155.0	58.0	0.320	0.150	0.3828	brown H2O
3/20/01	14:11	10.43	97.9	12.5	308.0	161.0	7.76	59.4	22.0	0.210	0.100	0.5022	cloudy
4/2/01	14:00	10.50	87.4%	7.4	323.0	162.0	7.63	23.7	5.0	0.120	0.060	0.5524	clear water
4/17/01	11:30	11.15	101.2%	11	366.0	190.0	7.75	11.1	7.0	0.110	0.053	0.1474	clear water
4/30/01	13:15	8.77	77.1%	9.7	305.0	157.0	7.61	59.9	71.0	0.150	0.100	0.2488	dark/rain event
5/15/01	13:00	8.69	88.0%	15.9	297.0	157.0	7.82	98.7	78.0	0.520	0.250	0.4373	dark/rain event
5/30/01	13:02	7.31	79.0%	19	327.0	177.0	7.95	24.1	41.0	0.340	0.091	0.001	still water
6/12/01	12:30	9.50	91.0%	12.6	330.0	173.0	7.90	20.9	45.0	0.250	0.078	0.003	still water
6/26/01	12:00											0	bone dry
7/10/01	9:43											0	no water
7/23/01	10:50											0	no water
12/19/01	13:50	12.56	82.9	0.4	690.0	330.0	7.25	14.9	BDL	0.180	0.140	0.3718	muddy
1/2/02	13:15	12.14	83.2	0.2	651.0	313.0	7.64	4.2	BDL	0.140	0.120	0.1058	cloudy
1/16/02	14:40	12.44	86.5	0.5	572.0	279.0	7.35	15.9	BDL	0.150	0.120	0.1113	cloudy
1/30/02	14:20	12.32	84.6	0.1	380.0	180.0	6.77	30.2	7	0.200	0.150		
2/12/02	14:00	11.35	78.7	0.5	344.0	166.0	6.68	31.0	8	0.200	0.150	1.577	cloudy
2/27/02	13:15	11.8	81.2	0.2	306.0	144.0	7.4	37.7	8	0.210	0.160	1.5513	cloudy
3/12/02	14:15	10.35	84.5	6.6	211.0	107.0	7.3	199.0	74	0.580	0.200	8.676	cloudy
3/26/02	14:00	9.52	83.6	9.5	214.0	111.0	7.5	81.8	32	0.340	0.200	4.1501	cloudy
4/10/02	13:00	10.86	95.7	9.9	256.0	132.0	8.4	17.7	9	0.120	0.072	0.625	cloudy
23-Apr	13:30	8.61	74	8.7	281.0	144.0	7.8	23.5	19	0.140	0.067	0.4656	cloudy
5/8/02	14:00	8.9	83.3	12.7	267.0	141.0	8	14.3	12	0.073	0.031	0.3662	clear
5/22/02	14:00	8.49	71.6	9.2			7.5		10	0.098	0.025	1.8852	
6/3/02	14:30	6.62	69.70	17.7	315	168.0	7.6	7.8	9	0.088	0.030	0.0615	cloudy
6/19/02	12:30	5.88	55.4%	13.4	315.0	165.0	7.7	11.8	BDL	0.097	0.093	0.0908	muddy