DRAFT Work Plan for the Assessment of Water Quality and Biological Communities in the Lower Boise River and Selected Tributaries, Ada and Canyon Counties, Idaho, 2011 through 2015

BACKGROUND

Agricultural land and water uses, treated wastewater discharges, land development, road construction, urban runoff, animal feeding operations (AFOs), reservoir operations, and river channelization affect water quality and biotic integrity of the Boise River. Between Lucky Peak Dam (at river mile 64) and Eagle Island (at river mile 42) the river is impacted primarily by surrounding urban communities. Between Eagle Island and the confluence with the Snake River it is affected primarily by irrigation diversions and return flows, AFOs, and other small municipalities. The land- and water-use activities affect stream flow and water temperatures in the river, and increase loadings of nutrients, sediment, and bacteria. As population continues to grow in the lower Boise River Basin, large tracts of agricultural land are being converted to residential or industrial uses, the types of pollutants entering the river are likely to change, and the demand for high-quality water resources increases.

Since 1994 the USGS has monitored water quality and biological communities in the Boise River in cooperation with the Idaho Department of Environmental Quality (IDEQ) and the Lower Boise Watershed Council (LBWC). Early efforts were designed to assess ongoing status and trends in river quality, including the monitoring of water quality and biological communities on the Boise River and synoptic studies to identify the tributaries contributing the most significant loads of selected constituents to the river. The program evolved over the years to accommodate data needs to formulate TMDLs in the Lower Boise basin. Included were several short-term studies to evaluate continuous water temperatures; nutrient loads contributed by groundwater, nutrient and sediment loads discharged to the Snake River, resident fish communities, cost-effective methods to monitor nutrients and sediment more frequently, and potential applications of isotopic tracers for understanding nutrient sources and cycling.

Efforts are now underway to evaluate attainable uses of streams in the basin as well as track trends in stream quality that might result from management of water resources. These efforts require an emphasis on gathering information within tributary basins in addition to continued monitoring on the Boise River for ongoing trend purposes. The objectives and approach for this work plan have been devised in conjunction with the Technical Advisory Committee (TAC) of the LBWC to cost-effectively meet the evolving needs of basin resource managers.

OBJECTIVES

This program is designed to help determine:

- Status and trends of stream quality in the Boise River and selected tributaries;
- Important areas, land uses, and processes contributing to tributary quality and beneficial uses;
- How tributaries contribute to Boise River water quality; and
- Future river-quality issues to be addressed.

APPROACH

Tributary Work

Tributaries will be addressed by a series of rotating assessments. A separate tributary or group of tributaries will be addressed each year. The rotation will be repeated after the last group is addressed, giving the ability to examine evolving trends in the tributaries. Six tributaries or groups of tributaries have been selected:

- Fifteen Mile Creek
- Indian Creek
- Mason Creek
- Dixie Drain, Willow Creek, and Mill Slough
- Eagle Drain and Dry Creek
- Cottonwood Creek, Hulls Gulch, and Crane Creek

Fifteen Mile Creek and Indian Creek have been addressed during 2008 through 2010. The assessment of Mason Creek will be done in 2011. USGS will work with the TAC to prioritize the other tributaries for future scheduling.

During FY11 the proposed scope of tributary monitoring consists of the following components (shaded items are new to the project scope):

TASK	TIME-FRAME	NO. SITES	NO. SAMPLES	DATA TO BE COLLECTED
Complete Mason Creek site selection	Feb 23, 2011	5 - 6	NA	Exact site locations, land access permission.
Install Gage at Mouth	Mar 25, 2011	1	NA	Land access permission.
Install temperature loggers	Mar 25, 2011	2	NA	Select two sites for temperature monitoring.
Sample at Mouth 8x/yr*	Mar – Nov, 2011	1	8	Discharge, E.Coli, sediment, TP, TN, nutrient species, water quality parameters. Monthly except bimonthly in June, July.
Collect water-quality "event" samples at tributary sites	Late April, July, and late October, 2011	5 – 6	3	Discharge, E.Coli, sediment, TP, TN, nutrient species, major ions, organic carbon, water quality parameters.
Collect bottom sediment samples at tributary sites	October 2011	3	1	Emerging contaminants and organic carbon in sediments.
Collect biological samples at tributary sites	October 2011	2	1	Benthic invertebrates, periphyton, habitat parameters, fish counts, bank stability, pebble counts

*Mobilization for extra water-quality samples at the single tributary site relies on funding from a different program completed in cooperation with Treasure Valley municipalities.

Water Quality:
Water-quality samples will be collected during 3 hydrologic events in an attempt to bracket water-quality conditions. The events to be targeted are (1) base flow conditions after the end of the irrigation season (late October), (2) early flushing of the canal system at the beginning of the irrigation season (typically late April or early May), and (3) base flow conditions during the irrigation season (July). Event samples will be analyzed for E.Coli, suspended sediment, total phosphorous (TP), total nitrogen (TN), nutrient species, major ions, and organic carbon.

A gage will be installed at one site along the tributary and serviced approximately 11 times during the monitoring year. A stage-discharge rating will be developed and a discharge record will be made available using USGS approved methods. Water quality samples will be collected at the gage site 8 additional times during the monitoring year (in addition to the event samples described above). These will be analyzed for E.Coli, suspended sediment, TN, TP, and nutrient species.

Two temperature loggers will be installed along the tributary at two sites of priority interest. The temperature data will not be presented as a USGS-approved water-quality record but will be quality assured with independent field measurements using a NIST-certified thermistor during each field visit.

Biology:
Biological monitoring will be reinstated during FY11. Two tributary sites will be sampled in September/October for benthic invertebrates, periphyton, habitat variables using EPA rapid bio-assessment protocol (RBP), and fish community assessment. The Mason Creek fish community has not been characterized. A reconnaissance for suitable fish sampling reaches will be necessary before sampling. The fish community assessment will rely heavily on volunteer help but will involve a minimum of one USGS biologist.

Stream Morphology and Sediment:
Stream-bottom materials will be analyzed at three tributary sites for wastewater contaminants and total organic carbon. The samples will be collected once per year. Bank stability and pebble counts will also be collected at two sites once per year in accordance with EPA RBP.

Land Use:
Ancillary data on land use and the routing of irrigation waters within the tributary basin will be acquired to assist interpretation of the chemical and biological data. This includes collecting a 360° photographic panorama at each tributary site and documenting site conditions.

Boise River Work
This work puts the tributary work "in context" of the Boise River and allows evaluation of continuing Boise River trends. Stream discharge related to samples collected is provided by continuous gages that currently exist. Water-quality samples will be collected at three of the sites that have been monitored since 1994:

- Parma, ID, representing impacts from nearly all basin activities and the quality of water discharged to the Snake River;

- Middleton, ID; representing a major transition zone for Boise River water quality *(data collection at this site has been dropped for 2011 to accommodate a funding shortfall);*

- Diversion Dam; a site upstream from most urban land uses that currently has very consistent water quality and represents the quality of water diverted to the basin's extensive canal system during the irrigation season *(data collection at this site has been dropped for 2011 to accommodate a funding shortfall).*

During FY11 the proposed scope of Boise River monitoring consists of the following components (shaded items are new to the project scope):

TASK	TIME-FRAME	NO. SITES	NO. SAMPLES	DATA TO BE COLLECTED
Sample at Parma 5x/yr*	Feb – Sept, 2011	1	5	Discharge, E.Coli, sediment, TP, TN, nutrient species, water quality parameters. Monthly except bimonthly in June, July.
Collect water-quality "event" samples at Parma*	Late April, July, and late October, 2011	1	3	Discharge, E.Coli, sediment, TP, TN, nutrient species, major ions, organic carbon, water quality parameters.
Collect bottom sediment samples at one rotating main-stem site	October 2011	1	1	Emerging contaminants and organic carbon in sediments. Site for FY11 is the Boise River at Middleton.
Collect biological samples at Diversion Dam, Middleton, and Parma	October 2011	3	1	Benthic invertebrates, periphyton, habitat parameters, fish counts, bank stability, pebble counts. Sampling will occur on a 3-yr cycle after 2011.

*Both mobilization and fees for the majority of laboratory analyses are funded by a different program completed in cooperation with Treasure Valley municipalities.

Water Quality:
Water-quality samples will be collected at Parma in conjunction with event samples collected along the tributary drainage and analyzed for the same constituents.

There is an existing gage at the Boise River near Parma and it is maintained and operated as part of a different funding agreement. Water-quality samples will be collected at Parma five additional times during the monitoring year (in addition to the event samples described above). These will be analyzed for E.Coli, suspended sediment, TN, TP, and nutrient species.

During FY11, salaries and the majority of analytical and mobilization costs for all sampling conducted at Parma are covered by a different cooperative funding agreement with several Treasure Valley municipalities.

Biology:
Biological monitoring will be reinstated during FY11 and occur thereafter on a three-year cycle at three sites along the main stem of the Boise River. These include the Boise River at Diversion Dam, the Boise River at Middleton, and the Boise River near Parma. The three sites will be sampled in September or October 2011 for benthic invertebrates, periphyton, habitat variables using EPA RBP, and fish community assessment. The fish community assessment effort will rely heavily on volunteer help but will involve a minimum of one USGS biologist on site.

Stream Morphology and Sediment:
Stream-bottom materials will be analyzed at one of the three main-stem sites for wastewater contaminants and total organic carbon. The sample will be collected once per year. The location of sampling for wastewater compounds in bottom sediments will rotate on a yearly basis. During FY11 Middleton is scheduled for sampling of bottom sediments. Bank stability and pebble counts will also be collected at the three main-stem sites during FY11 in accordance with EPA RBP. The three main-stem sites will be re-sampled for bank stability and pebble counts on a 3-year cycle along with biological constituents in the main stem.

PRODUCTS
An informational poster will be completed on an annual basis and presented at a TAC meeting in addition to the Boise Nonpoint Source Conference. The poster will summarize data and present preliminary findings in the tributaries and provide any context with respect to data collected along the main stem of the Boise River.

An alternative schedule for report production is proposed in this scope of work. Previously, it was proposed that a series of interpretive reports would be written. Each was to cover 4 tributaries or groups of tributaries. The first was to be written in FY2013, and subsequent reports will be written at 4-year intervals. Given the fact that six tributaries or groups of tributaries are planned to be monitored for this project, the first report would be published at the end of the first 6-year tributary monitoring cycle in 2015. The first report will present and interpret all data collected during the initial 6-yr monitoring cycle. The second report will be published in 2022 and will also address long term trends in the tributaries after they have been monitored during the second monitoring cycle.

BUDGET
Estimated annual costs for federal fiscal years 2011 through 2015 are summarized below. The USGS plans to provide matching funds each year equaling 50% of the total annual cost. As noted above ongoing monitoring efforts at Parma have been paid for via a funding agreement with Treasure Valley Municipalities during FY11. This agreement is assumed constant in the projections below. The FY11 budget also allows more flexibility due to a volunteer agreement to be entered into with a local student to assist with field work and additional volunteers to assist with fish community assessment. Costs associated with fish community assessment during FY11 and FY12 in addition to FY13 and FY14 have been split between those fiscal years. Work can span two fiscal years and budgeting as such attenuates the increased cost associated with conducting fish assessment at three additional sites on the main stem during FY11 and FY14.

Project costs in dollars for fiscal years 2011 through 2015
***Indicates fish assessment at three sites along the Boise River will be conducted.**

	FY2011*	FY2012	FY2013	FY2014*	FY2015
Salary/Labor	$54,900	$57,100	$59,380	$61,755	$64,200
Supplies	$4,500	$4,680	$4,900	$5,100	$5,300
Laboratory	$20,100	$20,900	$21,740	$22,610	$23,500
Biology	$19,700	$19,700	$21,600	$21,600	$16,300
Report Products	$2,300	$2,390	$2,500	$2,600	$66,550
TOTAL	**$101,500**	**$104,770**	**$110,120**	**$113,665**	**$175,850**
USGS share	**$50,750**	**$52,385**	**$55,060**	**$56,832**	**$87,925**
Cooperator share	**50,750**	**$52,385**	**$55,060**	**$56,832**	**$87,925**