COLORADO
Colorado Water Conservation Board
Department of Natural Resources
1313 Sherman Street, Room 718
Denver, CO 80203

Yampa/White/Green – Characterization of Streamflow, Suspended Sediment, and Nutrient – POGG1 2019-2728

February 27, 2019

Upper Yampa Water Conservancy District
Attn: Andi Rossi, District Engineer
P.O. Box 775529
Steamboat Springs, CO 80477

Dear Grantee:

We are pleased to inform you that the Colorado Department of Natural Resources, Colorado Water Conservation Board (CWCB) has approved your request for funding pursuant to the WSRF Grant Program ("Program"). This letter authorizes you to proceed with the Characterization of Streamflow, Suspended Sediment, and Nutrient Project ("Project") in accordance with the terms of this Grant Award Letter.

Attached to this letter are the terms and conditions of your Grant. Please review these terms and conditions, as they are requirements of this Grant to which you, Upper Yampa Water Conservancy District, agree by accepting the Grant Funds.

The WSRF Criteria & Guidelines can be located on our website for additional information. If you have any questions or concerns regarding the project, please contact Craig Godbout, Project Manager at 303-866-3441 or at Craig.Godbout@state.co.us. Please send the 6-month progress reports and invoices directly to the Project Manager and cc me at Dori.vigil@state.co.us.

Thank you.

Sincerely,

//s//

Doriann Vigil
Program Assistant II
O 303-866-3441 ext. 3250
1313 Sherman Street, Rm. 719, Denver, CO 80203
Dori.vigil@state.co.us / cwcb.state.co.com

STATE OF COLORADO

Department of Natural Resources

ORDER

Number: POGG1,PDAA,201900002728

Date: 2/27/19

Description:

PDAA 2500 WSRF UYWCD_CHAR OF STREAMFLOW_SED_NUTRIENT

Effective Date: 03/01/19

Expiration Date: 12/31/20

*****IMPORTANT*****

The order number and line number must appear on all invoices, packing slips, cartons, and correspondence.

BILL TO

COLORADO WATER BOARD CONSERVATION
1313 SHERMAN STREET, ROOM 718
DENVER, CO 80203

BUYER

Buyer:

Email:

VENDOR

UPPER YAMPA WATER CONSERVANCY DIST
PO BOX 775529
STEAMBOAT SPRINGS, CO 80477-5529

Contact: .

Phone: .

SHIP TO

COLORADO WATER BOARD CONSERVATION
1313 SHERMAN STREET, ROOM 718
DENVER, CO 80203

SHIPPING INSTRUCTIONS

Delivery/Install Date: -

FOB: FOB Ship Pt, Freight Allowed

VENDOR INSTRUCTIONS

EXTENDED DESCRIPTION

Line Item	Commodity/Item Code	UOM	QTY	Unit Cost	Total Cost	MSDS Req.
1	G1000		0	0.00	$77,424.00	☐

Description: PDAA 2500 WSRF UYWCD_CHAR OF STREAMFLOW_SED_NUTRIENT

Service From: 03/01/19 Service To: 12/31/20

TERMS AND CONDITIONS

https://www.colorado.gov/pacific/osc/small-dollar-grant-award-terms-conditions

DOCUMENT TOTAL = $77,424.00

Last Update: January 9, 2018

Colorado Water Conservation Board	
Water Supply Reserve Fund	
Exhibit A - Statement of Work	
Date:	**August 30, 2018**
Water Activity Name:	Characterization of Streamflow, Suspended Sediment, and Nutrients in the Upper Yampa River Basin
Grant Recipient:	**Upper Yampa Water Conservancy District**
Funding Source:	**Yampa/White/Green Basin Roundtable**

Water Activity Overview: (Please provide brief description of the proposed water activity (no more than 200 words). Include a description of the overall water activity and specifically what the WSRF funding will be used for.

The USGS, in cooperation with local stakeholders in the UYRB water community, proposes to characterize streamflow, suspended sediments, and nutrients using historic and more recently acquired water-quality data. Streamflow, suspended sediment, and nutrients have been prioritized by local stakeholders because of pending or existing regulations (CDPHE 2012 & 2014) and to better understand the potential causes of increased reports of prolific algal blooms in the UYRB, some of which have shown to be toxic. Investigations showing links between nutrients, sediment, and algae have been documented in several lakes and streams across the United States. Algal blooms potentially harbor toxins that can have an on effect aquatic and human health.

Objectives: (List the objectives of the project)

The project objectives include obtaining a better understanding of the causes of increased prolific algal occurrences in the Upper Yampa River watershed. Applying stream flow data to the past eight years of USGS water quality data collected at sampling sites in the basin will allow the USGS to create accurate nutrient and sediment loading models. This analysis is designed to provide new data and subsequent understanding of the transport and fate of nutrients and sediment as well as seasonal fluctuations at sites throughout the watershed. As part of this analysis, a comprehensive evaluation of potential loading sources will be undertaken. Water suppliers, wastewater treatment operators, recreational users, and the citizenry at large will benefit from this analysis. Water managers, including those in the agriculture industry, will be better able to make informed decisions as the dynamics of these important constituents are better understood. The full USGS study proposal including timeline and summary of costs are attached with this application.

Tasks
Provide a detailed description of each task using the following format:
Task 1 - Characterize streamflow timing, rate, and usage for the UYRB
Description of Task:

Tasks
An analysis of streamflow timing, rate, and usage will be done at 12 sites on the Yampa River and one Tributary to the Yampa River.
Method/Procedure:
Sites with partial or no streamflow gage record will be compared to sites with streamflow gages and record extension techniques (Granato, 2008) will be used to generate synthetic hydrographs and subsequent statistical summaries. Streamflow data will be apportioned into wet, dry, and average periods for analysis. Also considered will be the construction of impoundments or other physical structures that may impact post-construction streamflow characteristics.
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
These and other streamflow conditions will be used to help determine the impact that streamflow variability can have on water-quality concentrations (primarily nutrients). This may be particularly important in systems where decreasing trends in streamflow are observed. The streamflow gage analysis will also form the basis of the nutrient and sediment loading analysis described herein.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Summary report

Task 2 - Estimate trends in streamflow, suspended sediment, and nutrient loads and concentrations
Description of Task:
Review results of Task 1 and determine trends.
Method/Procedure:
Trends in flow and water-quality data As with the loading budgets, trends in streamflow and water-quality data will be assessed using trend Weighted Regressions on Time, Discharge, and Season (WRTDS) methods (Hirsch and others, 2010; Moyer, 2012). The method is designed to provide internally consistent estimates of the actual history of concentrations and loads as well as histories that eliminate the influence of year-to-year variations in streamflow. It employs the use of weighted regressions of concentrations on time, streamflow, and season. The method is designed to be useful as a diagnostic tool regarding the kinds of changes that are taking place in the watershed related to point sources, groundwater

sources, and surface-water nonpoint sources (Hirsch, 2010). This additional analysis will also be used to explore the timing and spatial patterns of observed seasonal and longer term trends. It is important to not only look at trends in annual data but also inter-annual data periods that may offset or be masked when looking at annual data. The trend analysis will contribute to the loading analysis by providing insight into which sites might be most important for understanding how land use affects the Yampa River
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
Data for next tasks.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Summary report.

Tasks
Task 3 - Develop a mass balance for suspended sediment and selected nutrients including total nitrogen and phosphorus as well as nitrate, nitrite, and orthophosphate
Description of Task:
Mass balance for select nutrients and total suspended solids will be calculated at the 12 sites where sufficient data are available.
Method/Procedure:
The mass of a given water-quality constituent is defined as the streamflow rate times the concentration of a given constituent times a conversion factor. Units for mass typically are in pounds or tons per day but can be converted to any units designating mass per time. Load calculations are useful for estimating source areas for a given water-quality constituent. This accounting enables land managers to identify regions of concern and assess suitable land management options. Loads for a given constituent can be calculated directly from sample data; however; regression techniques are generally preferred. Regression models derived from sample data typically need a period of continuous record (such as streamflow or specific conductance) that can be used as model input to estimate periods between sample events (Helsel and Hirsch, 2002). The continuous record is used to estimate concentrations and loads at a time step that exceeds the

Tasks
frequency of the sample data. Regression analysis produces a more complete picture of the variability of a given water-quality constituent as well as more accurate estimates of annual concentrations and loads. Weighted Regressions on Time, Discharge, and Season (WRTDS) methods (Hirsch, 2010) will be used to estimate loads at sites with sufficient data. Comparisons of loads among sites allows the user to determine what reaches of a river have the highest loads and when they typically occur. Concentration estimated from a regression model can be used to understand if and when standards are exceeded as well as help more accurately calculate percentiles or other statistical values used in regulatory or biological assessments. The sample site in Stagecoach reservoir will be evaluated for stratification or abundance of selected constituents including total dissolved solids, nutrients, field parameters and any available data associated with algal species (including blue green algae) and algal toxicity. The data will also be compared to historical data collected in Stagecoach just after the reservoir filled in the early 1990's. A comprehensive assessment of Stagecoach reservoir (Tobin, 1996) was conducted during construction of the reservoir which can serve as a baseline for which to compare historical and current data collection efforts.
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
The resulting models can be used to estimate loads during wet and dry periods. The calculations provide a more accurate estimate of loads relative to other sites with regression models. Sites can be compared in order to assess where and when the highest loading occurs.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Summary report.

Tasks
Task 4 - For the areas where trends are observed, provide an assessment of land use activities, population, and water consumption.
Description of Task:
Data permitting, an assessment of land use activities, population, and water consumption will be included at sites where trends are detected.

Last Update: January 9, 2018

Tasks
Method/Procedure:
Changes in land use, land cover, population, and water consumption will be obtained from the US Department of Agriculture's Geospatial Data Gateway (https://datagateway.nrcs.usda.gov/GDGOrder.aspx?order=QuickState) as well as from Maupin and Others (USGS,2014), Dieter (USGS,2017) and US Energy Balance Model Output (SSEBop) https://earlywarning.usgs.gov/useta/eta8dayhist.php, among others. The assessment of land use, population, and water consumption will be done through time to look for changes that might coincide with changes in water-quality (if any). For example, in the Grand Valley, near Grand Junction Colorado, salinity and streamflow decreased in several arroyos and washes as a result of land use transitioning from agricultural to residential and improvements to irrigation systems (Leib, 2008; Butler, 1997). The decreases in salinity concentration and streamflow coincided with an increase in population and no discernable change in water consumptive use. Improvements in water use efficiency was determined to be the reason why baseflow and salinity loads decreased The results of this study helped land managers in the Grand Valley better understand the potential effects of population growth and residential development on water quality. In addition to the hydrologic and land use assessments at the 9 UYRB sites, a climatic assessment will be done upstream of Stagecoach Reservoir if trends are detected at the inflow site (table 1, Yampa River above Stagecoach Reservoir). This region is of interest to stakeholders primarily because of the effects that land use and climate can potentially have on public water supplies (primarily regulatory concerns and toxicity associated with nuisance algal blooms). This assessment will help determine if observed changes in the hydrology or water-quality (if any) of this region resulted from anthropogenic and or climatic changes (or both). Climatic information is available from the National Oceanic and Atmospheric Administration (NOAA, https://www.ncdc.noaa.gov/climate-information) for use in characterizing historical variability in precipitation intensity, type, and timing. Regional comparisons of water-quality A general comparison of UYRB concentrations and loads for selected constituents will be made to provide context to the magnitude and environmental significance of the findings. Comparisons will be made and will take into account ancillary conditions like climate, population, and general land use types. Areas determined to be appropriate for this analysis will be compared to published water-quality or similar characterization reports. Geologic formations and parent material will also be considered during comparisons. Regions for comparison are not limited to the state of Colorado, but regions within Colorado will be looked at as a first step. Colorado will be prioritized primarily because of the similarity in Colorado water law as well regional similarities in

Tasks
climate. Results may indicate commonality and deviation from other similar systems. Depending on the outcome, land managers may use the analysis to identify better land use strategies, land use practices that are working well, and data gaps that could help better characterize and explain variations in water-quality and usage in the UY.
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
This analysis is intended to help land managers better identify land use practices that could be evaluated and potentially modified to benefit water-quality as well as identify land use types that tend to have less impact.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Summary report.
Task 5 – Draft Report
Description of Task:
USGS will provide a draft Scientific Investigations Report following the completion of Tasks 1-4. The report will contain discussion and findings related to: 1) The impact that streamflow variability can have on water-quality concentrations in the UYRB (primarily nutrients); 2) What sites (from the USGS UYRB sampling network) have the highest nutrient and sediment loads and when they typically occur; 3) Standard exceedances (for nutrients) as well as more accurate calculations of percentiles or other statistical values used in regulatory or biological assessments; 4) Newly acquired data in and near Stagecoach Reservoir; 5) Trends in streamflow, nutrients, and sediment at network sites in the UYRB; 6) Trends resulting from changes in land use, population, and water consumptive use (at sites where trends in streamflow and water quality are detected, data permitting); 7) Climatic impacts to the region upstream of Stagecoach Reservoir (if trends in streamflow or water quality are detected) and possible implications within

Tasks
Stagecoach Reservoir. 8) Comparisons of results from this study to results from other similar study's in the Western United States.
Method/Procedure:
USGS will prepare a draft report for peer review and stakeholder review.
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
Draft report.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Draft report.
Task 6 – Final Report
Description of Task:
USGS will provide a final printed Scientific Investigations Report following acceptance of stakeholder and peer review comments and associated revisions to the draft report.
Method/Procedure:
USGS will prepare a printed final report.
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
Final report (electronic and printed).
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Final report (electronic).
Task 7 – Project Administration/Coordination
Description of Task:
Provide day-to-day task oversight and grant administration duties to ensure project stays on point, on deadline and on budget. Submit required reports and paperwork to CWCB staff including invoices and required documentation.
Method/Procedure:

Last Update: January 9, 2018

Tasks
The UYWCD District Engineer and the UYRWG Coordinator will team up to accomplish this task throughout the project lifetime. The UYWCD has agreed to provide this service via a written contract with UYRWG on an in-kind basis. The UYRWC Coordinator will be paid a nominal fee.
Grantee Deliverable: (Describe the deliverable the grantee expects from this task)
Day to day task oversight and grant administration to ensure project stays on point, on deadline and on budget.
CWCB Deliverable: (Describe the deliverable the grantee will provide CWCB documenting the completion of this task)
Efficient and effective grant and project management including timely reporting and budget oversight.

Budget and Schedule
Exhibit B - Budget and Schedule: This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format. A separate excel formatted Budget is required for engineering costs to include rate and unit costs.

Reporting Requirements
Progress Reports: The grantee shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status of the tasks identified in the statement of work, including a description of any major issues that have occurred and any corrective action taken to address these issues. The CWCB may withhold reimbursement until satisfactory progress reports have been submitted.
Final Report: At completion of the project, the grantee shall provide the CWCB a Final Report on the grantee's letterhead that: • Summarizes the project and how the project was completed. • Describes any obstacles encountered, and how these obstacles were overcome. • Confirms that all matching commitments have been fulfilled. • Includes photographs, summaries of meetings and engineering reports/designs.

Payments
Payment will be made based on actual expenditures, must include invoices for all work completed and must be on grantee's letterhead. The request for payment must include a description of the work accomplished by task, an estimate of the percent completion for individual tasks and the entire Project in relation to the percentage of budget spent, identification of any major issues, and proposed or implemented corrective actions. The CWCB will pay the last 10% of the entire water activity budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the water activity and purchase order or contract will be closed without any further payment. Any entity that fails to complete a satisfactory Final Report and submit to CWCB within 90 days of the expiration of a purchase order or contract may be denied consideration for future funding of any type from CWCB.

Performance Requirements
Performance measures for this contract shall include the following: (a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as

Reporting Requirements
specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in Exhibit B. Per Grant Guidelines, the CWCB will pay out the last 10% of the budget when the final deliverable is completed to the satisfaction of CWCB staff. Once the final deliverable has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment. (b) Accountability: Per the Grant Guidelines full documentation of project progress must be submitted with each invoice for reimbursement. Grantee must confirm that all grant conditions have been complied with on each invoice. In addition, per the Grant Guidelines, Progress Reports must be submitted at least once every 6 months. A Final Report must be submitted and approved before final project payment. (c) Monitoring Requirements: Grantee is responsible for ongoing monitoring of project progress per Exhibit A. Progress shall be detailed in each invoice and in each Progress Report, as detailed above. Additional inspections or field consultations will be arranged as may be necessary. (d) Noncompliance Resolution: Payment will be withheld if grantee is not current on all grant conditions. Flagrant disregard for grant conditions will result in a stop work order and cancellation of the Grant Agreement.

Last Update: July 31, 2018

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Supply Reserve Fund
EXHIBIT B - BUDGET AND SCHEDULE

Date: August 30, 2018

Water Activity Name: Characterization of Streamflow, Suspended Sediment, and Nutrients in the Upper Yampa River Basin

Grantee Name: Upper Yampa River Watershed Group/Upper Yampa Water Conservancy District

Task No.[1]	Description	Start Date[2]	End Date	Matching Funds (cash & in-kind)[3]	WSRF Funds (Basin & Statewide combined)[3]	Total
1	Characterize streamflow timing, rate, and usage for the UYRB	March 1, 2019	June 30, 2019	$ 8,300.00	$ 7,900.00	$ 16,200.00
2	Estimate trends in streamflow, suspended sediment, and nutrient loads and concentrations	July 1, 2019	September 30, 2019	$ 9,400.00	$ 9,200.00	$ 18,600.00
3	Develop a mass balance for suspended sediment and selected nutrients including total nitrogen and phosphorus as well as nitrate, nitrite, and orthophosphate	October 1, 2019	March 31, 2020	$ 9,450.00	$ 8,980.00	$ 18,430.00
4	For the areas where trends are observed, provide an assessment of land use activities, population, and water consumption.	March 1, 2020	June 30, 2020	$ 13,500.00	$ 13,644.00	$ 27,144.00
5	Draft report/stakeholder & peer reviews	August, 2020	October, 2020	$ 12,750.00	$ 22,200.00	$ 34,950.00
6	Final Report	December, 2020	December, 2020	$ 8,676.00	$ 10,500.00	$ 19,176.00
7	Grant administration	March 1, 2019	December, 2020	$ 5,000.00	$ 5,000.00	$ 10,000.00
			Total	$67,076	$ 77,424.00	$ 144,500.00

(1) The single task that include costs for Grant Administration must provide a labor breakdown (see Indirect Costs tab below) where the total WSRF Grant contribution towards that task does not exceed 15% of the total WSRF Grant amount.

(2) Start Date for funding under $100K - 45 Days from Board Approval; Start Date for funding over $100K - 90 Days from Board Approval.

(3) Round values up to the nearest hundred dollars.

• Additional documentation providing a Detailed/Itemized Budget may be required for contracting. Applicants are encouraged to coordinate with the CWCB Project Manager to determine specifics.

• Reimbursement eligibility commences upon the grantee's receipt of a Notice to Proceed (NTP)

• NTP will not be accepted as a start date. Project activities may commence as soon as the grantee enters contract and receives formal signed State Agreement.

The CWCB will pay the last 10% of the entire water activity budget when the Final Report is completed to the satisfaction of the CWCB staff project manager. Once the Final Report has been accepted, the final payment has been issued, the water activity and purchase order (PO) or contract will be closed without any futher payment. Any entity that fails to complete a satisfactory Final Report and submit to the CWCB with 90 days of the expiration of the PO or contract may be denied consideration for future funding of any type from the CWCB.

• Additonally, the applicant shall provide a progress report every 6 months, beginning from the date of contract execution