

Sampling and analysis plan for the Jordan River

The purpose of this document is to summarize the data needs for the calibration and validation of the QUAL2K model being developed for the Division of Water Quality by Cirrus Ecological Solutions and their subcontractor Stantec. The QUAL2K model will be utilized by the Division for the development of Total Maximum Daily Loads for impaired waterbodies and wasteload allocations for facilities discharging to the river. The Division's contractors have provided the following data requirements as part of the data evaluation process.

Parameters

Division of Water Quality staff will perform all collection and handling of samples and deploy data loggers in the field. Water quality sampling will be a combination of water grab samples and field measurements of physical parameters. Data loggers will be deployed only on the Jordan River sites and will store hourly data for pH, dissolved oxygen, conductivity and temperature. Collection of field parameters for other sites will be performed only once at the time of grab sample collection. For a discussion on the relationship between model variables and water quality data *QUAL2K: A Modeling Framework for Simulating River and Stream Water Quality, Version 2.04: Documentation and Users Manual*. (Chapra, et al, 2006). The following represents a list of parameters required for validation of the QUAL2K model:

Carbonaceous Biological Oxygen Demand (mg/L)¹
Alkalinity (mgCaCO₃/L)¹
Total Kjeldahl Nitrogen (µgN/L)¹
Ammonium Nitrogen (µgN/L)¹
Nitrite Nitrogen (µgN/L)¹
Nitrate Nitrogen (µgN/L)¹
Chlorophyll a (suspended) (µgCHLa/L)²
Total Phosphorus (µgP/L)¹
Soluble Reactive Phosphorus (µgP/L)¹
Total Suspended Solids (mg/L)¹
Volatile Suspended Solids (mg/L)¹
Total Organic Carbon (mg/L)²
Dissolved Organic Carbon (mg/L)²
Specific Conductance (µmhos)³
Dissolved Oxygen (mg/L)³
pH³
Temperature (°C)³
E. coli (#organisms/100mL)⁴

¹Sample analysis will be performed by the Central Valley Water Reclamation Facility Laboratory. Note: CBOD will be analysed as filtered and non-filtered, 5-day BOD, with nitrification inhibition.

²Sample Analysis will be performed by the Utah Public Health Laboratory.

³Field parameters will be measured hourly by data loggers (In-situ Troll 9000 Multiparameter probes).

⁴E. coli will be measured using the Colilert system by Division of Water Quality staff.

Sampling Frequency

Model guidance recommends that synoptic sampling be performed daily for the equivalent of the travel time or approximately 3 days in the case of the Jordan River. Daily samples will be taken at each site at approximately the same time every day over the three day period. In addition, 10 Troll 9000 probes will be deployed on the mainstem of the Jordan River to collect hourly diurnal data for field parameters. In order to capture the range of seasonal conditions for model validation, synoptic sampling will be repeated in October 2006, January 2007 and once during high flow in the spring of 2007, if feasible.

Sampling Locations

The following sites on the Jordan River will be sampled daily in addition to deployment of continuous dataloggers:

Jordan River below Utah Lake Outlet
Jordan River at Bangerter Highway Crossing
Jordan River at 9000 South Crossing
Jordan River at 4100 South Crossing
Jordan River at 2100 South Crossing above Surplus Canal
Jordan River at 1700 South Crossing
Jordan River at 500 North Crossing
Jordan River at Cudahy Lane Crossing
Jordan River above Burnham Dam and State Canal Diversion

Grab samples and instantaneous field readings will be taken daily at the following tributary, point source and storm drain sites:

Little Cottonwood Creek
Big Cottonwood Creek
Mill Creek
1300 S. Conduit (combined flow of Parleys, Emigration, and Red Butte Creeks)
N. Temple Conduit
South Valley Wastewater Treatment Plant
Central Valley Wastewater Treatment Plant
South Davis South Wastewater Treatment Plant

Quality Control/ Quality Assurance

The Jordan River monitoring program will include the following QA/QC elements:

- Field collected blanks for all parameters submitted to the lab (~1 blank per sampling event)

- Laboratory blanks for each parameter composed of de-ionized water (1 per sampling event)
- Duplicate field samples for all parameters at 1 randomly selected site per sampling event
- Documentation of equipment calibration for each sampling event

References

Chapra, S.C., Pelletier, G.J. and Tao, H. 2006. QUAL2K: A Modeling Framework for Simulating River and Stream Water Quality, Version 2.04: Documentation and Users Manual. Civil and Environmental Engineering Dept., Tufts University, Medford, MA.