Memorandum

To: Files
From: Mindy Roberts, Mike LeMoine, Greg Pelletier, Kirk Sinclair, Lawrence Sullivan, Trevor Swanson, and Brian Zalewsky (Department of Ecology)
Date: July 31, 2003
Subject: Final Reconnaissance Study Plan for Deschutes River/Capitol Lake/Budd Inlet Total Maximum Daily Loads

This memorandum summarizes initial monitoring to be conducted throughout the Deschutes River/Budd Inlet watershed from June through December 2003. The primary field work in support of the TMDL water quality studies will occur in calendar year 2004. Ecology will develop a Quality Assurance Project Plan (QAPP) in fall 2003 for internal and external review and comment. The purpose of the proposed 2003 monitoring is to update historical data and generate new information with which to design the 2004 monitoring program. The 2003 data may provide a second year for validation of models or other analyses.

Introduction

The Deschutes River, Capitol Lake, and Budd Inlet TMDL project encompasses the entire watershed, from the Deschutes River headwaters through the marine areas (Figure 1). Tributaries to the Deschutes River, Capitol Lake, and Budd Inlet are included. The Clean Water Act section 303(d) listings addressed in the study include the following:

- fecal coliform bacteria
- temperature
- dissolved oxygen and nutrients
- pH
- fine sediment

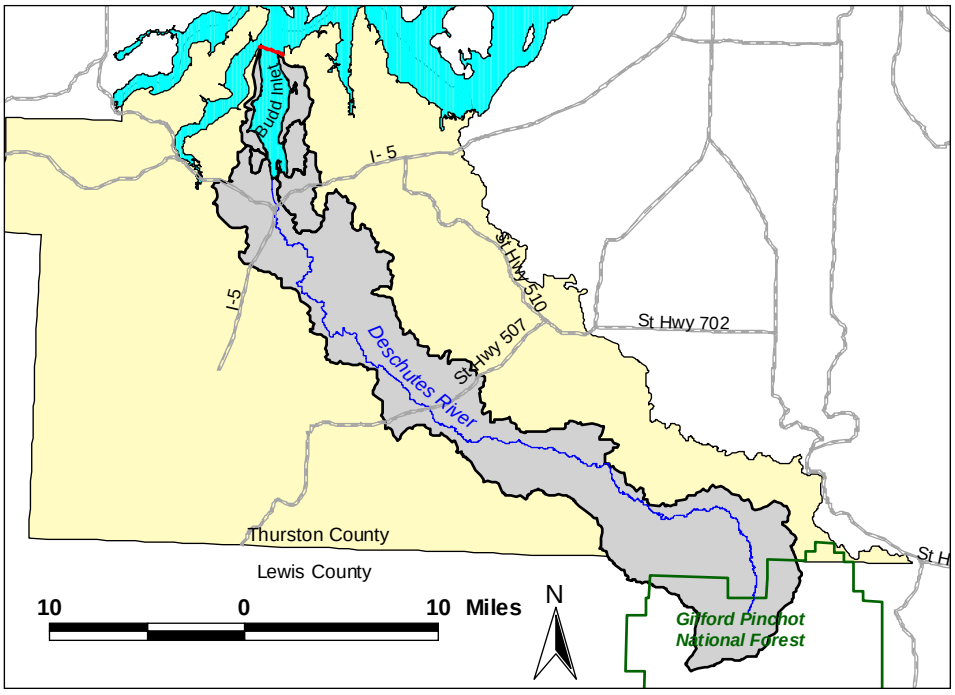

Figure 1. Deschutes River, Capitol Lake, and Budd Inlet TMDL study extent.

A number of previous and ongoing studies by USGS, Thurston County, and Department of Ecology characterize flow and surface water/groundwater interaction at various Deschutes River and tributary locations. Thurston County has monitored 75 locations throughout the project area for fecal coliform bacteria, dissolved oxygen, temperature, pH, nutrients, and chlorophyll. Ecology maintains ambient monitoring stations on the Deschutes River and in Budd Inlet; in addition, Ecology's Salmon Recovery Index Watershed monitoring project includes continuous temperature data, nutrients, and other water quality parameters at three locations on the Deschutes River. The Squaxin Island Tribe has monitored temperature, fine sediment, and related parameters. Weyerhaeuser Company has monitored flow, temperature, sediment, and habitat at several stations in the headwaters. The LOTT Budd Inlet study and Miller Brewing Company discharge study provide significant water body data sets for Capitol Lake and Budd Inlet.

Proposed 2003 Study Sites

The reconnaissance studies include continuous temperature monitoring, twice-monthly or monthly *in situ* measurements and grab samples, short-term continuous monitoring, and targeted stormwater outfall dry weather and wet weather monitoring. Where sampling locations coincide with existing Ecology or Thurston County monitoring stations, the original station identifiers are included. Monitoring will be conducted in accordance with standard Department of Ecology protocols. Figure 2 summarizes station locations.

Table 1 summarizes temperature monitoring stations. Continuous temperature monitors (i.e., Onset StowAway TidBits and Maxim Dallas i-buttons) will be used to record surface water, hyporheic water, and air temperatures. Relative humidity probes will be installed in a subset of locations. The Ecology Stream Hydrology Unit will install staff gages and continuous flow recorders at three stations. Piezometers will be used to characterize vertical hydraulic gradients at monitoring locations. Field teams will record streamflow during monthly downloads. Some sites are located on lands owned by Weyerhaeuser Company, and Ecology has received permission to access those sites.

Table 2 summarizes twice-monthly (July through October) and monthly (November and December) monitoring stations throughout the watershed. Grab samples will be collected and analyzed for fecal coliform, nutrients (dissolved and total), organic carbon, and/or alkalinity and hardness. Dissolved oxygen samples will be analyzed using Winkler titrations. *In situ* pH will be measured with field meters. Field replicates will be collected at a frequency of 5 to 10%. Flows will be measured at the time of sampling as indicated in the table.

In addition, Hydrolabs will be installed for up to two weeks in Ayer (Elwanger) Creek, Reichel Creek, Capitol Lake, and inner Budd Inlet, contingent on finding a secure location for deployment. Critical periods include August and September 2003.

Two rounds of monitoring will be conducted on Capitol Lake. During sampling rounds, planned for August and September 2003, Ecology will record temperature and conductivity/salinity profiles throughout the lake, and will collect samples to be analyzed for fecal coliform, nutrients, chlorophyll a, ultimate BOD, and organic carbon.

Ecology will conduct a round of dry-weather stormwater outfall monitoring in late summer 2003 at up to 25 locations to be determined in cooperation with the City of Olympia, City of Tumwater, General Administration, Thurston County, and Department of Transportation. A subset of sites

will be sampled over two storm events in fall/winter 2003, two to four times over the hydrograph. Samples will be analyzed for fecal coliform bacteria, nutrients (dissolved and total), BOD, and organic carbon.

Project Schedule and Products

Interim results will be summarized in quarterly reports that will be distributed to interested parties via e-mail. Quarterly reports will continue through subsequent calendar year 2004 monitoring. The project will culminate in a technical report summarizing all analyses in 2005.

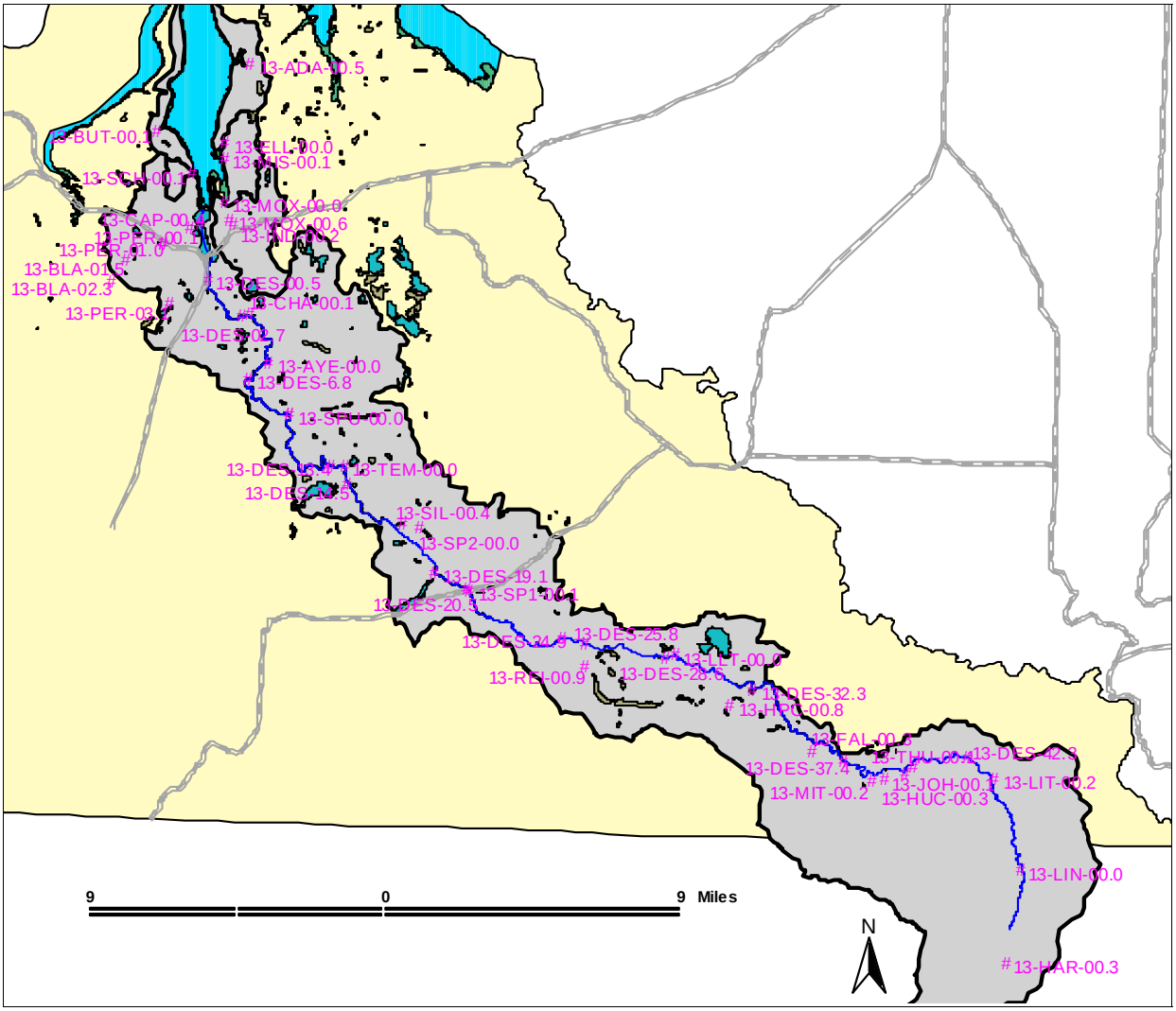

Figure 2. Stations for 2003 initial monitoring.

Table 1. Monitoring locations for temperature and related parameters.

Station Location	Thur. County Station	Project Station	Water Temp	Air Temp/ RH	Hypo-rheic Temp	SHU flows	Meas. flows	Staff Gage	Piezo-meter	Wey. Co. Permission Received
Main Stem Deschutes River										
Deschutes nr. Upper Falls	NM	13-DES-42.3	X	RH			X			
Deschutes at 1000 Rd	DESDE 0050	13-DES-37.4	X	X	X					X
Deschutes at 18731 old Camp Lane (Art Schacher)	NM	13-DES-32.3	X	X	X		X		X	
Deschutes at Vail Cutoff Road SE nr Lake Lawrence	DESDE 0040	13-DES-28.6	X		X		X		X	
Deschutes at Woodbrook Lane (SRIW Station 1307)	NM	13-DES-25.8	SRIW							
Deschutes at Vail Loop Rd SE (USGS sta 12079000)	DESDE 0045	13-DES-24.9	X	RH	X		X	USGS	X	
Deschutes at Rte 507	DESDE 0030	13-DES-20.5	X		X	X	SHU	SHU	X	
Deschutes at Military Rd	NM	13-DES-19.1	X		X		X		X	
Deschutes at Waldrick Road (SRIW Station 1304)	NM	13-DES-14.5	SRIW		X	X	SHU	SHU	X	
Deschutes nr Rich Rd SE/Jerry Boe	DESDE 0020	13-DES-09.2	X		X	X	SHU	SHU	X	
Deschutes nr Olympia Fuel & Asphalt off 84th/99	NM	13-DES-06.8	X	X	X		X		X	
Deschutes at Henderson Blvd SE	DESDE 0010	13-DES-02.7	X		X		X		X	
Deschutes at E St Bridge nr brewery (SRIW Sta 1302)	DESDE 0000	13-DES-00.5	SRIW	RH	X		USGS	USGS	X	
Upper Deschutes Tributaries										
Thurston Creek at 3000 Rd	DESTH 2100	13-THU-00.1	X				X			X
Johnson Creek at 3000 Rd	NM	13-JOH-00.1	X				X			X
Huckleberry Creek at 3000 Rd	DESHU 1900	13-HUC-00.3	X				X			
Mitchell Creek nr mouth at Gordon Rd SE/1000 Rd	NM	13-MIT-00.2	X				X			X
Fall Crk at Gordon Rd SE/ 1000 Rd	NM	13-FAL-00.3	X				X			X
Hull and Pipeline Creek at Gordon Rd SE/1000 Rd	NM	13-HPC-00.8	X				X			X
Lake Lawrence trib nr Vail Loop Rd SE	NM	13-LLT-00.0	X				X			
Reichel Lake Creek at Vail Loop Rd SE	DESRE 1100	13-REI-00.9	X				X			
Spring nr Rte 507 just upstream of Deschutes R. at Rte 507	NM	13-SP1-00.1	X				X			
Lower Deschutes River Tributaries										
Silver Spring near mouth	NM	13-SIL-00.4	X				X			
Small spring nr Silver Spring Artist Facility	NM	13-SP2-00.0	X							
Tempo Lake outflow nr Stedman Road	NM	13-TEM-00.0	X				X			
Spurgeon Cr at Rich Rd SE (access at 9431 Rich Rd SE/Jerry Boe)	DESSP 0500	13-SPU-00.0	X				X			
Ayer (Elwanger) Cr at Riverlea Dr	DESAY 0400	13-AYE-00.0	X				X			
Chambers Cr off Rich Rd SE (Q); off 58th Ave SE (T)	DESCH 0300	13-CHA-00.1	X				X	Th. Co.		

Station Location	Thur. County Station	Project Station	Water Temp	Air Temp/ RH	Hypo-rheic Temp	SHU flows	Meas. flows	Staff Gage	Piezo-meter	Wey. Co. Permission Received
Capitol Lake Tributaries										
Black Lake outlet at Belmore Rd	BUDBL 0399	13-BLA-02.3	X	X			X	Th. Co.		
Black Lake Ditch at Jones Quarry Bridge	NM	13-BLA-01.5	X				X	Th. Co.		
Black Lake Ditch nr Percival confluence	NM	13-BLA-00.0	X				X	Th. Co.		
Percival Creek at Trosper Rd SW	NM	13-PER-03.1	X							
Percival Creek nr Black Lake Ditch confluence	BUDPE 0020	13-PER-01.0	X	X			X			
Percival Creek nr mouth	BUDPE 0000	13-PER-00.1	X				X			

Flow at shaded stations will be monitored by the Department of Ecology Stream Hydrology Unit.
NM = not monitored previously by Thurston County

Table 2. Monitoring locations for fecal coliform, dissolved oxygen, nutrients, alkalinity/hardness, and organic carbon.

Thurston Co Station	Project Station	Description	Q	FC	DO	Nuts	pH	Alk/Hard	TOC/ DOC	Wey. Co. permission
Main Stem Deschutes River										
DESDE0050	13-DES-37.4	Deschutes River at 1000 Rd	Wey.Co.				pH	alk/hard		
DESDE0040	13-DES-28.6	Deschutes River at Vail Cutoff Rd SE	USGS				pH	alk/hard		
DESDE0030	13-DES-20.5	Deschutes River at Rte 507	Q			nuts	pH	alk/hard		
DESDE0020	13-DES-09.2	Deschutes River nr Rich Rd SE/Jerry Boe	Q				pH	alk/hard		
DESDE0010	13-DES-02.7	Deschutes River at Henderson Blvd SE	no	FC	DO	nuts	pH			
DESDE0000	13-DES-00.5	Deschutes River at E St bridge (SRIW 1302)	USGS	FC	DO	nuts	pH	alk/hard	OC	
Upper Deschutes Tributaries										
DESHD3700	13-HAR-00.3	Hard Creek above confluence w/ upper Deschutes	Wey.Co.				pH			X
DESLI3100	13-LIN-00.0	Lincoln Creek above confluence w/ upper Deschutes	Wey.Co.				pH			X
DESLD2700	13-LIT-00.2	Little Deschutes River above confluence w/ Deschutes	Wey.Co.				pH			X
DESTH2100	13-THU-00.1	Thurston Creek at 3000 Rd	Wey.Co.				pH			X
DESHU1900	13-HUC-00.3	Huckleberry Creek at 3000 Rd	Wey.Co.		DO		pH			X
DESRE1100	13-REI-00.9	Reichel Creek at Vail Loop Rd	Q	FC	DO		pH			
Lower Deschutes Tributaries										
DESSP0500	13-SPU-00.0	Spurgeon Creek at Rich Road/Jerry Boe	Q	FC			pH			
DESAY0400	13-AYE-00.0	Ayer (Elwanger) Creek off Riverlea Dr	Q	FC	DO		pH			
DESCH0300	13-CHA-00.1	Chambers Creek off 58th Ave SE	Th.Co.	FC			pH			
Capitol Lake and Tributaries										
BUDBL0399	13-BLA-02.3	Black Lake outlet at Belmore Rd	Th.Co.	FC	DO		pH			
NM	13-BLA-00.0	Black Lake Ditch nr Percival confluence	Th.Co.	FC	DO		pH			
BUDPE0020	13-PER-01.0	Percival Creek nr Black Lake Ditch confluence	Th.Co.	FC						
BUDPE0000	13-PER-00.1	Percival Creek nr mouth	no	FC	DO	nuts	pH			
BUDCAL010	13-CAP-00.4	Capitol Lake at Railroad Trestle	no	FC	DO	nuts			OC	
Budd Inlet Tributaries										
BUDAD0000	13-ADA-00.5	Adams Creek at Boston Harbor Rd	Q	FC			pH			
BUDBU0000	13-BUT-00.1	Butler Creek at French Loop Rd	Q	FC			pH			
BUDEL0000	13-ELL-00.0	Ellis Creek at East Bay Dr	Q	FC			pH			
BUDIN0010	13-IND-00.2	Indian Creek at Quince Ave	Q	FC						
BUDMI0000	13-MIS-00.1	Mission Creek at East Bay Drive	Q	FC						
BUDMO0030	13-MOX-00.6	Moxlie Creek at Plum St and Henderson	Q	FC			pH			
NM	13-MOX-00.0	Moxlie Creek at East Bay	no	FC						
BUDSC0000	13-SCH-00.1	Schneider Creek at West Bay Dr	Q	FC			pH			

NM = not monitored